(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 242 002**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87200694.5**

(51) Int. Cl.4: **F21S 3/14**

(22) Date of filing: **14.04.87**

(30) Priority: **14.04.86 DK 1680/86**

(43) Date of publication of application:
21.10.87 Bulletin 87/43

(84) Designated Contracting States:
BE DE ES FR GB GR IT NL SE

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(54) A system of endwise joined elongated elements, e.g. tubular lighting units, and a joining member therefor.

(57) For the assembling of a structure comprising a number of elongated construction elements (2), primarily lighting units, a joining member (4) is disclosed which allows for the elongated elements to be endwise joined with any desired mutual direction. The joining member is a ball (4) having in the six main directions holding holes (10) for respective tightening bolts (14) of which these in use are each received through an elongated diametral slot (28) in a segment disc (26) mounted inside an end portion of a tube bushing (20) projecting from the ball surface; the peiphery of the segment disc (26) steps on an internal end flange (24) of the bushing (20), such that the bushing is fixed to the ball surface when the bolt (14) is screwed home. The bushing (20), the outer end of which is used for holding the associated elongated construction element (2), may be fixed to the ball surface anywhere inside an area defined or described by the segment disc (26) being rotated about the bolt (14) with the latter placed at one end of the said slot (28), whereby the positions and the directions of the elongated elements (2) can be adjusted in a stepless manner, without the remaining free surface portions of the ball (4) being disfigured by particularly visible non-used fastening means.

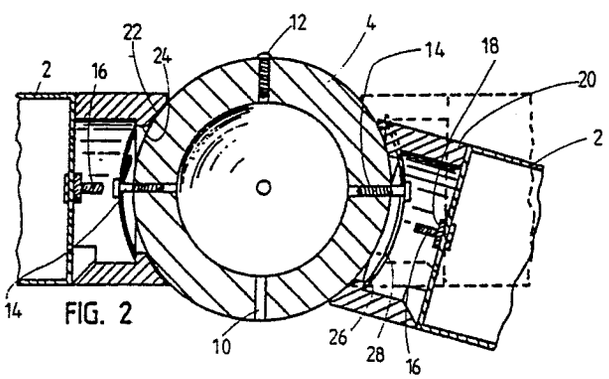

FIG. 2

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A system of endwise joined elongated elements, e.g. tubular lighting units, and a joining member therefor.

The present invention relates to a modular construction of elements, consisting of endwise joined, elongated elements, such as tubular lighting units with endwise interposed joining members shaped as balls or ball segments and operable to hold the adjoining elements with these projecting in any selected, arbitrary directions. It is possible with such a system to build up a row of elongated tubular lighting units which project through both horizontal and vertical shifts of direction, which is often desirable in modern lighting installations. The joining members, just as joining members e.g. for gutters, may be provided with connector stubs projecting in different directions such that for a given joining prescription it is required to use a correspondingly preshaped or preadapted joining member. While this is an advantageous possibility it is nevertheless troublesome to provide the associated high number of different joining members.

On this background it is the purpose of the invention to provide an element construction, the elongated elements of which may be joined with mutually different directions with the use of joining members of but a single design or very few designs, while at the same time the free surface portions of the joining members should present a smooth and aestethically attractive appearance without having to be covered by special covering means.

According to the invention this is achieved by an element construction as specified in the characterizing clause of claim 1. The ball shaped joining members may be provided with the said segment plates only adjacent a few selected places near the ends of the associated elongated elements, and these ends may then, by actuation of the corresponding protruding fastening bolt means, be tightened against the surface of the joining member. This tightening may be effected both centrally and pronounced decentrally relative the fastening bolt, inasfar as the segment plate member itself may be located within a relatively large area about the fastening bolt means, viz. with the latter located anywhere along the said slot of or in the segment plate. For each fastening bolt the associated segment plate may thus be located anywhere inside the circular area defined by the area which will be covered or described by the segment plate when the latter is rotated about the fastening bolt with this bolt located at an outermost end portion of the slot. The tightening force as hereby applicable adjacent one end of the slot will reveal itself with reduced strength adjacent the diametrally opposite area of the segment plate, the more larger the plate is, and for this reason there is practical limit for the size of the segment plates. It has been found, however, that it is possible to make use of each and very mounting place, all over the surface of the ball member, with the use of segment plates cooperating with fastening bolts located in only the six main directions of the ball member. The fastening bolts should not necessarily be materially present at places other than those where they are required for the actual mounting, and a standard ball member for connecting the elongated elements with any mutual directions, therefore, may be shaped e.g. with discrete reception holes for the bolts or similar members, which should be used for each single mounting.

