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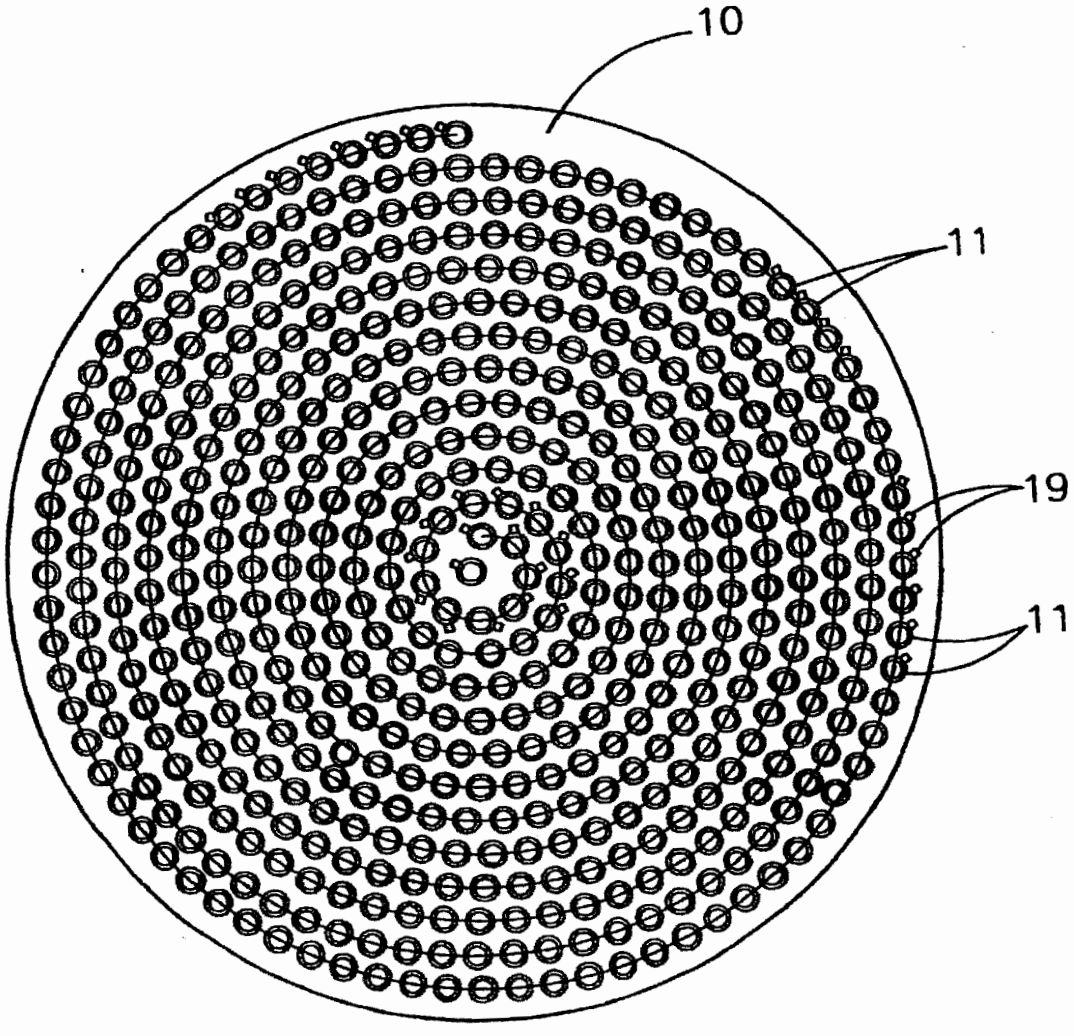

