

A SHUTTER PANEL ASSEMBLY

FIELD OF INVENTION

- 5 The invention relates to a shutter panel assembly. More particularly, the invention relates to a shutter panel assembly with improved waterproof function.

BACKGROUND OF THE INVENTION

- 10 Shutter panel is a type of door formed by connecting together a plurality of slats or sub-panels, whereby the shutter panel is raised to open and lowered to close. Conventionally, shutter panel is used in commercial applications such as offices and banks or in industrial applications such as factories and warehouses. Additionally, shutter panel can be used in facilities such as the warehouses and loading bays to
15 provide fire protection such that damage to goods and products is minimized.

- Recently, shutter panel has been designed to provide waterproof capability by introducing gaskets or seals such that leakage of water through the shutter panel is minimized. For instance, China Registered Utility Model No. CN214943836U
20 discloses a roller shutter door unit that can be connected to another roller shutter door unit. The roller shutter door unit comprises a front panel, a rear panel, a top side, a bottom side, and two grooves, wherein each groove is disposed on the top side and the bottom side of the roller shutter door unit. Additionally, a connecting piece with two parallel cylindrical bodies connected by a flexible film is provided to be inserted into
25 the groove to connect two adjacent roller shutter door units. The connecting piece may prevent water leakage between the two adjacent roller shutter door units. Nonetheless, water leakage may occur at both distal ends of the roller shutter door units or at the bottom side of the roller shutter door unit which contacts the ground surface.

Accordingly, it would be desirable to provide a shutter panel assembly with improved waterproof capability. This invention provides a solution to the problem.

SUMMARY OF INVENTION

5

One objective of the invention is to provide a shutter panel assembly with improved waterproof capability. Particularly, the shutter panel assembly comprises a first resilient member disposed between sub-panels to form a watertight seal therebetween.

- 10 In a first aspect of the invention, there is provided a shutter panel assembly comprising a plurality of vertically stackable sub-panels, wherein each of the sub-panels comprises a body having a top end, a bottom end, and two opposing sides, wherein the top end has a first interlocking profile and the bottom end has a second interlocking profile complimentary to the first interlocking profile, and wherein the first interlocking profile
- 15 of a first sub-panel and the second interlocking profile of a second sub-panel are releasably interlocked with one another when the first and second sub-panels are vertically stacked; a first resilient member disposed between the first and second interlocking profiles to form a first watertight seal therebetween when the first and second sub-panels are vertically stacked; and means provided by the sub-panels to
- 20 retain the sub-panels, in use, within guide means.

Preferably, the means provided by the sub-panels to retain the sub-panel is one or more flanges extended outwardly from at least one side of the body for preventing detachment of the sub-panel from one or more guide means.

25

Preferably, the first interlocking profile and the second interlocking profile are selected from a group of interlocking profiles consisting of a groove that extends longitudinally along the top end or the bottom end and a tongue member that extends longitudinally along the top end or the bottom end.

Preferably, the guide means is a guide rail disposed at one of the two opposing sides for slidably receiving the sub-panels through the flanges to provide guided movement of the shutter panel along the guide rail such that the shutter panel moves between an open
5 position where the guide rail is unoccupied or partially occupied by the shutter panel and a closed position where the guide rail is fully occupied by the shutter panel.

Preferably, the guide rail comprises a generally U-shaped body, at least one slot portion disposed at an inner surface of the generally U-shaped body for receiving a second
10 resilient member such that the second resilient member engages with the sub-panels to form a second watertight seal, and a pair of opposing protrusion members disposed at the inner surface of the generally U-shaped body for engaging with the flange to prevent the sub-panels from derailing from the guide rail.

15 Preferably, the guide rail further comprises a fastening member opposing to the slot portion configured to tighten the sub-panels and the second resilient member to form the second watertight seal.

In a second aspect of the invention, there is provided a third resilient member disposed
20 at the first interlocking profile or the second interlocking profile of a first or a final sub-panel to form a third watertight seal when the shutter panel is in the closed position.

In a third aspect of the invention, there is provided a shutter panel assembly comprising a plurality of vertically stackable sub-panels, wherein each of the sub-panels comprises
25 a body having a top end, a bottom end, and two opposing sides, wherein the top end has a first interlocking profile and the bottom end has a second interlocking profile complimentary to the first interlocking profile, and wherein the first interlocking profile of a first sub-panel and the second interlocking profile of a second sub-panel are releasably interlocked with one another when the first and second sub-panels are

vertically stacked, a first resilient member disposed between the first and second interlocking profiles to form a first watertight seal therebetween when the first and second sub-panels are vertically stacked, and means provided by the sub-panels to retain the sub-panels within a guide rail, wherein the guide rail is disposed at one of the two opposing sides for slidably receiving the sub-panels through the means provided by the sub-panels to retain the sub-panels within the guide rail to provide guided movement of the shutter panel along the guide rail such that the shutter panel moves between an open position where the guide rail is unoccupied or partially occupied by the shutter panel and a closed position where the guide rail is fully occupied by the shutter panel.

