A MULTI-PANEL ASSEMBLY

FIELD OF TECHNOLOGY

The present invention relates generally to a multi-panel assembly suitable for door, window or cabinet, in which the assembly is operable by sliding, hinged swinging and/or folding.

BACKGROUND OF THE INVENTION

A conventional hinged swing door or window encroaches on an entrance or exit space when opening or closing. For instance, a United States Patent Application Publication No. US 2004173324 A1 showed a door assembly having a conventional hinged connection about an axis of rotation. A conventional sliding door or window offers saving in space because they slide open rather than swing outwards, but it inevitably involves installation of sliding tracks. For instance, a United States Patent No. US 4611436 A disclosed a sliding door assembly. Aside from the above, there is also a slide-and-swing door or window assembly which combines the sliding and swinging concept to offer benefits from both operations. For example, United States Patent Application Publication No. US 2007119548 A1 disclosed a combination-action slide and hinge swinging door. Further, there is also a foldable door or window assembly which includes bi-folding configuration where it can open and close in a folding and sliding manner. For instance, a foldable door or window assembly is exemplified by Chinese Utility Model No. CN 221664566 U.

SUMMARY OF THE INVENTION

One object of the present invention is to provide a multi-panel assembly suitable for door, window or cabinet, in which the assemble is operable by sliding, hinged swinging and/or folding, as desired by a user.

At least one of the preceding aspects is met, in whole or in part, by the present invention, in which one of the embodiments of the present invention is a multi-panel assembly comprising: a frame provided with a top sliding track; a first panel configured with a hanging, rotatable roller coupled to the sliding track to provide a swivelling movement of the first panel relative to the sliding track; at least a second panel slidingly engaged with respect to the first panel by means of a sliding mechanism; and at least a third panel pivotally engaged with respect to the second panel.

Preferably, the assembly further comprises a handle positioned at the first, second and/or the third panel to enable an alternative operational choice by a user.

In certain embodiment, the assembly further comprises at least a locking mechanism to secure the position of any one of the panels. For instance, the locking mechanism can be positioned between the first and the second panel, and/or between the second and the third panel.

In one embodiment, the assembly is operable from a closed position to a partially open position by sliding the first panel against the second panel while the third panel remains closed.

In another embodiment, the assembly is operable from a closed position to a partially open position by pivotal movement of the third panel against the second panel while the first panel remains closed.

In another embodiment, the assembly is operable from a closed position to a fully open position by simultaneously sliding the first panel against the second panel and triggering a pivotal movement of the third panel against the second panel, in which the first panel meets with the folded second and third panels along the sliding track.

In the present invention, the sliding mechanism of the first and second panel comprises a plurality of wheels and sliding tracks.

Preferably, the sliding mechanism is provided at a top and at a bottom portion of the first and second panel.

More preferably, the wheels are provided by one of the panels and the sliding track is provided by the other of the panels.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated, although not limited, by the following description of embodiments made with reference to the accompanying drawings in which:

Figure 1 shows an exemplary door assembly of the present invention where the assembly is configured from a set of three panels (101, 102, 103).

Figure 2 shows a perspective view of an exemplary door assembly of the present invention.

Figure 3 shows a side view of an exemplary door assembly as seen from direction AA of Figure 2 or 4.

Figure 4 shows a partial view of the door assembly where the sliding mechanism is embedded within the panels (101, 102).

Figure 5 shows an exploded view of the sliding mechanism embedded between first (101) and second panel (102) in an assembly of the present invention.

Figure 6 shows an exemplary operation of an assembly of the present invention where the assembly is configured from a set of three panels (101, 102, 103), each of the panels operational in relative to one another to provide a sequence as shown in Figure 6(A) to (D).

Figure 7 shows another exemplary door assembly of the present invention where the assembly is configured from a set of three panels (101, 102, 103), each of the panels operational in relative to one another to provide another sequence as shown in Figure 7(A) to (D).

Figure 8 shows a top view of the assembly in a closed position i.e., Figure 6(A) and Figure 7(A).

Figure 9 (A) and (B) show a top view of the assembly correlating to Figure 7(B) and Figure 7(C).

Figure 10 shows an exemplary door assembly of the present invention where the assembly is configured from two sets of three panels (101, 102, 103 and 101', 102' and 103'), each of the panels operational in relative to one another to provide a sequence as shown in Figure 10(A) to (C).

Figure 11 shows a top view of the door assembly in a closed position.

