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A CURTAIN WALL SYSTEM

The invention relates to a curtain wall system, and in particular, a system for installing a curtain wall on a building.

Conventional curtain walls are generally installed using one of two systems. The first system is to install all the horizontal supports and the mullions (i.e. the vertical members separating adjacent panels) on to the outside of the building, and then subsequently to attach the panels to the framework formed by the horizontal supports and mullions. This system has the disadvantage of requiring the mullions to be bolted to the building and/or the horizontal supports and the panels are then usually bolted to the mullions and the horizontal supports. Accordingly, this system requires a substantial amount of work on the exterior of the building in order to install the curtain wall.

The second type of system in common use comprises prefabricated frames which are mounted on the external surface of the building. These require to be bolted together after installation. In addition, although the prefabricated frames are mounted on rails it is not possible to slide the panels on the rails after they have been mounted on the rail due to the use of a gasket on the rail. In addition, it is still necessary to bolt the individual prefabricated frames together.

In accordance with a first aspect of the present invention, a curtain wall system comprises a first support member, a second support member and a number of panel members, each panel member being adapted to engage with the first support member at one edge and to engage with the second support member at an opposite edge to mount the panel member on the



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first and second support members, and the panel members being adapted to be moved linearly on the support members after being mounted thereon.

In accordance with a second aspect of the present invention, a method of installing a curtain wall on a building, comprises installing a first support member on a first supporting structure of the building, installing a second support member on a second supporting structure of the building, the first and second supporting structures being spaced vertically from each other and the first and second support members being installed substantially parallel to each other, and engaging opposite edges of a panel member with the respective first and second support members and subsequently moving the panel member along the support members to a desired position on the support members.

An advantage of the invention is that by having panel members which are adapted to engage with the support members and subsequently be moved along the support members, it is possible to have a curtain wall system which does not require the panel members to be bolted to each other or to the support members.

Preferably, the system further comprises a number of longitudinal supporting members, each longitudinal supporting member being adapted to engage with the first and second support members at respective opposite ends of the longitudinal supporting member, the longitudinal supporting members also being adapted to be moved linearly along the support members after being engaged with the support members.

Preferably, the longitudinal supporting members separate adjacent panels from each other. Typically, the

longitudinal supporting members engage with an edge of each adjacent panel to help support the panels.

Preferably, the panels are installed by inserting a first edge onto the first support member and moving the panel towards the first support member and then engaging a second opposite edge of the panel with the second support member. Typically, after the panel is engaged with and moved towards the first support member, the panel is pivoted into alignment with second support member and then moved towards the second support member so that the second opposite edge engages with the second support member. Preferably, the first support member is located vertically above the second support member, so that the panel rests on the second support member after being installed on the support members.

Preferably, the first and second support members are generally in the form of rails along which the panel members may be moved.

Typically, the panel members may support a glazed unit which, for example, may be single glazed or double glazed. Alternatively, the panel members may form cladding for a building, such as aluminium plate or stone facing.

An example of a curtain wall system in accordance with the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a cross-sectional view through two adjacent structural double glazed panel members interconnected by a first example of a mullion;
Figure 2 is a cross-sectional view through two adjacent structural double glazed panel members interconnected by a first example of a guide rail;

Figure 3 is a cross-sectional view showing installation of the panels shown in Figures 1 and 2; Figure 4 is a cross-sectional view showing the panels of Figures 1 and 2 after installation; Figure 5 shows a structural double glazed panel being engaged with the first mullion and a supporting wall; Figure 6 shows the panel of Figure 5 after engagement with the supporting wall and the first mullion and another structural double glazed panel to be engaged with the mullion; Figure 7 is a schematic diagram showing the general principle of installation of the curtain wall system in accordance with the invention; Figure 8 is a cross-sectional view through a vertical inner corner support member with two structural double glazed panels engaged with the support member; Figure 9 is a cross-sectional view of a vertical outer corner support member with two structural double glazed panels engaged with the support member; Figure 10 is a cross-sectional view through the first mullion engaged with two structural single glazed panel members; Figure 11 is a cross-sectional view through the first guide rail engaged with two panel members of the type shown in Figure 10; Figure 12 is a cross-sectional view through the first mullion engaged with two single glazed frame panel members; Figure 13 is a cross-sectional view through the first guide rail engaged with two panel members of the type shown in Figure 12; Figure 14 is a cross-sectional view through the first mullion engaged with two double glazed frame panel members; Figure 15 is a cross-sectional view through the first guide rail engaged with two panels of the type shown

in Figure 14;

Figure 16 is a cross-sectional view through a second example of a mullion engaged with two aluminium cladding panels;

Figure 17 is a cross-sectional view through a second example of a guide rail engaged with two cladding panels of the type shown in Figure 16;

Figure 18 is a cross-sectional view through the second mullion engaged with two stone cladding panel members;

Figure 19 is a cross-sectional view through the second guide rail engaged with two panels of the type shown in Figure 18;

Figure 20 is a cross-sectional view of the first mullion engaged with two structural double glazed panel members having a thermal break; and

Figure 21 is a cross-sectional view through the first guide rail engaged with two panel members of the type shown in Figure 20.