One skilled in the art will readily appreciate that the invention is well adapted to carry out the objects and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments described herein are not intended as limitations on the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawing the preferred embodiments from an inspection of which when considered in connection with the following description, the invention, its construction and operation and many of its advantages would be readily understood and appreciated.

Fig. 1A is a schematic diagram illustrating a disassembled side view of a preferred embodiment of a shutter panel assembly.

Fig. 1B is a schematic diagram illustrating an assembled side view of the preferred embodiment of the shutter panel assembly.

Fig. 2A is a schematic diagram illustrating a disassembled side view of another embodiment of the shutter panel assembly.

5 Fig. 2B is a schematic diagram illustrating an assembled side view of the other embodiment of the shutter panel assembly.

Fig. 2C is a schematic diagram illustrating a side plate having flanges.

10 Fig. 3A is a schematic diagram illustrating a top view of an embodiment of guide means.

Fig. 3B is a schematic diagram illustrating a top view of another embodiment of the guide means.

15

DETAILED DESCRIPTION OF THE INVENTION

The invention will now be described in greater detail, by way of example, with reference to the drawings.

20

A shutter panel assembly (100) is illustrated in Fig. 1. Particularly, Fig. 1A illustrates a disassembled view of the shutter panel assembly (100) while Fig. 1B illustrates an assembled view of the shutter panel assembly (100). The shutter panel assembly (100) may be used in commercial applications such as offices and banks or in industrial applications such as factories and warehouses. In a preferred embodiment of the invention, the shutter panel assembly (100) generally comprises a plurality of vertically stackable sub-panels (101), a first resilient member (104), and means provided by the sub-panels (101) to retain the sub-panels (101), in use, within guide means.

25

In the preferred embodiment of the invention, each of the sub-panels (101) comprises a body having a top end, a bottom end, and two opposing sides. Preferably, the body of the sub-panel (101) is an elongated strip-shaped structure made from ferrous metal such as steel and cast iron or non-ferrous metal such as aluminium and copper. Preferably, 5 the top end has a first interlocking profile (102) and the bottom end has a second interlocking profile (103) complimentary to the first interlocking profile (102), wherein the first interlocking profile (102) of a first sub-panel (101) and the second interlocking profile (103) of a second sub-panel (101) are releasably interlocked with one another when the first and second sub-panels (101) are vertically stacked. More preferably, the 10 first interlocking profile (102) and the second interlocking profile (103) are selected from a group of interlocking profiles consisting of a groove that extends longitudinally along the top end or the bottom end and a tongue member that extends longitudinally along the top end or the bottom end. Most preferably, the first interlocking profile (102) is a tongue member that extends longitudinally along the top end of the sub-panel (101) 15 and the second interlocking profile (103) is a groove that extends longitudinally along the bottom end of the sub-panel (101).

The interlock between the first and second interlocking profiles (102, 103) may result in water leakage due to presence of a gap therebetween. Advantageously, the first 20 resilient member (104) is provided to prevent water leakage through the gap. Preferably, the first resilient member (104) is disposed between the first and second interlocking profiles (102, 103) to form a first watertight seal therebetween when the first and second sub-panels (101) are vertically stacked. By way of example, the first resilient member (104) can be made of elastomeric materials such as natural rubber, styrene-butadiene 25 rubber, and silicone elastomers.

In the preferred embodiment of the invention, the means (105) provided by the sub-panels (101) to retain the sub-panels (101) is one or more flanges (105). Preferably, the flanges (105) extend outwardly from at least one side of the body for preventing

detachment of the sub-panel (101) from one or more guide means. More preferably, the flanges (105) extend outwardly from both sides of the body for preventing detachment of the sub-panel (101) from the one or more guide means. Preferably, the flanges (105) extend longitudinally along both sides of the body. Fig. 2 illustrates another embodiment of the shutter panel assembly (100). Particularly, Fig. 2A illustrates a disassembled view of the shutter panel assembly (100) while Fig. 2B illustrates an assembled view of the shutter panel assembly (100). The shutter panel assembly (100) may comprise a side plate (200) having the one or more flanges (105) as illustrated in Fig. 2C. Preferably, the side plate (200) is releasably connected to at least one side of the body, wherein the flanges (105) extend outwardly from both sides of the side plate (200) for preventing detachment of the sub-panel (101) from the one or more guide means. Preferably, the flanges (105) extend longitudinally along both sides of the side plate (200). The side plate (200) can be releasably connected to the side of the body using fastening means such as screws. Alternatively, the means (105) provided by the sub-panels (101) to retain the sub-panels (101) can be a plurality of roller members disposed at both sides of the body.

