DEVICE FOR CONNECTING COMPONENTS OF A BUILDING FRAMEWORK

The present invention relates to building framework assemblies and to connector assemblies for use in the construction of building frameworks as well as to buildings comprising such assemblies and to methods of construction.

It is known to construct buildings by first assembling a steel and/or concrete framework and then providing walls to the framework. The framework is generally constructed by first laying foundations and locating columns to extend upwardly therefrom. A lattice of primary beams is then arranged to extend between the columns and secondary beams are arranged to extend between the primary beams where necessary.

Buildings constructed in this manner are generally several storeys high and in order to connect the beams to the columns or to other beams it is necessary for construction workers to operate at height. A known method of construction requires a beam to be moved towards its desired location by a crane and for a construction worker to manually guide the beam to its final position. The beam must then be secured in place by welding or bolting it to a column or another beam before it can be released by the crane.

This can be a somewhat laborious and potentially hazardous process and it is undesirable for a construction worker to be in close proximity to beams whilst they are located into position. There is thus a need for alternative means

for connecting beams to one another or to columns and for safer and more efficient methods of construction.

Connectors for use in building construction are known, for example DE19647332 discloses a wall system comprising pillars and connector bars and W092/15791 discloses a structural connector to interconnect a first and second member. However, there remains a need for improved means for connecting building framework members.

Accordingly, the present invention aims to address at least one disadvantage associated with the prior art whether discussed herein or otherwise.

According to a first aspect of the present invention there is provided a building framework assembly comprising first and second framework members and having locating means, wherein the locating means is arranged to guide the framework members to a connected position, as one is moved towards the other to produce a building framework, and wherein the locating means is such that it can retain the framework members substantially in position relative to one another. The locating means comprises a connector means of the first framework member, a connector means of the second framework member and a guide means. One of the first and second connector means comprises a receptacle and the other connector means comprises a connector part arranged to locate within said receptacle, and the guide means comprises a mouth which narrows towards the receptacle.

Suitably, the locating means is such that, in use, the framework members are automatically located in a connected position as one is moved towards the other.

Suitably, the locating means comprises a guide means of one of the framework members.

Preferably, the building framework assembly comprises first and second framework members comprising first and second connector means respectively with at least one of said framework members comprising guide means, wherein: the first framework member is arranged to be installed to form part of a building framework prior to the second; the

guide means is arranged to guide the connector means towards a connected configuration with one another when the second framework member is moved into position relative to the first; and the connector means are arranged such that once in the connected configuration they can retain the framework members substantially in position relative to one another.

Suitably, the connector means are arranged such that, once in the connected configuration, they can retain the framework members substantially in position until the framework members are secured to one another at a later time. The connector means themselves may thus be such that they do not rigidly secure the framework members to one another but form a sufficiently rigid connection to resist temporary construction loads such as wind or gravity forces.

Suitably, in use, connected framework members may be secured to one another with securement means for example bolts, to form a substantially rigid structure.

Suitably, the connector means are arranged to retain the framework members in position such that a small degree of relative movement is permitted. The connector means may thus be arranged to accommodate manufacturing tolerances. Accordingly, in use, connected framework members may be able to move to their final positions as they are secured to one another.

Suitably, the connector means are arranged such that, in use, gravity assists to maintain them in the connected

configuration once they have been correctly positioned relative to one another.

The framework assembly may further comprise retaining means for retaining the framework members in position until they are secured with securement means. The retaining means may for example comprise a clip, for example a spring clip, or strap which may pass around the framework members and/or connecting means. The retaining means may thus prevent the framework members from being disconnected if knocked, for example by being caught by a part of a crane.

Suitably, the connector means and guide means are arranged such that, in use, gravity can assist to locate the connector means in the connected configuration.

The first framework member may comprise a body comprising a column. Alternatively, the first framework member may comprise a body comprising a beam, preferably a primary beam.

The second framework member suitably comprises a body comprising a beam. Where the first framework member comprises a body comprising a column the second framework member preferably comprises a body comprising a primary beam. Where the first framework member comprises a body comprising a primary beam the second framework member preferably comprises a body comprising a secondary beam.

