ARCHED BUILDING ASSEMBLY FORMED OF RESILIENTLY, FLEXIBLE MEMBERS


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ABSTRACT
A building assembly for erecting an arched, resiliently flexible building member in which the building member consists of two sub-members which are interconnected by a resiliently flexible connector capable of greater flexure than the sub-members so that, on erection, the building member has an upwardly pointed shape. Flexure of the flexible connector, and upward cambering of the sub-members is effected by loading the sub-members in compression with loading cables which interconnect longitudinally spaced parts of the building member and are raised with the building member by bracing means which maintain the cables in fixed spaced relationship to intermediate parts of the building member. Flexure in both the resiliently flexible connector and the sub-members occurs simultaneously, but to a greater extent in the resilient sub-member. Additional loading cables may be provided for flexing the sub-members independently.

2 Claims, 4 Drawing Figures
ARCHED BUILDING ASSEMBLY FORMED OF RESILIENTLY, FLEXIBLE MEMBERS

BACKGROUND OF THE INVENTION

The invention relates to a building assembly for the erection of an arched, resiliently flexible building member, and constitutes an improvement in or modification of the invention described in the complete specification of my United Kingdom Pat. No. 1,202,706.

In the complete specification of this earlier patent there is claimed a method of erecting an arched building member which comprises connecting tensioning means to the member so that the tensioning means is raised with the member on erection, applying a longitudinal force to tensioning means connected to the member to load the member in compression and thereby effect elastic deformation of the member, controlling the deformation to ensure that the member is cambered upwardly to a required extent within the elastic limit of the member, and locking the member in the cambered condition.

The complete specification of United Kingdom Pat. No. 1,202,706 also claims a building assembly comprising an elongate building member, a flexible tensioning means, connecting means for securing the tensioning means to two spaced portions of the building member and for positioning the tensioning means in fixed spaced relationship to at least one intermediate portion of the building member, and means for controlling deformation of the building member so that on applying a longitudinal force to the tensioning means to load the member in compression, the member is cambered upwardly and the tensioning means is raised with the member on erection.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a building assembly whereby an elongate building member is capable of being erected in an arch of greater height than the arch of a building member erected as described in the complete specification of United Kingdom Pat. No. 1,202,706.

According to the present invention the elongate building member includes two elongate sub-members connected end-to-end by a resiliently flexible connector. On loading the member in compression by means of the tensioning means, the building member is cambered upwardly to form a pointed arch, or at least to form an arch having an intermediate portion of smaller radius than the flanks of the arch. In a preferred construction, the flexible connector is disposed at the mid-point of the building member.

As disclosed in the complete specification of United Kingdom Pat. No. 1,202,706, the tensioning means may comprise a cable which is secured to one end of the building member, the other end of the building member being anchored to hinged means and being provided with a bracket for the attachment of jack means for tensioning the cable. The bracket for the jack means may be provided with locking means for securing the cable to said other end of the building member. In an alternative form of construction, the tensioning means include two additional cables respectively attached to the inner ends of the two sub-members on opposite sides of the flexible connector. A bracket may be provided at the outer end of each sub-member for the attachment of jack means capable of tensioning the additional cable attached to the inner end of the sub-member. This bracket may be provided with locking means for securing the cable to the outer end of the sub-member.

In an alternative form of construction the additional cable connected to one of the sub-members may be passed around a guide, for example: pulley means, disposed at the outer end of this sub-member and back beneath the building member to the jack means for tensioning the additional cable connected to the other sub-member, or to jack means disposed adjacent the jack means for tensioning the additional cable connected to the other sub-member. On erection, the length of cable disposed beneath the erected building member may be covered by, or embedded in, a subsequently provided base member.

To erect an elongate building member forming part of a building assembly according to the present invention in which separate additional cables are attached to the two sub-members, one end of the building member may be anchored to hinged means and the other end of the other sub-member may be mounted in guide means which allow the outer end of this other sub-member to travel, in a controlled manner, towards the anchored outer end of the other sub-member as the single cable connecting the two sub-members is tightened during erection of the building member. The two additional cables are then tightened so as to camber the two sub-members which are inclined to each other as a result of flexure of the flexure means during tightening of the first cable. Alternatively, the two additional cables may be tightened, either concurrently or in sequence, to camber the two sub-members before the single cable connecting the two sub-members is tightened to raise the two sub-members.

By the use of suitable jack means, two or more elongate building members of building assemblies according to the invention may be erected simultaneously. In this case the simultaneously erected building members may be interconnected by cross members which may be in the form of panels or shutters to provide a roof for the erected structure. The panels may be plastics or similarly suitable sheet material and may be corrugated or otherwise strengthened. In one form of construction which is particularly suitable for use in the erection of a roof over an expanse of water, the panels or other cross-members may be provided with hollow sections of sufficient buoyancy to support the structure on the surface of the water prior to erection.

DESCRIPTION OF THE DRAWINGS

A building assembly according to the invention, and its method of erection, is hereinafter illustrated, by way of example only, with reference to the accompanying drawing, in which:

FIGS. 1 and 2 show a first embodiment in the unerected and erected conditions, respectively; and FIGS. 3 and 4 show a second embodiment in the unerected and erected conditions, respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, an elongate building member comprises two sub-members 10A and 10B interconnected by a connector 11. The outer end of sub-member 10A is pivotally connected to an anchor 12 and the outer end of sub-member 10B is pivotally con-
connected to a shoe 13 which is slidable in a channel-section guide 14 (shown in section). A cable 15 is secured by locking means provided on bracket 19 at the outer end of sub-member 10A. The cable 15 is threaded through the tubular guides 17 supported by brackets 18 dependent from intermediate and inner portions of the sub-members 10A and 10B, and its free end is threaded through a bracket 19 at the outer end of sub-member 10B and connected to a hydraulic jack 20.