In a further embodiment of the invention as illustrated in Fig. 3, the guide means is a guide rail (300). Preferably, the guide rail (300) is disposed at one of the two opposing sides for slidably receiving the sub-panels (101) through the flanges (105) to provide guided movement of the shutter panel along the guide rail (300) such that the shutter panel moves between an open position where the guide rail (300) is unoccupied or partially occupied by the shutter panel and a closed position where the guide rail (300) is fully occupied by the shutter panel. Alternatively, the guide rail may comprise an internal track rail to receive the roller member. When in use, the roller members move along the internal track rail to facilitate the movement of the shutter panel along the guide rail (300). Optionally, the guide rail (300) can be disposed at the two opposing sides. Preferably, the guide rail (300) can be made from ferrous metal such as steel and cast iron or non-ferrous metal such as aluminium and copper.

Preferably, the guide rail (300) comprises a generally U-shaped body, at least one slot portion (301) disposed at an inner surface of the generally U-shaped body, and a pair of opposing protrusion members (303) disposed at the inner surface of the generally U-shaped body. Referring to Fig. 3A, the slot portion (301) is disposed at one side of the inner surface of the generally U-shaped body for receiving a second resilient member (302). Preferably, the slot portion (301) extends longitudinally along the inner surface of the generally U-shaped body. The second resilient member (302) preferably comprises an elongated strip-shaped body complimentary to the slot portion (301).

When the sub-panel (101) is slidably received by the guide rail (300), a gap is formed therebetween. Therefore, the second resilient member (302) in the slot portion (301) engages with the sub-panels (101) to form a second watertight seal between the sub-panel (101) and the guide rail (300). Upon engagement, the second resilient member (302) is sandwiched between the sub-panel (101) and the guide rail (300) for sealing the gap therebetween. Advantageously, such configuration prevents water leakage through the gap between the sub-panel (101) and the guide rail (300). By way of example, the second resilient member (302) can be made of elastomeric materials such as natural rubber, styrene-butadiene rubber, and silicone elastomers. Additionally, the pair of opposing protrusion members (303) engages with the flanges (105) to prevent the sub-panels (101) from derailing from the guide rail (300). The flanges (105) have a width greater than a distance between the pair of opposing protrusion members (303) such that the sub-panels (101) are retained in the guide rail (300), thereby preventing derailment of the sub-panels (101) from the guide rail (300). Alternatively, the pair of opposing protrusion members (303) engages with the roller members to prevent the sub-panels (101) from derailing from the guide rail (300). Optionally, the guide rail (300) comprises multiple pairs of opposing protrusion member (303) disposed at the inner surface of the generally U-shaped body. This allows the sub-panels (101) to be received at different depth of the guide rail based on the engagement between the flanges (105) and one of the multiple pairs of opposing protrusion member (303).

Referring to Fig. 3A, the guide rail (300) preferably comprises a fastening member (304) opposing to the slot portion (301). The fastening member (304) is configured to tighten the sub-panel (101) and the second resilient member (302) to form the second watertight seal. When fastened, the fastening member (304) pushes the sub-panel (101) towards the second resilient member (302) such that the sub-panel (101) and the second resilient member (302) are tightened. Preferably, the fastening member (304) comprises an eye bolt and a nut. Alternatively, the fastening member (304) is an electrical pusher that is powered by a motor. Alternatively, the fastening member (304) may be replaced with another slot portion (301), as illustrated in Fig. 3B. In this configuration, two opposing second watertight seals are formed between the sub-panel (101) and the guide rails (300) to improve waterproof capability.

Referring to Fig. 1 and Fig. 2, the shutter panel assembly (100) further comprises a third resilient member (106) disposed at the first interlocking profile (102) or the second interlocking profile (103) of a first or a final sub-panel (101). When in use, the third resilient member (106) contacts a ground surface when the shutter panel is in the closed position, thereby forming a third watertight seal therebetween. By way of example, the third resilient member (106) can be made of elastomeric materials such as natural rubber, styrene-butadiene rubber, and silicone elastomers.

The present invention further provides a shutter panel assembly (100) including a guide rail (300). The shutter panel assembly (100) generally comprises a plurality of vertically stackable sub-panels (101), a first resilient member (104), and means (105) provided by the sub-panels (101) to retain the sub-panels (101) within the guide rail (300). Preferably, each of the sub-panels (101) comprises a body having a top end, a bottom end, and two opposing sides, wherein the top end has a first interlocking profile (102) and the bottom end has a second interlocking profile (103) complimentary to the first interlocking profile (102), and wherein the first interlocking profile (102) of a first sub-

panel (101) and the second interlocking profile (103) of a second sub-panel (101) are releasably interlocked with one another when the first and second sub-panels (101) are vertically stacked. Preferably, the first resilient member (104) disposed between the first and second interlocking profiles (102, 103) to form a first watertight seal
5 therebetween when the first and second sub-panels (101) are vertically stacked. Preferably, the guide rail (300) is disposed at one of the two opposing sides for slidably receiving the sub-panels (101) through the means (105) provided by the sub-panels (101) to retain the sub-panels (101) within a guide rail (300) to provide guided movement of the shutter panel along the guide rail (300) such that the shutter panel
10 moves between an open position where the guide rail (300) is unoccupied or partially occupied by the shutter panel and a closed position where the guide rail (300) is fully occupied by the shutter panel.