Suitably, the column and/or beam(s) comprise load bearing bodies. Suitably the column and/or beam(s) comprise steel.

Each connector means may comprise receiving means arranged to receive securement means, suitably a bolt, such that the connector means and thus framework members can be secured to one another. Alternatively, the bodies of the framework members may comprise receiving means arranged to receive securement means, suitably a bolt, such that the framework members can be secured to one another.

Suitably, one of the first and second connector means comprises a receptacle and the other connector means comprises a connector part arranged to locate within said receptacle. Preferably, the first framework member comprises said receptacle.

Suitably, the first connector means comprises a receptacle which comprises an opening which is arranged to receive a connector part of the second connector means and which is orientated such that it faces upwardly when the first framework member is installed in a building framework.

Suitably, the framework member comprising the connector means which comprises the receptacle further comprises the guide means. Preferably, the first framework member comprises the guide means.

Suitably one of the first and second framework assemblies comprises a connector assembly which provides connector means. Suitably, said connector assembly defines a receptacle which comprises the connector means of said framework assembly. Preferably, the first framework member comprises said connector assembly.

Suitably, one of the first and second framework assemblies, preferably the first, comprises a connector assembly which provides guide means and connector means. Suitably, the connector means and guide means are integral. The guide means may comprise a part of the connector means.

Suitably, the guide means comprises one or more guiding surfaces for guiding the connector means towards the connected configuration.

Preferably, the guide means is formed integrally with a receptacle of a connector means. The guide means may for example comprise a mouth to the receptacle. Suitably the guide means comprises a mouth which narrows towards the receptacle.

Suitably the first framework member comprises the guide means. Suitably the guide means comprises an opening which is arranged to face upwardly in use. Once the first framework member is installed to form part of a building framework the second framework member may thus be manoeuvred into position relative to the first framework member and dropped into place such that the connector means of the second framework member enters the opening of the guide means and travels until it reaches a connected position relative to the connector means of the first framework member.

Suitably, the first and second framework members comprise first and second support surfaces respectively arranged to abut one another when the framework members are connected. Suitably, the support surfaces comprise part of the

connecting means. Suitably the support surfaces are arranged such that they can bear the weight of the second framework member when it is connected to the first.

Suitably, the support surface of one of the framework members, suitably of the first, comprises part of a connector assembly.

Suitably, the support surface of the other of the framework members, suitably of the second, comprises part of a body of the framework member.

The connector part of the connector means which is arranged to be guided into a receptacle of the other connector means by the guide means may comprise a bolt extending from the body of the framework member. Suitably, the second connector means comprises the connector part. The body suitably comprises a beam.

Alternatively, the connector part of the connector means which is arranged to be guided into a receptacle of the other connector means by the guide means may comprise a part of a body of a framework member which comprises a beam. Suitably, the second connector means comprises the connector part. For example, the connector part may comprise an end part of an "I" beam where the lower arm of the "I" is removed at the end such that the beam has a "T" shaped cross-section at its end. The leg of the "T" may thus form the connector part.

In one embodiment the guide means of a first framework member and a connector means associated therewith may comprise two opposed bent plates arranged to define a

receptacle, which comprises generally "Y" shaped channel, therebetween. The connector means of the second framework member suitably comprises a connector part comprising the downwardly extending leg of a part of the second framework member. In use, the connector part is lowered into the receptacle from above. Thus, if the connector part is not correctly aligned with the receptacle it may be guided by the sloping sides of the guide means into the receptacle and thus can be located into position without manual manipulation.

Suitably, each of the connector means comprises apertures arranged to align when the connectors are in the retaining position such that bolts can be passed therethrough to secure the framework members in position to form a permanent building structure.

In an alternative embodiment the connector of the first framework member and the guide means associated therewith may comprise a funnel shaped receptacle. Suitably the funnel shaped receptacle comprises a conical funnel. The connector means of the second framework member suitably comprises a connector part which suitably comprises a bolt. The bolt may pass through an aperture in the body of said other framework member. In use, the bolt may be guided into position towards the stem of the funnel by the wall of the cone section of the funnel as the framework member is lowered into place. The bolt may then drop into place in the stem section such that it retains the framework members in position.

