

STRUCTURAL ASSEMBLIES FOR BUILDING CONSTRUCTION

FIELD OF THE INVENTION

[001] The present invention is in the field of building construction. In particular, the present invention relates to the manufacturing and fitting of sub-frames for doors and windows.

BACKGROUND OF THE INVENTION

[002] A sub-frame is a structural component in a construction site, and often used for structures such as doors or windows. Such sub-frames are discrete, separate structures that are mounted within an outer frame or unit body to and configured to support the outer frame. Typically, sub-frames are used as an intermediate structural support between the outer frame (that supports a door or a window) and the brick mortar.

[003] Traditionally, sub-frames have been manufactured from timber. However, such timber sub-frames have certain disadvantages. For example, the timber sub-frames are vulnerable to moisture and other pests that may eventually degrade the whole sub-frame and thereby make the outer frame and the whole door or window assembly unstable. Further, during re-use of outer frames, for example, during the change of the outer frame, timber sub-frames are limited by their ability to sustain re-use. For example, repeated holes made to the sub-frame may weaken them after each re-use.

[004] Present day timber sub-frames are mounted on a brick wall via the mortar. Such assembly methods have several disadvantages. First, the mortar used for bonding the brick wall and the timber sub-frame do not adhere well. Second, excess moisture seeps into the timber sub-frame and degrades the stability of the timber sub-frame since mortar is a mixture of lime or cement, sand and water.

[005] Further, the use of adhesives and other non-mechanical fixing techniques on the timber sub-frames may also act as an impediment to the future re-use or recycling of timber sub-frames.

[006] Therefore, there is a need for an alternate material as well as improved sub-frame structural assembly, which must at the same time maintain the stability of the structure. Further, there is a need for the re-use such sub-frames in a way that avoids constant refurbishment during building construction or during renovation works. There is also a need to use recyclable material.

BRIEF DESCRIPTION

[007] Briefly, a structural assembly comprising a sub-frame element is presented. The structural assembly comprises a sub-frame element, wherein the sub-frame element further comprises a metal sub-frame having a first side configured to be affixed on to a wall and a second side configured to accommodate a main frame. The metal sub-frame comprises two or more projections, a first projection configured to hold a fixing flange and a second projection configured to hold a template flange, the first and the second projections having longitudinally extended grooves, and the metal sub-frame comprising a hollow structure tapered on one edge. The sub-frame element comprising the metal sub-frame, the fixing flange, and the template flange is disposed around an opening that is configured to receive the main frame, and the main frame is further configured to hold a door or a window. The fixing flange is configured to be grouted within the wall and the template flange is configured to maintain constant distance between two metal sub-frames. The structural assembly that is disposed around the opening comprises a plurality of the metal sub-frames, each sub-frame element comprising two metal sub-frames disposed substantially parallel to each other.

[008] In one embodiment, a sub-frame assembly is proposed. The sub-frame assembly includes a metal sub-frame having a hollow central core and at least two projections, a first projection configured to be affixed to a wall, and a second projection configured to hold a template flange. A stopper groove is longitudinally disposed on the length of the metal sub-frame and configured to secure the metal sub-frame to the wall. A fixing flange is configured to be grouted onto the wall and firmly fixed to the first projection, and the template flange is configured to hold a sub-frame set to maintain a constant distance between the two metal sub-frames, wherein the metal sub-frame includes at least one tapered outer edge, the tapered outer edge configured to accommodate fasteners. A plurality of the sub-frame sets are disposed at regular intervals around an opening, each sub-frame set comprising two metal sub-frames disposed substantially parallel and held by the template flange.

BRIEF DESCRIPTION OF THE DRAWINGS

[009] These and other features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0010] FIG. 1 is an exploded view of a sub-frame assembly according to an embodiment of the invention;

[0011] FIG. 2 is an assembled view of the sub-frame assembly around an opening according to an embodiment of the invention;

[0012] FIG. 3 is a profile view of the assembled sub-frame element on to a wall according to an embodiment of the invention;

[0013] FIG. 4 is a cross-sectional top view of an assembled sub-frame element within the opening according to an embodiment of the invention;

[0014] FIG. 5 is a detailed profile view of the metal sub-frame according to an embodiment of the invention.