DETAILED DESCRIPTION OF THE INVENTION

Exemplary, non-limiting embodiments of the invention will be disclosed. However, it is to be understood that limiting the description to the preferred embodiments of the invention is merely to facilitate discussion of the present invention and it is envisioned that those skilled in the art may devise various modifications without departing from the scope of the appended claim.

The present invention provides a multi-panel assembly suitable for door, window or cabinet, in which the assembly is operable by sliding, hinged swinging and/or folding, as desired by a user. According to Figure 1, the door assembly comprises a door frame (100); a first door panel (101), a second door panel (102) and a third door panel (103). It shall be understood that the dimension and material of the door frame are suitable for the dimension and the material of the door panels. Further, the door panels can be made of one or a combination of material. Each of the door panels may comprise of horizontal bars, vertical bars and a center panel. Preferably, the horizontal and vertical bars are made of metals, such as aluminum, but not limited thereto. Preferably, the center panel can be made of wood, plastic, glass, metal, or any other suitable material. The aforementioned bars and panel can be joined by suitable physical joint, welding and/or adhesive method known in the art.

According to Figure 1 and 2, the assembly comprises: a frame (100) provided with a top sliding track (109); a first panel (101) configured with a hanging, rotatable roller (104) coupled to the sliding track (109) to provide a swivelling movement of the first panel (100) relative to the sliding track (109); at least a second panel (102) slidingly engaged with respect to the first panel (101) by means of a sliding mechanism (107); and at least a third panel (103) pivotally engaged with respect to the second panel (102).

The assembly may further comprise a handle (not shown) positioned at the first, second and/or the third panel to enable an alternative operational choice or sequence by a user. In certain embodiment, the third panel (103) is further pivotally engaged with respect to the door frame (100) by means of hinges (112). In certain embodiment, the third panel (103) may be free from engagement with respect to the door frame (100), but pivotally engaged to the second panel (102) by means of hinges, such that an opening can be provided by swinging open the third panel (103) in relative to the second panel (102).

In certain embodiment according to Figure 2, the assembly further comprises at least a locking mechanism (108) to secure the position of any one of the panels. A user may determine which of the panels shall remain stationary in case of a desired operation. For instance, the locking mechanism can be positioned between the first and the second panel, and/or between the second and the third panel. Alternatively, the locking mechanism can be positioned between any one of the panels and the frame (100). The locking mechanism can be a magnet, or the like.

According to Figure 1 and 2, the frame (100) is formed by at least a horizontal rail (201) and at least a vertical rail (202). The horizontal rail (201) is configured to adapt the top sliding track (109). According to Figure 3, the rotatable roller (104) couples the top sliding track (109) from the frame (100) with the first panel (101) positioned underneath. Accordingly, as shown in Figure 8 and 9, the roller (104) is movable in-plane in relative to the top sliding track (109) to provide swiveling movement of the first (101) and second panels (102). On the other hand, the sliding mechanism (107) may move out-of-plane in relative to the top sliding track (109) during swiveling movement (see Figure 9) of the first (101) and second panels (102). Hence, it shall be understood that the rotatable roller (104) operate independently from the sliding mechanism (107) provided between the first (101) and second panel (102).

According to Figure 3 to 5, the sliding mechanism (107) of the first (101) and second panel (102) comprises a plurality of wheels (110) movable along a facing sliding track (111). According to Figure 1 and 2, the sliding mechanism (107) herein is embedded or concealed between the first (101) and second (102) panel of the assembly. According to Figure 5, the wheels are provided by one of the panels and the sliding track is provided by the other of the panels. To ensure stability and smooth sliding motion, the sliding mechanism (107) can be provided at a top and at a bottom portion of the first (101) and second panel (102). It shall be understood that the first (101) and second panel (102) are configured in shape and dimension to adapt the sliding mechanism (107).

In one aspect of the present invention, the assembly can be configured from a set of at least three panels (101, 102, 103) operational in relative to one another to provide multiple openings, such as those shown in Figure 6 and 7, but not limited thereto. Further, Figure 8 provides to a top view of Figure 6A and 7A (in closed position). According to Figure 6(A) to 6(D), the handle (not shown) is preferably positioned at the first panel (101) and the third panel (103) for ease of operation. Further, the third panel (103) is also pivotally engaged with respect to the door frame (100) by hinges (112). Further, there is a locking mechanism (108) between the second panel (102) and the third panel (103) to control the pivotal engagement between both panels. Accordingly, the assembly is operable from a closed position (A) to a partially open position (B) by sliding the first panel (101) against the second panel (102) while the third panel remains closed (103). Whenever necessary, the assembly is operable from the partially open position (B) to another partially open position (C) by unlocking the locking mechanism at the pivotal engagement between the second panel (102) and the third panel (103) hence folding the second panel (102) with the third panel (103). It shall be understood that the first panel (101) and the second panel (102) do not fold in relative to one another due to the presence of the sliding mechanism (107) between them, as seen from Figure 2.