Once connected the framework members may be secured to one another with bolts to form a permanent building structure.

In either embodiment the "loose" connection formed before bolts are installed may be sufficient to hold the framework members in position such that they can be positioned and left whilst other components are positioned and do not need to be immediately bolted to one another.

The guide means and connector means may also cause the framework members to be connected substantially automatically when the framework members are moved toward one another.

According to a second aspect of the present invention there is provided a connector assembly for use with a body of a framework member, wherein the connector assembly comprises a connector means for co-operating with a further connector means of a further framework member such that the connector means can be placed in a connected configuration in which they can retain the framework members in position relative to one another and wherein the connector assembly further comprises guide means for guiding the connector means towards a connected configuration when the framework members are moved into position relative to one another and wherein once in the connected configuration the connector means can retain the framework members substantially in position relative to one another wherein one of the first and second connector means comprises a receptacle and the other connector means comprises a connector part arranged to locate within said receptacle, and the guide means comprises a mouth which narrows towards the receptacle.

The connector assembly may comprise any feature as described in relation to a connector assembly of the first aspect.

According to a third aspect of the present invention there is provided a method of assembling a building framework, wherein the method comprises connecting first and second framework members together using locating means, the locating means comprising a connector means of the first framework member, a connector means of the second framework member and guide means such that the framework members are automatically located in substantially the correct position relative to one another as they are brought towards one another and can be retained in that position by the locating means until they are secured to each other, wherein the guide means comprises a mouth which narrows towards a receptacle.

Suitably, the correct position of the framework members corresponds to a connected position.

Suitably, the connection formed by the locating means is sufficiently strong to withstand temporary construction loads. The framework members may thus be held connected until such time that permanent and more robust connections can be made in a safer working environment.

Suitably, the locating means comprises a connector means of the first framework member, a connector means of the second framework member and guide means. Suitably, the locating means comprises guide means of one of the framework members.

Suitably, the method comprises: installing a first framework member comprising a first connector means to form part of a building framework; moving a second framework member comprising a second connector means into a position relative to the first framework member such that a guide means of one of the framework members engages the connector means of the other and guides it towards a connected configuration, in which the connector means

retains the framework members in position relative to one another; and wherein the method is such that the framework members are automatically located in substantially the correct position relative to one another as they are brought towards one another and can be retained in that position by the connector means until they are secured to each other.

Suitably, the method further comprises the step of securing the framework members to one another. Suitably, the securement step comprises bolting the framework members together.

Suitably, the method comprises assembling a building framework using a frame assembly according to the first aspect.

The method may comprise any feature as described in relation to the first aspect.

The method may comprise the use of a connector assembly according to the second aspect.

According to a fourth aspect of the present invention there is provided a building comprising a framework assembly according to the first aspect and/or a connector assembly according to the second aspect and/or which is constructed according to the method of the third aspect.

The present invention will now be illustrated by way of example with reference to the accompanying drawings in which:

Figure 1 is a cross-sectional view showing a framework assembly;

Figure 2 is a perspective view showing a connector assembly used in the arrangement of Figure 1 and including some hidden detail; and

Figure 3 is a perspective view showing an alternative embodiment of a framework assembly.

As illustrated by Figure 1 a building framework assembly 1 comprises a first framework member 10 which comprises a body 11 which comprises an "I" beam which forms a column of a building framework. This column is connected to the foundations of a building structure (not shown) such that it extends generally upwardly.

The assembly 1 further comprises a second framework member 40 which comprises a body 41 which comprises an "I" beam which forms a primary beam of a building framework. The second framework member 40 is arranged to be connected to the first framework member 10.

The first framework member 10 comprises connector means 20 and guide means 30 and the second framework member 40 comprises connector means 50 for co-operating therewith.

The connector and guide means 20, 30 of the first framework member 10 are best illustrated by Figure 2. The guide means 30 and connector means 20 are provided by a connector assembly 20A which comprises a block 21 having a flange 22. The flange 22 which is connected to the body 11 by bolts (not shown). An upper face 23 of the block 21

is arranged to provide a support surface of the connector means 20 for supporting the lower wall 52 of the body 41 which forms a support surface of the connector means 50 of the second framework member 40.