FIG 1

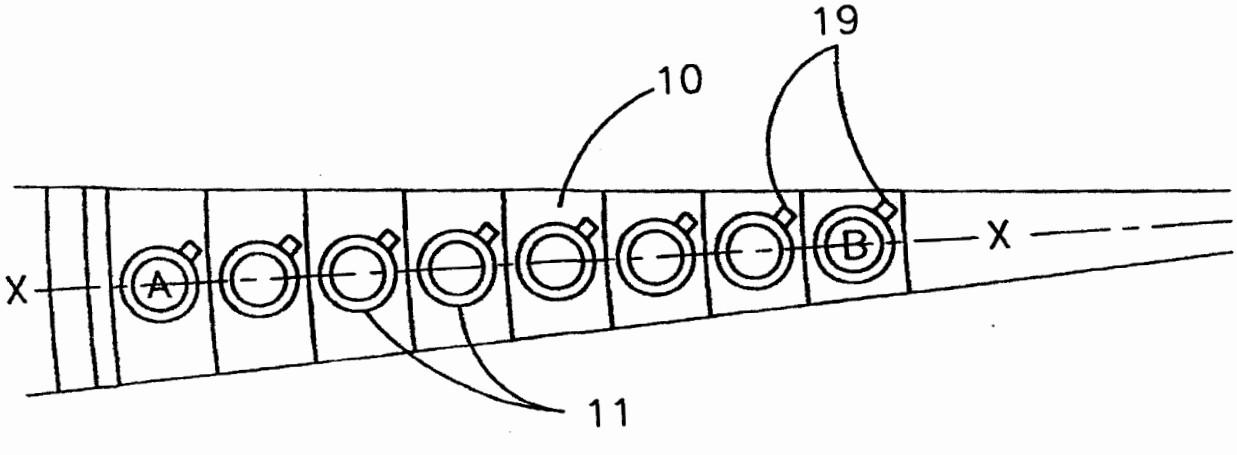

FIG 2

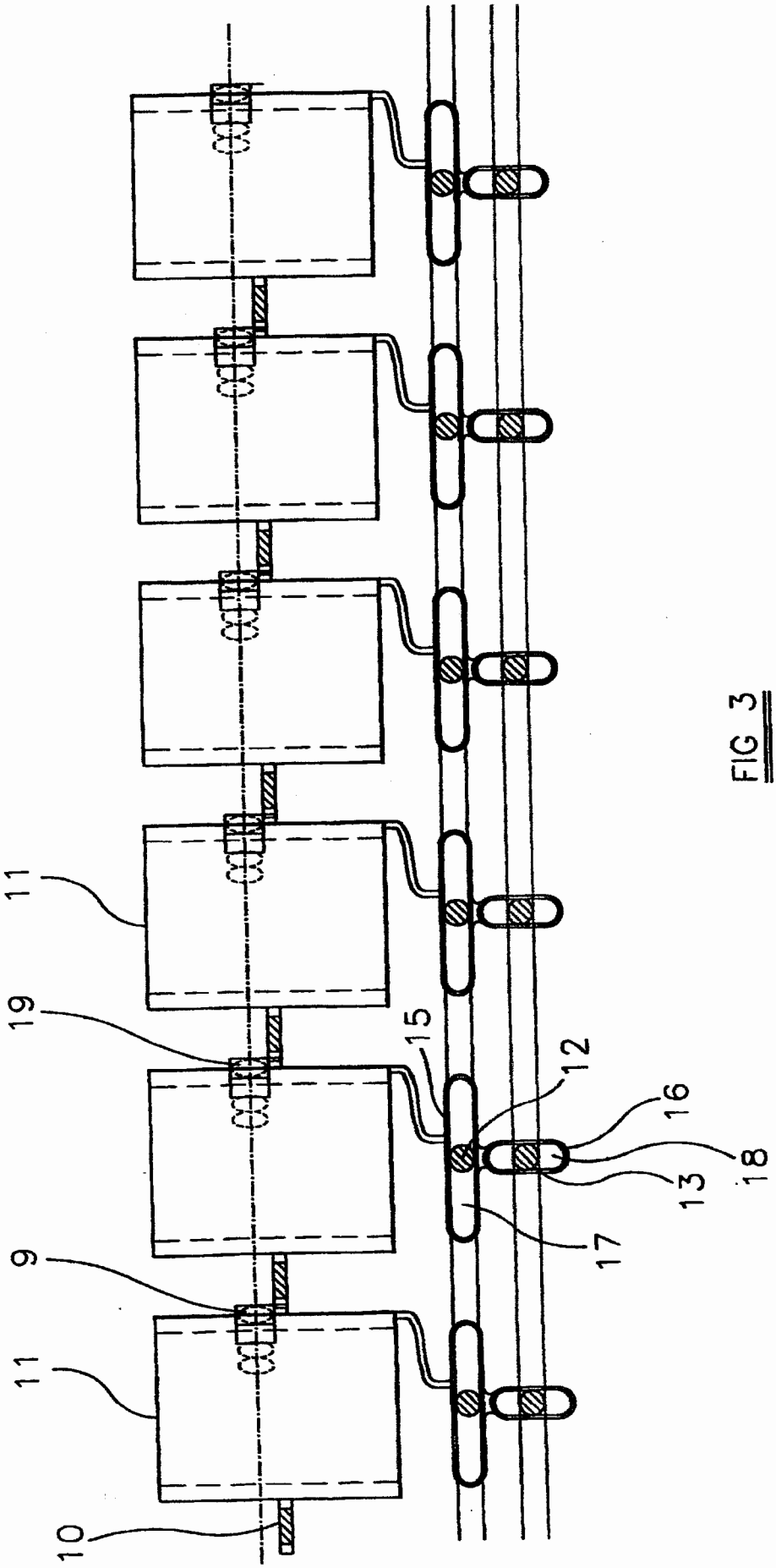

FIG 3

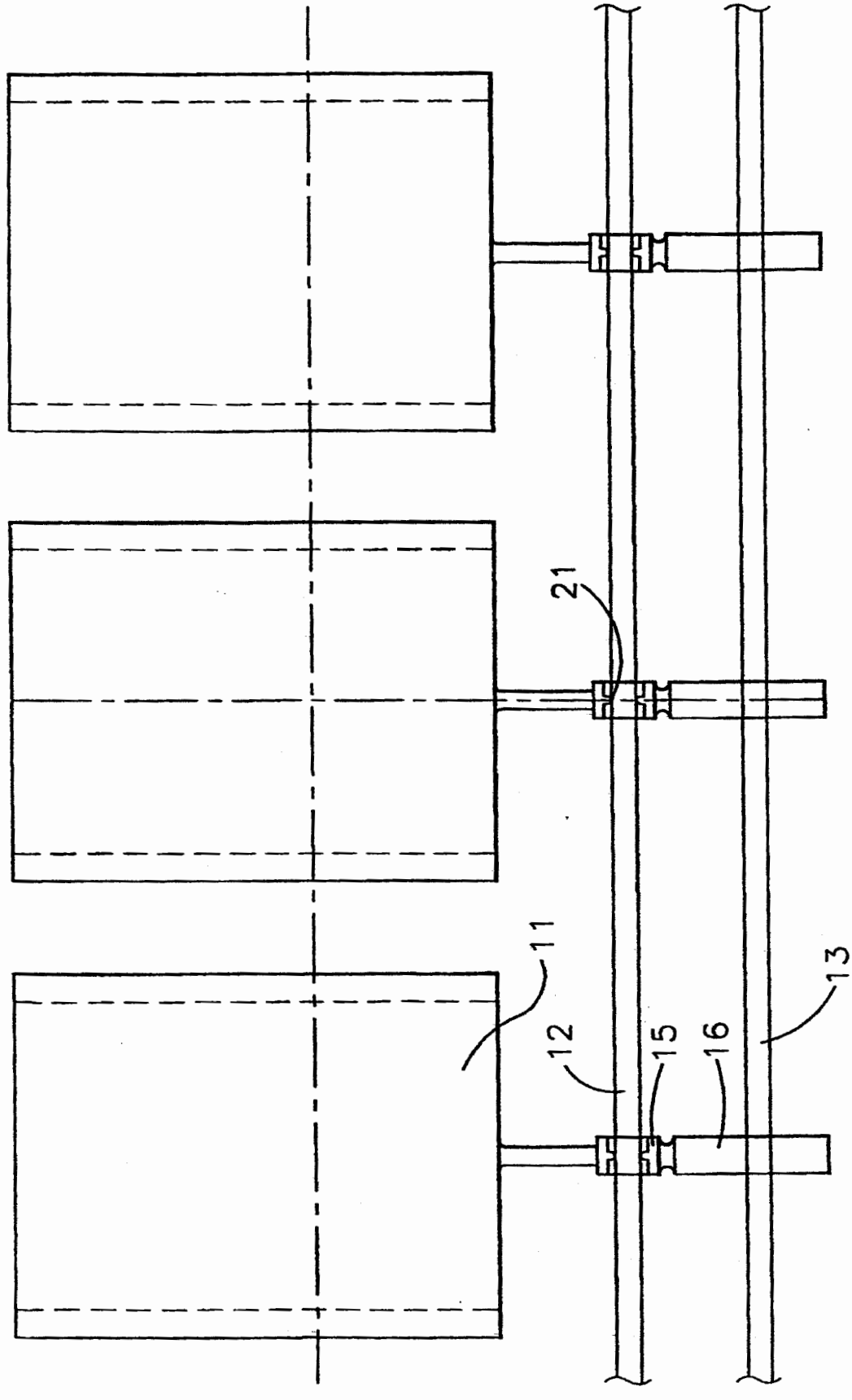

FIG 4

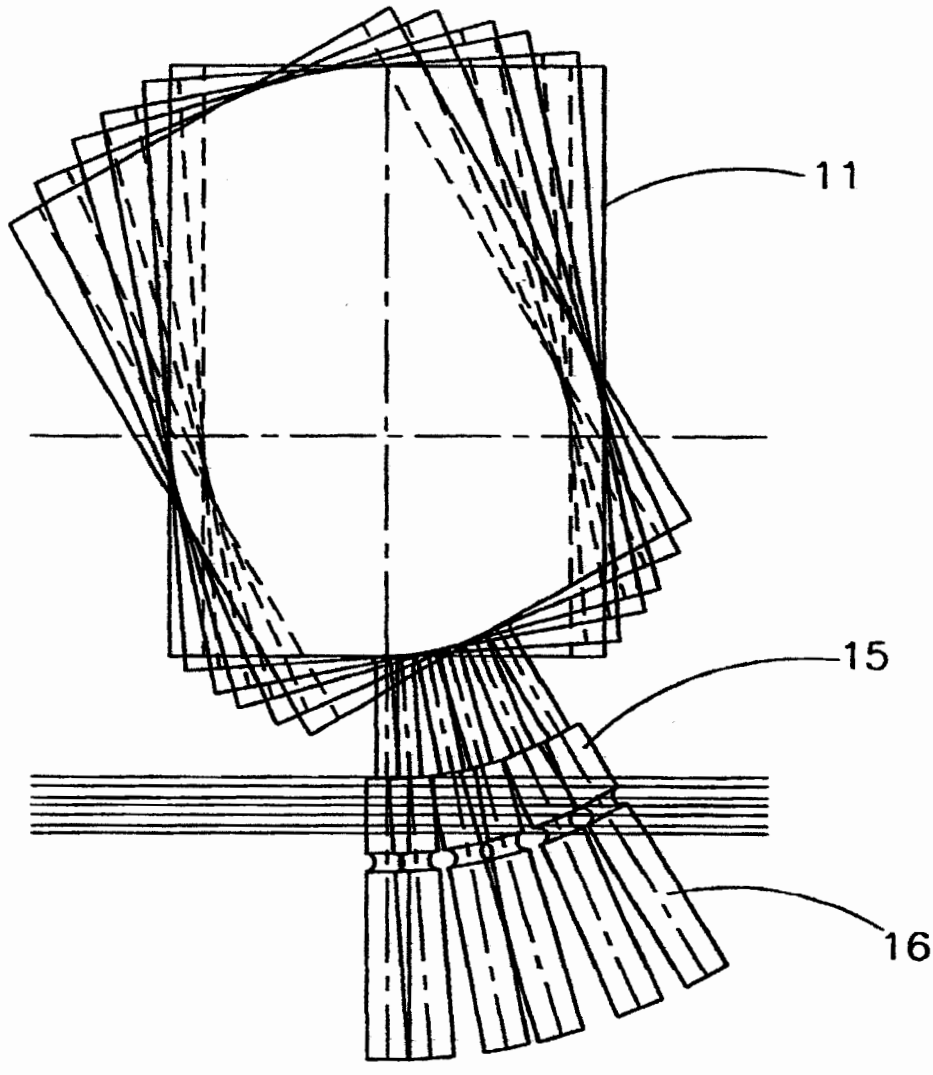

FIG 5

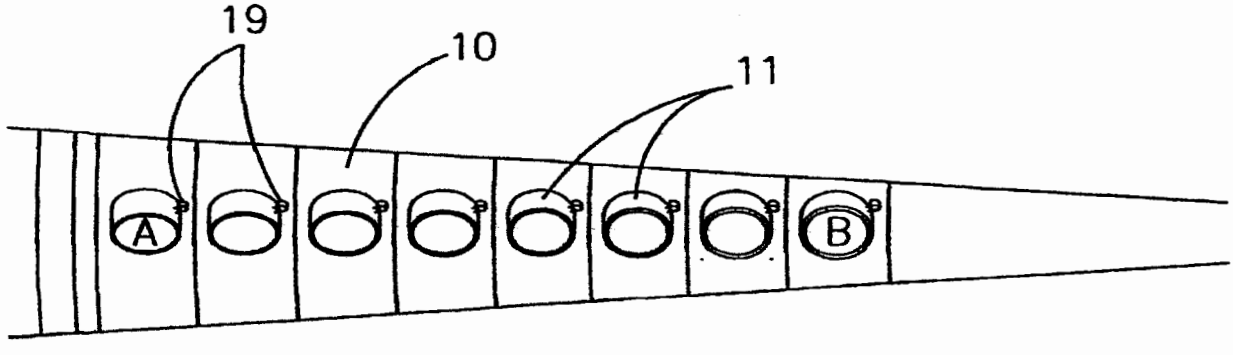

FIG 6

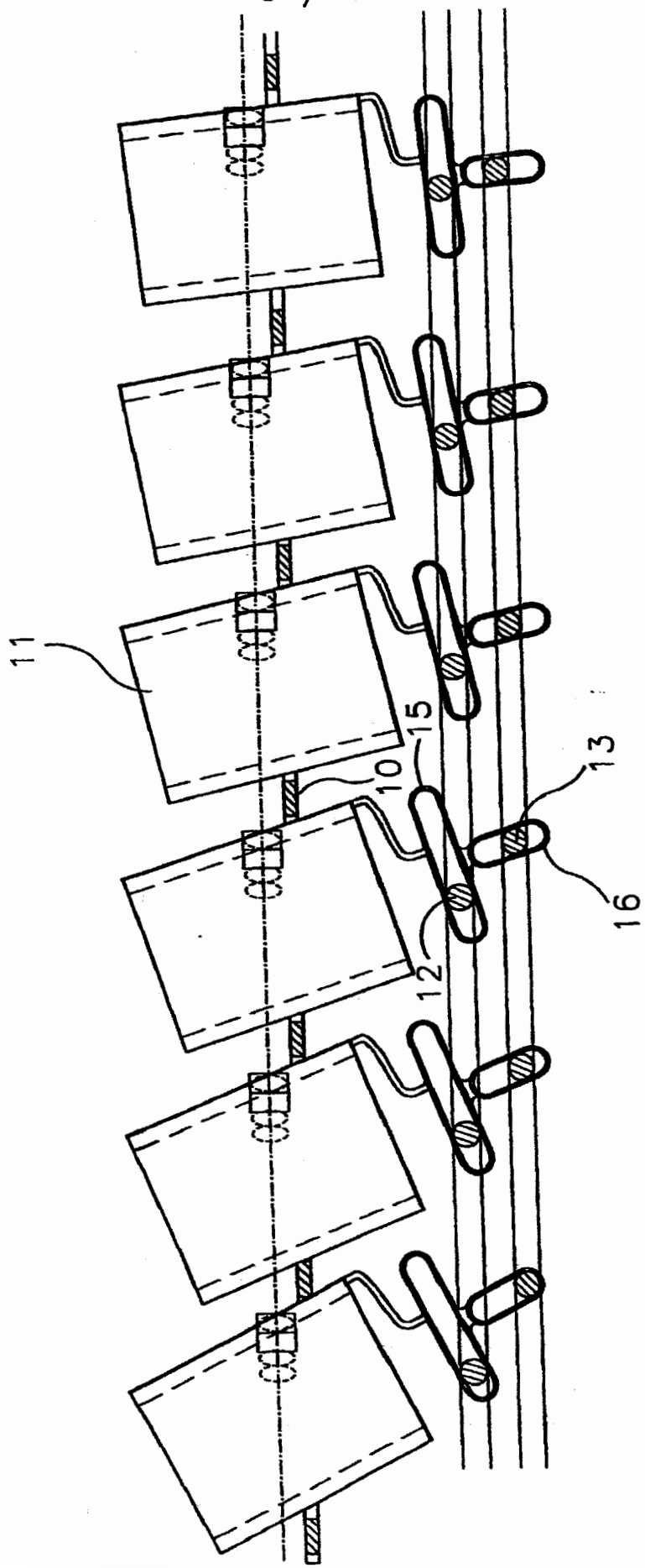

FIG 7

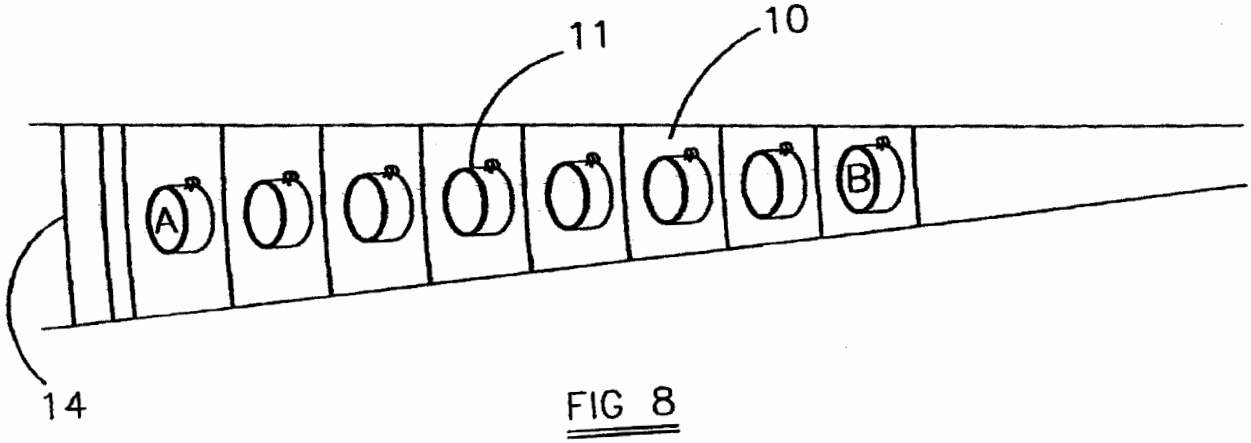

FIG 8

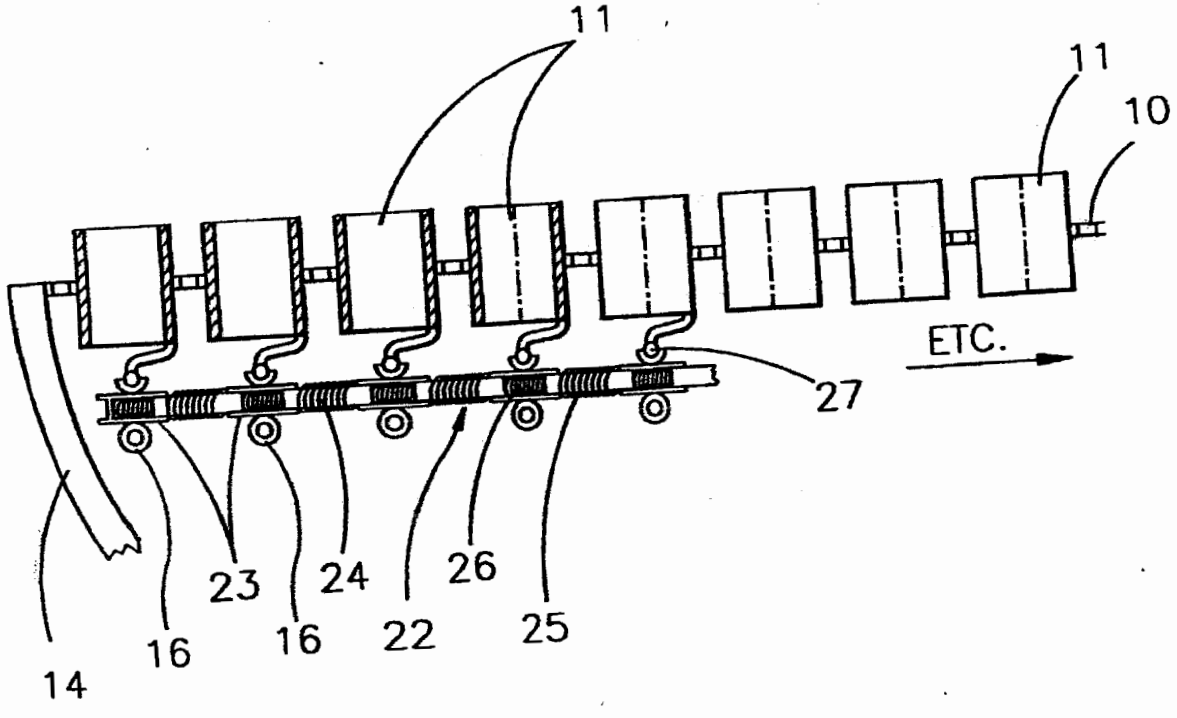

FIG 9

AUTOMATED LIGHTING

This invention relates to automated lighting.