In another aspect of the present invention (not shown), the handle (not shown) is preferably positioned at the third panel (103) for ease of operation. Further, there is a locking mechanism (108) between the first panel (101) and the second panel (102) to allow or disallow the sliding mechanism between both panels. Accordingly, the assembly is operable in another sequence, such as from a closed position to a partially open position by pivotal movement of the third panel (103) against the second panel (102) while the first panel (101) remains closed.

In another aspect of the present invention, the assembly can be configured from a set of at least three panels (101, 102, 103) operational in relative to one another to provide multiple

openings, such as those shown in Figure 7(A) to (D). The assembly is operable from a closed position to a fully open position by simultaneously sliding the first panel (101) against the second panel (102) and triggering a pivotal movement of the third panel (103) against the second panel, in which the first panel (101) meets with the folded second (102) and third panels (103) along the sliding track. For the purpose of understanding, Figure 9(A) and 9(B) are provided to show the top views of Figure 7(B) and 7(C), respectively. It shall be understood that the first panel (101) and the second panel (102) do not fold in relative to one another due to the presence of the sliding mechanism (107) between them, as seen from Figure 9(B).

In another aspect according to Figure 10 and 11, the assembly may comprise two sets of three panels (101, 102, 103 and 101', 102' and 103') to provide a double-sided configuration, such as a double-sided door assembly. The operations are similar to the assembly made of a set of 3 panels in the preceding description, each of the sets may vary in direction of movement and number of panels.

In another embodiment, the door assembly may further comprise a stopper (not shown) to prevent unintentional opening of the door. The stopper can be provided at the door frame to secure the assembly within the frame in a closed position. For example, the stopper can be a pair of magnets with one terminal positioned at the leg of the door frame and the other terminal positioned at the leg of the third panel.

The present invention may be embodied in other specific forms without departing from its essential characteristics. The described embodiments are to be considered in all aspects only as illustrative and not restrictive. The scope of the invention is therefore indicated by the appended claims rather than by the foregoing description. All changes, which come within the meaning and range of equivalency of the claims, are to be embraced within their scope.

CLAIMS

1. A multi-panel assembly suitable for door, window or cabinet comprising:
a frame (100) provided with a top sliding track (109);
a first panel (101) configured with a hanging, rotatable roller (104) coupled to the sliding track (109) to provide a swivelling movement of the first panel (101) relative to the sliding track (109);
at least a second panel (102) slidingly engaged with respect to the first panel (101) by means of a sliding mechanism (107); and
at least a third panel (103) pivotally engaged with respect to the second panel (102).

2. The assembly according to claim 1 further comprises a handle positioned at the first (101), second (102) and/or the third panel (103) to enable an alternative operational choice by a user.

3. The assembly according to claim 1 or 2 further comprises at least a locking mechanism (108) to secure the position of any one of the panels.

4. The assembly according to any one of claims 1 to 3 is operable from a closed position to a partially open position by sliding the first panel (101) against the second panel (102) while the third panel (103) remains closed.

5. The assembly according to any one of claims 1 to 3 is operable from a closed position to a partially open position by pivotal movement of the third panel (103) against the second panel (102) while the first panel (101) remains closed.

6. The assembly according to any one of claims 1 to 3 is operable from a closed position to a fully open position by simultaneously sliding the first panel (101) against the second panel (102) and triggering a pivotal movement of the third panel

(103) against the second panel (102), in which the first panel (101) meets with the folded second (102) and third panels (103) along the sliding track (109).

7. The assembly according to any one of the preceding claims, wherein the sliding mechanism (107) of the first (101) and second panel (102) comprises a plurality of wheels (110) and sliding tracks (111).

8. The assembly according to claim 7, wherein the sliding mechanism (107) is provided at a top and at a bottom portion of the first (101) and second panel (102).

9. The assembly according to claim 7 or 8, wherein the wheels (107) are provided by one of the panels and the sliding track (111) is provided by the other of the panels.