The present disclosure includes as contained in the appended claims, as well as that of
15 the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

CLAIMS

1. A shutter panel assembly (100) comprising:
a plurality of vertically stackable sub-panels (101), wherein each of the sub-panels
5 (101) comprises a body having a top end, a bottom end, and two opposing sides,
wherein the top end has a first interlocking profile (102) and the bottom end has a
second interlocking profile (103) complimentary to the first interlocking profile
(102), and wherein the first interlocking profile (102) of a first sub-panel (101) and
the second interlocking profile (103) of a second sub-panel (101) are releasably
10 interlocked with one another when the first and second sub-panels (101) are
vertically stacked;
a first resilient member (104) disposed between the first and second interlocking
profiles (102, 103) to form a first watertight seal therebetween when the first and
second sub-panels (101) are vertically stacked; and
15 means (105) provided by the sub-panels (101) to retain the sub-panels (101), in use,
within guide means.
2. The shutter panel assembly (100) according to claim 1, wherein the means (105)
provided by the sub-panels (101) to retain the sub-panel (101) is one or more flanges
20 (105) extended outwardly from at least one side of the body for preventing detachment
of the sub-panel (101) from one or more guide means.
3. The shutter panel assembly (100) according to claim 1, wherein the first interlocking
profile (102) and the second interlocking profile (103) are selected from a group of
25 interlocking profiles consisting of a groove that extends longitudinally along the top
end or the bottom end and a tongue member that extends longitudinally along the top
end or the bottom end.
4. The shutter panel assembly (100) according to claim 1 or claim 2, wherein the guide

means is a guide rail (300) disposed at one of the two opposing sides for slidably receiving the sub-panels (101) through the flanges (105) to provide guided movement of the shutter panel along the guide rail (300) such that the shutter panel moves between an open position where the guide rail (300) is unoccupied or partially occupied by the shutter panel and a closed position where the guide rail (300) is fully occupied by the shutter panel.

5 The shutter panel assembly (100) according to claim 4, wherein the guide rail (300) comprises a generally U-shaped body, at least one slot portion (301) disposed at an inner surface of the generally U-shaped body for receiving a second resilient member (302) such that the second resilient member (302) engages with the sub-panels (101) to form a second watertight seal, and a pair of opposing protrusion members (303) disposed at the inner surface of the generally U-shaped body for engaging with the flange (105) to prevent the sub-panels (101) from derailing from the guide rail (300).

15

6. The shutter panel assembly (100) according to claim 5, wherein the guide rail (300) further comprises a fastening member (304) opposing to the slot portion (301) configured to tighten the sub-panels (101) and the second resilient member (302) to form the second watertight seal.

20

7. The shutter panel assembly (100) according to any one of claims 4 to 6, further comprising a third resilient member (106) disposed at the first interlocking profile (102) or the second interlocking profile (103) of a first or a final sub-panel (101) to form a third watertight seal when the shutter panel is in the closed position.

25

8. A shutter panel assembly (100) comprising:
a plurality of vertically stackable sub-panels (101), wherein each of the sub-panels (101) comprises a body having a top end, a bottom end, and two opposing sides, wherein the top end has a first interlocking profile (102) and the bottom end has a

second interlocking profile (103) complimentary to the first interlocking profile (102), and wherein the first interlocking profile (102) of a first sub-panel (101) and the second interlocking profile (103) of a second sub-panel (101) are releasably interlocked with one another when the first and second sub-panels (101) are
5 vertically stacked;
a first resilient member (104) disposed between the first and second interlocking profiles (102, 103) to form a first watertight seal therebetween when the first and second sub-panels (101) are vertically stacked; and
means (105) provided by the sub-panels (101) to retain the sub-panels (101) within a
10 guide rail (300), wherein the guide rail (300) is disposed at one of the two opposing sides for slidably receiving the sub-panels (101) through the means provided by the sub-panels (101) to retain the sub-panels (101) within the guide rail (300) to provide guided movement of the shutter panel along the guide rail (300) such that the shutter panel moves between an open position where the guide rail (300) is unoccupied or
15 partially occupied by the shutter panel and a closed position where the guide rail (300) is fully occupied by the shutter panel.