According to the present invention there is provided automated lighting having a source of light formed by a plurality of white light emitting diodes pivotably mounted on a support member so that they are adjustable to change the angle and/or shape of the light beam produced by the diodes.

The invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of an angle adjustment device for use in one embodiment of automated lighting according to the invention,

Figure 2 is a fragmentary plan view of part of the angle adjustment device of Figure 1 on an enlarged scale,

Figure 3 is a section taken along the line X-X of Figure 2 on a much enlarged scale,

Figure 4 is a view generally at right angles to the view of Figure 3,

Figure 5 is a side view showing the manner in which a holder is deflected about a radially outwardly extending axis.

Figure 6 is a plan view similar to Figure 2 but showing the holders deflected about the radially extending axis,

Figure 7 is a side view showing the holders deflected about an axis perpendicular to the radially extending axis,

Figure 8 is a plan view similar to Figure 2 but showing the holders deflected about the axis perpendicular to the radially extending axis, and

Figure 9 is a view similar to Figure 3 of another angle adjustment device for use in another embodiment of automated lighting according to the invention.

Referring firstly to Figures 1 to 8 of the drawings, the angle adjustment device shown therein comprises a support member 10, a plurality of LED holders 11 supported by the support member 10 and two spiral elements 12 and 13.

The support member 10 is in the form of a tightly wound spiral which is punched out of sheet material, typically plastics material or an aluminium alloy, and which is capable of flexing for a purpose which will become apparent hereinafter. The support member 10 is mounted in a retaining bowl 14 and has its outer peripheral edge secured to the lip of the bowl 14.

The LED holders 11 are connected to the support member 10 by universal joints 19 so that the holders 11 can pivot relative to the support member 10.

Each holder 11 has two eyelets 15 and 16. The eyelet 15 has an elongate horizontally extending slot 17 and the eyelet 16 has an elongate vertically extending slot 18.