Thus, with the use of the disclosed joining members the elongated elements may be joined with mutually arbitrary directions without the free surface portions of the ball members being disfigured by essentially visible holding means.

In the following the invention will be described in more detail with reference to the drawing, in which:-

Fig. 1 is a schematic perspective view of an element construction according to the invention,

Fig. 2 is a sectional view of a joint in the construction,

Figs. 3,4 and 5 are more detailed views of various parts of the applied joining means, and

Fig. 6 is a sectional view corresponding to Fig. 2, but illustrating further embodiments of the invention.

The construction shown in Fig. 1 is a fraction of a row of elongated lighting units 2, which are illustrated only by their outer shell portions, these elements being joined end to end by means of ball shaped joining elements 4. The elongated elements as shown in full lines are joined flush with each other, but it is shown in dotted lines that the ball member 4 may be connected with an additional, orthogonally projecting lighting unit 6 or a corresponding rod or tubular element, and that in stead of two fully aligned elements 2 the ball member may join elements 2 and 8, which are directionally mutually deviating, horizontally of vertically or in any inclined plane therebetween.

The joint is illustrated in a more detailed manner in Fig. 2. The ball member is provided with threaded holes 10 in each of its six main directions, and some of these holes will be unused and thereby be either open or filled out by a cover screw 12. Two opposite holes 10 are provided with holding bolts 14, which are used for the fastening of the respective ends of the elements 2. By means of

screws 16 these ends are connected to a diametrically extending cross piece 18 on a tube bushing 20 forming an intermediate connector member between the element 2 and the ball 4. In practice the bushing 20 is first connected to the ball, whereafter the element 2 is secured to the outer end of the bushing.

The end portion of each bushing 20 facing the ball 4 is shaped with a spherical edge area 22, which continues inwardly in a circumferential interior nose flange 24, which cooperates with the edge area of a spherical segment plate 26 as also shown in Figs. 3 and 4. The segment plate is shaped with a slot 28, which is crossing almost over the entire width of the plate, through the center thereof, and which received the fastening bolt 14. In the left hand side of Fig. 2 it is shown that the bolt 14 is received through the slot in a central position of the segment plate, and it is also shown that the segment plate assumes a position in which the slot 28 is swung somewhat out of the plane of the paper; the segment plate will be centered whenever the bolt 14 is located at the middle of the slot. Irrespectively of how the segment plate is turned about the bolt, when the bolt 14 is tightened, the peripheral edge of the segment plate will tighten against the interior nose flange 24 and thereby cause the bushing 20 to be tightened against the ball 4. Thereafter the element 2 is endwise secured to the bushing 20.

In the right hand side of Fig. 2 it is shown that the segment plate 26 is turned so that the slot 28 extends in the plane of the paper and that the associated bushing 20 is tilted downwardly relative the centered position outside the bolt 14, this bolt being received by or through the upper end of the slot. Also here a screwing home of the bolt will result in the segment plate and therewith the bushing 20 to be tightened to the ball member 4.

Each of the segment plates will be usable for the tightening of the bushing to the ball 4 in any arbitrary or desired directional position inside an area as covered or described by the segment plate when it is rotated about the bolt 14 with the latter engaged adjacent one end of the slot 28, i.e. the operationally usable area around each of the bolts 14 may be rather large. With a suitable dimensioning of the pacts it is achievable that all sub areas of the ball are usable for mounting purposes when the ball is provided with bolts or bolt holes in the said six main directions.

Principally the spherical segment plates 26 may be constituted by rigid end wall portions on the bushings 20, but in that case it shall have to be acceptable that the bushings may have to assume positions in which they are turned differently about their own axes all according to their mounting location relative the ball member. This may be acceptable in many cases, but not where the outer shape of the bushings is adapted to match with some non-circular shape of the associated elongated elements 2.