DETAILED DESCRIPTION

[0015] FIG. 1 illustrates an exploded view of a sub-frame assembly according to an embodiment of the invention. The sub-frame assembly 10 includes a sub-frame element 12, wherein the sub-frame element 12 further includes a metal sub-frame 14(16) having a first side 18 configured to be affixed on to a wall and a second side 20 configured to accommodate a main frame 22. The main frame 22 may be further configured to host a door or a window.

[0016] Metal sub-frame 14(16) further includes two or more projections, wherein a first projection 26(28) is configured to hold a fixing flange 34(36) and a second projection 30(32) is configured to hold a template flange 38(40). As used herein, the term “flange” may also refer to metal brackets or any mechanism configured to fasten securely any two disjoint objects. The first and the second projections 26(28), and 30(32) are longitudinally extended grooves disposed respectively on the metal sub-frames 14,16. The metal sub-frame comprises a hollow structure 42,44, and a tapered edge 46,48.

[0017] The sub-frame element 12 further comprising the metal sub-frame 14 (16), the fixing flange 34 (36), and the template flange 38 (40) are disposed around an opening that is configured to receive the main frame 22, the main frame further configured to hold a door or a window. An architrave 21 (23) may be disposed around the metal sub-frame 14 (16) for the purposes of a better façade such that the architrave conceals the fixing arrangement of the metal sub-frame 14 (16). The fixing flange 34 (36) is configured to be grouted within the wall and the template flange 38 (40) configured to maintain constant distance between a sub-frame set having two metal sub-frames 14 and 16. Alternatively, in another embodiment, the fixing flange may include a projection at one end where the fixing flange is fastened to the metal sub-frame such that the projection is configured to accommodate grouting on various sizes of wall thickness, for example, on a marble wall or on a brick wall that have different thickness and shape.

[0018] The structural assembly 10 is disposed around the opening comprises multiple sub-frames sets, each set comprising two metal sub-frames 14,16 disposed substantially parallel to each other on the opening.

[0019] FIG. 2 is an assembled view of the sub-frame assembly around an opening according to an embodiment of the invention. The structural assembly 50 includes multiple sub-frame elements of FIG. 1 disposed around the opening 52. For example, in one embodiment, sub-frame elements 12, 56-68

includes fixing flanges 34, 70-82 grouted to the wall 54 around the opening 52. Each sub-frame element 12, 56-68 are mounted with the support of detachable template 51 that is generally configured to be removed after fixing and curing of the sub-frame element into the wall. It may be noted that the sub-frame elements are disposed at regular intervals around the opening 52.

[0020] FIG. 3 illustrates a profile view of the assembled sub-frame element on to a wall according to an embodiment of the invention. The sub-frame element 12 (56) in the illustrated embodiment includes metal sub-frame 14,16 disposed at regular intervals around with each sub-frame set comprising two metal sub-frames 14,16 disposed substantially parallel and held by the template flange 38,40. It may be appreciated by one skilled in the art that such metal sub-frames are disposed discretely at regular intervals and not continuously laid out, as in the case of present day timber sub-frames.

[0021] FIG. 4 illustrates a cross-sectional top view of an assembled sub-frame element within the opening according to an embodiment of the invention. In the illustrated embodiments, the details of the assembled metal sub-frame are clear. For example, the fixing flange 34 (36) is firmly fastened to the metal sub-frame 14 (16) via the fastener 102. Further, the fixing flange 34 (36) is firmly fastened to the wall 54 via the fastener 106. A cement layer 108 is filled from the top and between the sub-frame element and the wall 54. A second fastener 104 is configured to fasten the template flange 38.