The connector means 20 comprises a receptacle 24 for receiving a connector part 51 of the connector means 50 of the second framework member 40.

The connector part 51 of the second framework member 40 comprises a bolt and the receptacle 24 of the connector comprises a stem portion of a funnel arranged to receive the bolt such that it can move no more than 1 or 2mm relative to the axis of the stem.

Located between the receptacle 24 and upper face 23 of the block 21 is the guide means 30. The guide means comprises the cone portion of a funnel and this provides a mouth 31 which narrows towards the receptacle 24. The guide means 30 thus comprises a continuation of the receptacle 24.

In use, the second framework member 40 can be lifted generally into position with a crane and located such that its connector means 50 overlies the connector means 30 of the first framework member 10. The second framework member 40 can then be lowered into position (as illustrated by arrow A) such that the connector part 51 engages the guide means 30 and is directed towards the receptacle 24 such that the second framework member 40 is automatically located in the desired position relative to the first 10. Once the framework members 10, 40 are located such that their connector means 20, 50 are in a connected configuration they may be held in a sufficiently

fixed position relative to one another that other construction operations can be performed without securing them to one another. To provide a permanent structure the bodies 11 and 41 of the framework members 10, 40 are secured to one another by passing bolts (not shown) through a wall 12 of the first framework member and a flange 42 of the second framework member 40.

In an alternative embodiment (not shown) prior to securement with bolts the framework members are retained in position relative to one another by a retaining means comprising a metal clip passing around the framework members as well as by the connecting means. Though not structural this retaining means may prevent a crane dislodging the framework members and may provide a further safety feature.

Figure 3 illustrates an alternative embodiment of a framework assembly 101. The general principles are the same but the connector means 120 of this arrangement may be more suitable for connecting a secondary beam to a primary beam whereas that of Figures 1 and 2 is more appropriate for connecting a primary beam to a column.

The first framework member 110 of this embodiment comprises a body 111 which comprises and "I" beam which comprises a primary beam of a building framework. A second framework member 140 which is arranged to be connected to this first framework member 110 comprises a body 141 comprising an "I" beam which comprises a secondary beam of a building framework.

The first framework member 110 further comprises a connector assembly which comprises connector means 120. The connector assembly comprises opposed metal plates 121, 122 arranged to define a generally "Y" shaped channel therebetween. The connector assembly also comprises guide means 140.

The metal plates 121, 122 each comprise a generally horizontally extending upper wall sections 123. These are arranged to provide a supporting surface for supporting an upper wall section 152 of the body 141 which forms supporting surface of the second framework member 140. Thus, when the connector means are located in the retaining configuration the supporting surfaces support the weight of the second framework member 140. Each of the metal plates 121, 122 further comprises a generally vertically extending wall 124, arranged to define a channel therebetween which provides a receptacle 125 for receiving a connector part of the second framework member 140. Located between the upper and lower wall sections 123, 124 of each of the plates 121, 122 is a wall section 131 which provides a transition from the vertical wall direction to the horizontal wall direction. These wall sections 131 comprise the guide means 130.

The connector means of the second framework member 140 comprises an end part of the body 141. A part of a lower wall section of the body 141 is removed such that the body 141 comprises a "T" rather than an "I" cross section at its end. The downwardly depending wall section 153 thus serves as a connector part.

In use, the wall sections 131 effectively act as a funnel guiding the wall section 153 of the second framework member 140 into the receptacle channel 125. When the second framework member 140 is lowered into position toward the first framework member 110 as illustrated by arrow B.

The connector means of the first framework member 110 and second framework member 140 each comprise apertures 160, 170 which are arranged to align when the framework members 110,140 are correctly positioned relative to one another. Bolts (not shown) can then be passed through these apertures to secure the framework members in position.

In this embodiment the upper wall 112 of the body 111 of the first framework member 110 also serves to some degree as a guide means as does the upper wall 152 of the body 141 of the second framework member 140. In use, the framework members can be moved in position such that edges of these walls 112, 142 but against each other to help to define the framework members correct relative positions.