In the right hand side of Fig. 5 it is shown that the end surface region of the bushing adjacent the ball member may be obliquely cut off, and in the left hand side it is shown that the bushing may be shaped as an irregular trasition element connecting the ball member with the elongated element 2, which may then have any arbitrary cross sectional shape.

It should be mentioned that the segment plates would not really need to be spherical, when they are only shaped so as to make sure that by the tightening of the bolts 14 they will not be tightened against the surface of the ball element. It will be an associated drawback, however, that planar tightening plate portions will stand obliquely relative the tightening bolts 14 whenever the bushings are secured to the ball member in offcentered positions.

The invention also comprises the disclosed ball joining members. As far as the associated segment plates are concerned it will be sufficient that the slots 28 extend radially to one side of the central area, and these plate members should not necessarily be of the illustrated regular disc shape; they may be substituted by a cross strip member having a middle slot, or they may be shaped as star members.

Claims

1. A modular element construction comprising endwise joined, elongated elements such as lighting units and one or more ball or ball segment shaped joining members for mounting between the ends of the elongated elements in such a manner that these elements are fastenable to the joining member projecting in arbitrarily selected directions therefrom, characterized in that each of the joining members is provided, at discrete locations on its spherical surface, with means for holding outwardly projecting fastening pins or bolts cooperating with respective outer segment plates, which are each shaped with a radially or diametrically extending slot receiving the fastening bolt at a selected place along the length of the slot for enabling the segment plate to be tightened against the joining member, the segment plate being mounted inside a tube bushing member projecting from the joining member and having an interior end flange portion, which engages underneath the periphery of the segment plate and is thereby fixable against the surface of the joining member by the tightening of the segment plate thereagainst, the tube bushing

having connector means for holding an end portion of one of said elongated elements, or the tube bushing being constituted by such an end portion.

2. An element construction as claimed in claim 1, in which the segment plates are rotation bodies, which in non-fixed condition are freely rotatable inside and relative to the associated tube bushing.

3. An element construction according to claim 2, in which the tube bushing adjacent its outer and/or inner end is shaped with a non-circular cross section, its shape adjacent its outer end preferably corresponding to the cross sectional shape of the elongated elements.

4. An element construction according to claim 1, in which the segment plates are spherical substantially corresponding to the curvature of the surface of the joining member.

5. A ball shaped joining member for use in an element construction according to claim 1 and provided with holding means, segment plates and tube bushings as specified in any of the preceding claims.