[0022] FIG. 5 is a detailed profile view of the metal sub-frame according to an embodiment of the invention. The metal sub-frame 14 includes the first projection 26 and the second projection 30 configured to be affixed to the wall 54. The metal sub-frame further includes a stopper groove 106 longitudinally disposed on the length of the metal sub-frame and configured to secure the metal sub-frame to the wall. The main frame and the architrave are disposed on surface 46, 110 (are referenced in FIG. 4), and 112. The tapered edge 46 is configured to accommodate fasteners easily from the main frame through its surface. Construction bond 110 (FIG. 4) may be disposed between the main frame and the metal sub-frame. In one embodiment, the metal used to manufacture such metal sub-frames includes but is not limited to aluminium. Further, such metal sub-frames may be manufactured via an extrusion process. It may be noted that using metal sub-frames will enable recyclable material, for example, the metal sub-frame may be recycled for further use after decommissioning.

[0023] Advantageously, such metal sub-frames completely eliminate pests and moisture related problems associated with the traditional timber sub-frames. Further, as the timber sub-frames are replaced with metal sub-frames, it is more rugged in construction and easy to re-use, wherein multiple fix and remove operations of main frame may be performed without damaging the metal sub-frame. It may be noted that the proper grouting may be ensured during installation of such metal sub-frames as they are not continuously disposed around the opening. Further, the metal sub-frames are stronger in construction, and therefore continuous lay out of the metal frame around the opening is not required, thereby saving on material costs.

[0024] While only certain features of the invention have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

CLAIMS

The invention claimed is:

1) A structural assembly comprising a sub-frame element, wherein the sub-frame element comprises a metal sub-frame having a first side configured to be affixed on to a wall and a second side configured to accommodate a main frame, the metal sub-frame comprising two or more projections, a first projection configured to hold a fixing flange and a second projection configured to hold a template flange, the first and the second projections having longitudinally extended grooves, the metal sub-frame comprising a hollow structure tapered on one edge,

wherein the sub-frame element comprising the metal sub-frame, the fixing flange, and the template flange is disposed around an opening configured to receive the main frame, the main frame further configured to hold a door or a window, the fixing flange configured to be grouted within the wall and the template flange configured to maintain constant distance between two metal sub-frames,

wherein the structural assembly disposed around the opening comprises a plurality of the metal sub-frames, each sub-frame element comprising two metal sub-frames disposed substantially parallel to each other.

2) The structural assembly according to claim 1, wherein the metal sub-frame is made of a recyclable material.

3) The structural assembly according to claim 1, wherein the metal sub-frame is configured for re-use such that the main frame can be fixed and removed multiple times.

4) The structural assembly according to claim 1, wherein the fixing flange and the template flange are configured to accommodate different size and shape of the wall.

5) The structural assembly according to claim 1 further comprising a detachable template configured to be removed after fixing and curing of the sub-frame element.

6) The structural assembly according to claim 1, wherein the metal sub-frame is made from an extrusion process.

7) A sub-frame assembly comprising:

a metal sub-frame having a hollow central core and at least two projections, a first projection configured to be affixed to a wall, and a second projection configured to hold a template flange;

a stopper groove longitudinally disposed on the length of the metal sub-frame and configured to secure the metal sub-frame to the wall;

a fixing flange configured to be grouted onto the wall and firmly fixed to the first projection, and the template flange configured to hold a sub-frame set to maintain a constant distance between the two metal sub-frames,

wherein the metal sub-frame having at least one tapered outer edge, the tapered outer edge configured to accommodate fasteners;

a plurality of the sub-frame sets disposed at regular intervals around an opening, each sub-frame set comprising two metal sub-frames disposed substantially parallel and held by the template flange.

8) The sub-frame assembly according to claim 7, wherein a main frame is disposed on the sub-frame assembly.

9) The sub-frame assembly according to claim 8, wherein a door or a window is disposed on the main frame.