It will be appreciated that framework assemblies according to the present invention may allow safer and/or more efficient construction of building structures.

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A building framework assembly comprising first and second framework members and having locating means, wherein the locating means is arranged to guide the framework members to a connected position, as one is moved towards the other to produce a building framework, and wherein the locating means is such that it can retain the framework members substantially in position relative to one another, the locating means comprising a connector means of the first framework member, a connector means of the second framework member and a guide means, wherein one of the first and second connector means comprises a receptacle and the other connector means comprises a connector part arranged to locate within said receptacle, and the guide means comprises a mouth which narrows towards the receptacle.

2. An assembly according to claim 1, wherein the locating means comprises a guide means of one of the framework members.

3. An assembly according to any preceding claim, wherein the building framework assembly comprises first and second framework members comprising first and second connector means respectively with at least one of said framework members comprising guide means, wherein: the first framework member is arranged to be installed to form part of a building framework prior to the second; the guide means is arranged to guide the connector means towards a connected configuration with one another when the second framework member is moved into position relative to the first; and the connector means are arranged such that once in the connected

configuration they can retain the framework members substantially in position relative to one another.

4. A connector assembly for use with a body of a framework member, wherein the connector assembly comprises a connector means for co-operating with a further connector means of a further framework member such that the connector means can be placed in a connected configuration in which they can retain the framework members in position relative to one another and wherein the connector assembly further comprises guide means for guiding the connector means towards a connected configuration when the framework members are moved into position relative to one another and wherein once in the connected configuration the connector means can retain the framework members substantially in position relative to one another, wherein one of the first and second connector means comprises a receptacle and the other connector means comprises a connector part arranged to locate within said receptacle, and the guide means comprises a mouth which narrows towards the receptacle.

5. An assembly according to any preceding claim, wherein the connector means are arranged to retain the framework members in position such that a small degree of relative movement is permitted.

6. An assembly according to any preceding claim, wherein the connector means are arranged such that, in use, gravity assists to maintain them in the connected configuration once they have been correctly positioned relative to one another.

7. An assembly according to any preceding claim, wherein the connector means and guide means are arranged such that, in use, gravity can assist to locate the connector means in the connected configuration.

8. An assembly according to any preceding claim, wherein the first framework member comprises a body comprising a column and the second framework member comprises a body comprising a primary beam or the first framework member comprises a body comprising a primary beam, and the second framework member comprises a body comprising a secondary beam.

9. An assembly according to any preceding claim, wherein the first and second framework members comprise first and second support surfaces respectively arranged to abut one another when the framework members are connected.

10. An assembly according to any preceding claim, wherein the guide means of a first framework member and a connector means associated therewith comprise two opposed bent plates arranged to define a receptacle, which comprises generally "Y" shaped channel, therebetween and the connector means of the second framework member comprises a connector part comprising

the downwardly extending leg of a part of the second framework member.

11. An assembly according to any preceding claim, wherein the connector means of the first framework member and the guide means associated therewith comprise a funnel shaped receptacle and the connector means of the second framework member comprises a connector part which comprises a bolt.

12. A method of assembling a building framework, wherein the method comprises connecting first and second framework members together using locating means, the locating means comprising a connector means of the first framework member, a connector means of the second framework member and guide means such that the framework members are automatically located in substantially the correct position relative to one another as they are brought towards one another and can be retained in that position by the locating means until they are secured to each other, wherein the guide means comprises a mouth which narrows towards a receptacle.

13. A method according to claim 12, wherein the method comprises: installing a first framework member comprising a first connector means to form part of a building framework; moving a second framework member comprising a second connector means into a position relative to the first framework member such that the guide means of one of the framework members engages

the connector means of the other and guides it towards a connected configuration, in which the connector means retains the framework members in position relative to one another; and wherein the method is such that the framework members are automatically located in substantially the correct position relative to one another as they are brought towards one another and can be retained in that position by the connector means until they are secured to each other.

14. A method according to any of claims 12 and 13, wherein the method further comprises the step of securing the framework members to one another.

15. A building comprising an assembly according to any of claims 1 to 11 and/or which is constructed according to the method of any of claims 12 to 14.