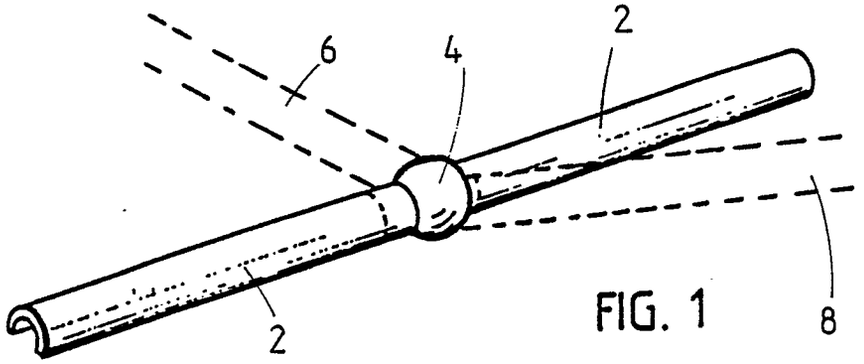

FIG. 1

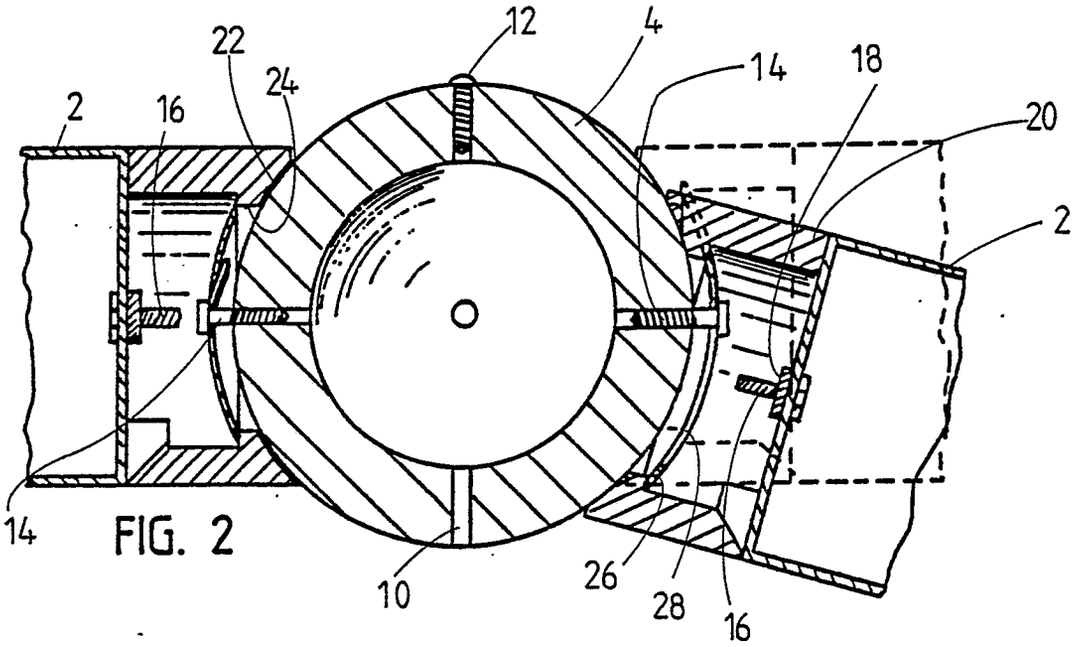

FIG. 2

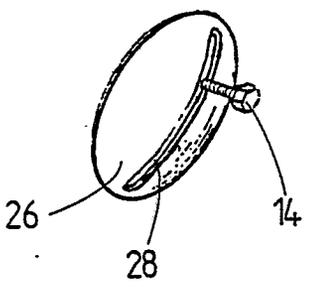

FIG. 3

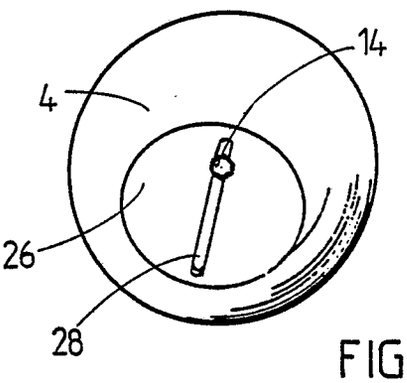

FIG. 4

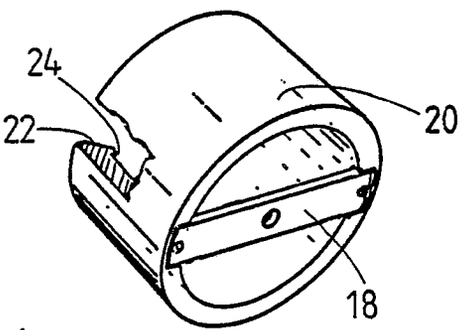

FIG. 5

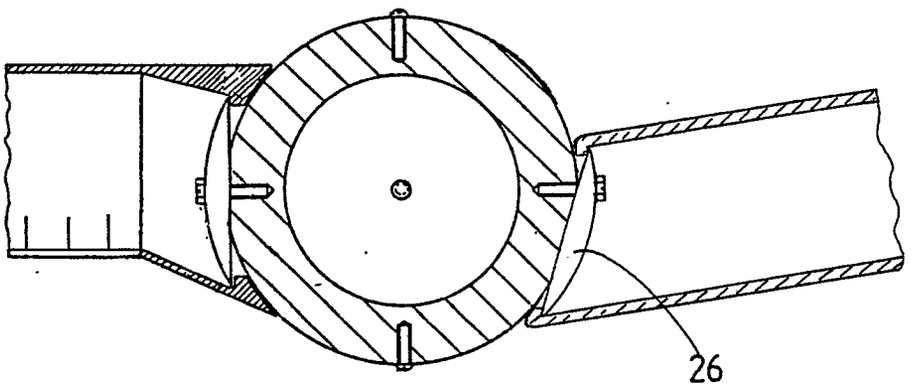

FIG. 6