Two additional cables 15A and 15B are secured by locking means 16 to the inner ends of the sub-members 10A and 10B. Each of these additional cables is threaded through one of the tubular guides 17 dependent from the intermediate portions of the sub-members 10A and 10B, and its free end is threaded through one of the brackets 19 and connected to one of the jacks 20 mounted on these brackets.

On application of the jacks, the cables 15, 15A and 15B are tightened so as to draw the shoe 13 along the guide 14 and to load the sub-members 10A and 10B in compression. As a result of this loading on cable 15, there is pivotal movement between the sub-members 10A and 10B about the connector 11 as the connector is raised, and the sub-members 10A and 10B are themselves cambered upwardly as a result of compressive loading caused by cables 15A and 15B, as shown in FIG. 2.

When the building assembly is disposed as shown in FIG. 2, the shoe 13 is locked in place by suitable anchoring means (not shown), and part or all of the guide 14 may be removed. Locking means provided on the brackets 19 are also used to secure the cables 15, 15A and 15B to the outer ends of the sub-members 10A and 10B, and the jacks 20 are removed. To provide greater rigidity, screws 17A are tightened in screw-threaded holes provided in the tubular guides 17 to clamp the cables securely to the brackets 18.

As shown in FIG. 2, the provision of the flexible connector 11 permits the erection of a much higher arched structure than would be possible using an elongate building member subject to a uniform deformation. The shape 21 of such a uniformly deformed building member is shown in outline in FIG. 2.

In the embodiment illustrated in FIGS. 3 and 4, where like parts have been assigned like reference numerals, sub-members 10A and 10B are interconnected by an elongated resiliently flexible connector 11A having less bending resistance than the sub-members 10A and 10B. Although the member 11A shown in FIGS. 3 and 4 is different in cross-section to the sub-members 10A and 10B, the reduction in bending resistance may be provided wholly, or in part, by the use of more flexible material than the material of sub-members 10A and 10B.

In the construction shown, a single cable 15 is secured by locking means 16 to an outer end of sub-member 10A, and the other end of this cable 15 is connected to locking means provided on bracket 19 supporting a hydraulic jack 20 at the outer end of sub-member 10B. While not illustrated in FIGS. 3 and 4, the additional cables 15A and 15B can also be utilized.

When the cable 15 is tightened by means of the jack 20, the sub-members 10A and 10B are cambered upwardly, the intermediate member 11A is flexed, and the shoe 13 slides inwards along the guide 14 as shown in FIG. 4. As described in respect of the first embodiment, the shoe 13 is then locked in position and the screws 17A provided in the tubular sleeves 17 are tightened so as to engage the cable 15 and so provide a more rigid structure. Clearly, the extent to which the sub-members 10A and 10B are cambered depends upon the relative rigidity of these sub-members and the intermediate member 11A.

Although the invention has been described with reference to several general and specific embodiments, it is to be understood that the invention includes compatible combinations of the various features of these different embodiments. It is also possible that, by use of suitable tie members, the elongate building member may be formed with three or more sub-members which are inter-connected by flexure means as described above.

I claim:

1. In a building assembly having an elongate building member, the improvement comprising: said building member including first and second elongate sub-members positioned in end-to-end relation, said first sub-member having one end thereof positioned closely adjacent one end of said second sub-member, said first and second sub-members each being bendable into an arched shape; said building member also including a resiliently bendable connector connected between the adjacent one ends of said first and second sub-members, said connector having less resistance to bending than said sub-members; first anchor means stationarily positioned adjacent one end of said building member and pivotally connected to the other end of said first sub-member; second anchor means positioned adjacent and inter-connected to the other end of said building member, said second anchor means including an elongated guide extending in a direction toward said first anchor means and a shoe slidable mounted on said guide, said shoe being pivotally connected to the other end of said second sub-member; said first and second sub-members respectively having first and second guide means fixed thereon in spaced relation from said other ends thereof; tensioning means for simultaneously yet individually resiliently flexing said first and second sub-members and said connector to camber said building member upwardly into the shape of a pointed arch, said connector defining the apex of said arch and said first and second sub-members being individually flexed upwardly into an arched shape and defining the sides of said arch; said tensioning means including an elongated flexible cable extending from said first anchor means through said first and second guide means to said second anchor means, whereby tensioning of said cable causes said shoe to move toward said first anchor means and causes said building member to be cambered upwardly; and said flexible connector consisting of an elongated, elastically bendable rodlike element extending between and fixedly connected to the corresponding one ends of said first and second sub-members, said rodlike element being bent by said tensioning means into an arch-shape defined by a first radius which is rather small, and said first and second sub-
members being bent by said tensioning means into an arch-shape defined by a second radius which is large relative to said first radius.

2. In a building assembly according to claim 1, wherein said tensioning means includes a second elongated flexible cable extending between said first anchor means and said one end of said first sub-member, said second cable being fixedly anchored to said first sub-member adjacent said one end thereof, said tensioning means including a third elongated flexible cable extending between said second anchor means and said one end of said second sub-member, said second cable being fixedly anchored to said second sub-member adjacent said one end thereof, and said tensioning means also including jack means for tensioning said first-mentioned, said second and said third cables for causing said building member to camber upwardly and for causing said first and second sub-members to be individually flexed into an arch-shape.

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