Figure 1 shows a cross-sectional view through a longitudinal supporting member in the form of a mullion 1. The mullion 1 has a box section portion from which extends an engagement portion 2 having two engagement arms 3, 4.

In addition, the mullion 1 includes two seal members 5 and a cover plate 6 which engage in recesses formed in the mullion 1. The engagement arms 3 and 4 each engage with an engagement slot formation 7 formed along a vertical edge of panel members 8. The panel members 8 are structural double glazed panels and each include a side and top frame portions 9 and a lower frame portion 27 (see Figure 2). The slot formations 7 is formed in the side and top frame portions 9. Double glazed units 10 are mounted on the frame portions 9 by sealant 11, structural sealant 12 and a seal member 13.

The engagement arms 3, 4 are shaped with a head profile 14 which elastically distort slot formation 7 when pressed into the slot formation 7 and the slot formation 7 closes behind the head profile 14 to engage against a neck profile 15 on the engagement arms 3, 4. The seals 5 provide a seal between the mullion 1 and the panels 8.

Figure 2 shows a horizontal support member in the form of a guide rail 20 which is attached to a supporting structure (typically, the floor of a building) 21 by a right angle bracket 22 via bolts 23, 24. The horizontal support member 20 has two upper projecting arms 25 and a lower projecting arm 26. The lower frame portion 27 comprises two slots defined by central portion 29 and two side portions 30, 31 into which the upper projecting arms 25 are located. The lower projecting arm 26 engages with slot 7 in the top frame portion 9. In addition, the panels 8 also include a support block 28 along the inside of the lower frame portion 27 which helps supports the glazing unit 10 on the lower frame portion 27.

Installation of the panels 8 and the mullions 1 onto the guide rails 20 to form a curtain wall for a building is shown in Figures 3 to 7. As shown in Figure 7, first of all the guide rails 20 are installed on the edge of each floor 21 of the building using brackets 22 and bolts 23, 24. Each panel 8 is then lifted using a hoist 40 from a horizontal position on floor 21 into a substantially vertical orientation. As shown in Figure 3, the slot formation 7 in the upper frame portion 9 of the panel 8 is engaged with the lower projecting arm 26 of the guide rail 20 at an angle to the vertical. This is facilitated by the curved form of slot formation 7. The panel 8 is then lifted upwards in the direction of arrow 41 until the slot formation 7 is adjacent the upper end of the lower support member 26.

In this position, the panel 8 can be pivoted towards vertical. In this position, the lower frame 27 is positioned above the upper projecting arms 25. The panel 8 can then be lowered onto the projecting arms 25 such that projecting arms 25 engage with the slots defined by the central portion 29 and side portions 30, 31, so that the lower frame 27 rests on the projection arms 25, as shown in Figure 4. After the first panel has been installed, the panel 8 may be moved along the guide rails 20 towards, for example, an end wall 42 (see Figure 5) which includes a supporting bracket 43, until the slot formation 7 in the side frame portion 9 engages with an engagement arm 44 of the support bracket 43.

The mullion 1 has a similar upper and lower profile to the panels 8 and is installed on the guide rails 20 in a similar manner to the panels 8. After the mullion 1 is installed on the guide rails 20, the mullion 1 may be slid along the guide rails 20 so that arm 4 engages with the slot formation 7 in the other side of the panel 8 (see Figures 5 and 6). Another panel 8 can then be slid towards the mullion 1 to engage with the other projecting arm 3 of the mullion 1 so that both panels 8 are engaged with the mullion 1.

After the panel 8 has been engaged with the support bracket 44, a seal member and sealant is applied to the gap between the edge of the panel 8 and wall 42 to seal the gap.

Typically, the curtain wall on one floor is installed by first installing all the panels 8 and then installing each of the mullions 1 after all the panels 8 have been installed. The panels and mullions can then be adjusted to the correct positions and the sliding facility and the length of arms 3, 4 and the depth of the slot formations 7 permits adjustment to take into account tolerances in the

dimensions of the building. Cover plates (not shown) are then inserted over the mullions and between the adjacent panels in order to lock the panels in position and prevent further movement.

One of the advantages of the system is that the panels and mullions may be moved manually to any position on the guide rails 20 without requiring specialist tools nor requiring fasteners, such as bolts or screws, to fix the panels or mullions to the guide rails 20. Hence, the invention has the advantage of permitting adjustment between the panels to take into account manufacturing tolerances both in the panels and the mullions and also in the dimensions of the building.

If it is necessary for the panels to extend around a corner, support members may be utilised such as shown in Figures 8 and 9. Figure 8 shows an inner corner support member 50 with two panels 8 installed thereon. Figure 9 shows an outer corner support member 51 also with two panels 8 installed thereon.

Although the curtain wall system and installation described above has been performed using structural double glazed panels 8, a similar system may be used for structural single glazed panels, single glazed frame panels, double glazed frame panels, thermal break double glazed panels and cladding panels, such as aluminium cladding panels or stone cladding panels.

Figures 10 and 11 show an example of a curtain wall system using structural single glazed panels 60. It should be noted that the mullion 1 and guide rail 20 are identical to the mullion 1 and guide rail 20 shown in Figures 1 and 2. The only difference is in the structure of the panels 60. In the panels 60, glazing 61 is mounted on side and upper

frame portions 62 and a lower panel frame portion 63. The frame portions 62, 63 are substantially similar to the frame portions 9, 27 especially with respect to the manner in which the frame portion 62, 63 engage with the mullion 1 and guide rail 20.

Figures 12 and 13 show a single glazed frame panel 65 and the manner in which the single panels 65 are mounted on the mullion 1 and guide rail 20 is identical to the manner in which the panels 8 are mounted on the mullion 1 and guide rail 20.

Figures 14 and 15 show double glazed frame panels 66 and show that the panels 66 are mounted on the mullion 1 and guide rails in an identical manner to the manner in which the panels 8 are mounted on the mullion 1 and guide rail 20.

Figures 16 and 17 show aluminium cladding panels 67 mounted on a mullion 68 and a guide rail 69. Although the mullion 68 and the guide rail 69 differ slightly from the mullion 1 and guide rail 20, respectively, the manner in which the panels 67 are mounted on the mullion 68 and guide rails 69 is identical to the manner in which the panels 8 are mounted on the mullion 1 and guide rail 20.

Figures 18 and 19 show stone cladding panels 70 mounted on the mullion 68 and guide rail 69. As with the panels 67, the panels 70 are mounted on the mullion 68 and guide rail 69 in the same manner in which the panels 8 are mounted on the mullion 1 and guide rail 20.

Figures 20 and 21 show structural double glazed panels including a thermal break for providing thermal insulation. The thermal break is provided by thermal isolation elements 72, 73, 74 and 75 which engage between upper and lower

edges of adjacent panels 71. However, the panels 70 are mounted on the mullion 1 and guide rail 20 in the same manner as the panels 8 are mounted on the mullion 1 and guide rail 20.

Claims

1. A curtain wall system comprising a first support member, a second support member, a number of panel members, and a number of longitudinal supporting members; each panel member being adapted to engage with the first support member at one edge and to engage with the second support member at an opposite edge to mount the panel member on the first and second support members, and each longitudinal supporting member being adapted to engage with the first and second support members at respective opposite ends of the longitudinal supporting member, and the panel members and the longitudinal supporting members being adapted to be moved linearly along the support members after being engaged with the support members.

2. A system according to claim 1, wherein each longitudinal supporting member is adapted to engage with two adjacent panel members.

3. A system according to claim 2, wherein the longitudinal support members engage with the panel members by means of a slot formed in one of the longitudinal supporting members and the panel members and a tongue formed on the other of the longitudinal supporting members and the panel members, the tongue being adapted to be inserted into the slot.

4. A system according to claim 2 or claim 3, wherein adjustment means is provided to facilitate adjustment of the separation of the panel members after the panel members have been engaged with the longitudinal supporting members.

5. A system according to claim 4 when dependent on claim 4, wherein the adjustment means is provided by the depth of the slot and the length of the tongue.

6. A system according to any of the preceding claims, wherein the first and second support members are generally in the form of rails along which the panel members may be moved.

7. A method of installing a curtain wall on a building comprising installing a first support member on a first supporting structure of the building, installing a second support member on a second supporting structure of the building, the first and second supporting structures being spaced vertically from each other and the first and second support members being installed substantially parallel to each other, engaging opposite edges of a panel member with the respective first and second support members and engaging opposite ends of a longitudinal supporting member with the respective first and second support members, and linearly moving the panel member and the longitudinal supporting member along the support members to desired positions on the support members in which the longitudinal supporting member engages with the panel member.

8. A method according to claim 7, wherein a number of panel members and a number of longitudinal supporting members are engaged with the first and second support members, each longitudinal supporting member being engaged with the first and second support members between two adjacent panel members.

9. A method according to claim 8, wherein the longitudinal supporting members separate two adjacent panel members from each other.

10. A method according to any of claims 7 to 9, wherein the panel members are installed by inserting a first edge onto the first support member and moving the panel towards the first support member and then engaging a second opposite edge of the panel member with the second support member.

11. A method according to claim 10, wherein after the panel member is engaged with and moved towards the first support member, the panel member is pivoted into alignment with the second support member and then moved towards the second support member so that the second opposite edge engages with the second support member.

12. A method according to any of claims 7 to 11, wherein the first support member is located vertically above the second support member, so that the panel member rests on the second support member after being installed on the support members.