The first and second elongate spiral elements 12 and 13, typically formed from relatively rigid wire, are wound through the eyelets 15 and 16, respectively. The spiral element 13 is not attached to the eyelets 16 but is slidable relative thereto and is rotatable relative to the support member 10 by an electric motor (not shown). Rotation of the spiral element 13 will move the eyelets 16 radially inwards or radially outwards depending on the direction of rotation of the spiral element 13 and this will cause the holders 11 to tilt as shown in Figures 7 and 8. If the spacing between all turns of the spiral is equal and if the outer end of the spiral element 13 is free and allowed to wind into and out of a guide slot located around the inside of the bowl 14, all holders 11 will be deflected by equal amounts. If the outer end of the spiral element 13 is clamped or driven by a motor at a different speed from the inner end, rotation of the spiral element 13 at the centre will cause unequal deflection of the inner and outer holders 11. Assuming a clockwise wound spiral element 13, clamping the outer edge of the spiral whilst the centre of the spiral element is rotated in an anti-clockwise direction will result in an increase in the spacing between the outer turns of the spiral element 13 and a tightening of the

inner coils. The outer holders will then deflect more than the inner holders. If the spiral element 13 is wound so that the spacing between turns increases as it winds outwards, the outer holders will deflect more than the inner holders. Conversely, if the spiral element 13 is wound so that the spacing between turns decreases as it winds outwards, the inner holders will deflect more than the outer holders.

The spiral element 12 is held captive with respect to the eyelets 15 of each holder 11 so that the spiral element 19 can slide along the slot 17 but cannot slide relative to the eyelet in the direction of the longitudinal extent of the spiral. This can be done as shown in Figure 4 by providing indents 21 in the spiral element 12 in which the eyelet 15 engages or by collars or washers (not shown) fixed to the spiral element 12 on opposite sides of the eyelet 15. The spiral element 12 is angularly displaceable relative to the support member 10 by a second electric motor (not shown). Such angular movement of the spiral element 19 will cause the holders 11 to tilt about a radially extending axis as shown in Figures 5 and 6.

The spiral elements 12 and 13 can be displaced by their respective motors at the same time.

The eyelets 15 and 16 (and the spiral elements 19 and 20) could be interchanged so that the top spiral element causes deflection about an axis at right angles to a radius and the bottom spiral element produces deflection about a radially extending axis.

A third electric motor (not shown) could be provided to push the support member 10, together with the spiral elements 12 and 13, from the planar condition shown in the drawings into a dome-shaped condition or to pull the support member 10, together with the spiral elements 12 and 13, into a bowl-shaped condition. It is for this reason that the support member 10 is formed so as to be capable of flexing.

The holders 11 support white LED's each having blue, red and green guns.

Referring now to Figure 9 of the drawings, the spiral element 12 is replaced by spokes 22. The spokes 22 are telescopically extendible and are located below the support member 10. The spokes 22 extend radially outwards from the axis of the spiral support member 10 and are equi-angularly spaced. Each spoke 22 comprises a plurality of sleeve-like parts 23 and a plurality of rod-like parts 24 each of which is slidably mounted in two adjacent sleeve-like parts 23 thus permitting the spokes 22 to extend and retract. The sleeve-like parts 23 are interconnected by springs 25 and the rod-like parts 24 are interconnected by springs 26. Each holder 11 may be connected to one of the sleeve-like parts 23 by a further universal joint 27.

The spokes 22 are angularly displaceable relative to the support member 10 by an electric motor (not shown). Such angular movement of the spokes 22 will cause the holders 11 to tilt about a radially extending axis as shown in Figure 5 and

6. The holders 11 closer to the outer periphery of the support member 10 will tilt more than the holders 11 closer to the inner periphery of the support member 10 and this will change the angle and shape of the light beam emitted by LED's supported in the holders 11.

The embodiments described above are given by way of example and various modifications will be apparent to a person skilled in the art without departing from the scope of the invention. For example, the spokes 22 or second spiral element 12 could be omitted. In this case, the holders 11 could not be tilted as shown in Figures 5 and 6 but could still be tilted as shown in Figures 7 and 8. Also, the support member 10 may not be capable of flexing and may instead be of fixed planar shape or of fixed dome-like or bowl-like shape.

CLAIMS

1. Automated lighting having a source of light formed by a plurality of white light emitting diodes pivotably mounted on a support member so that they are adjustable to change the angle and/or shape of the light beam produced by the diodes.

2. Automated lighting as claimed in claim 1, wherein each light emitting diode has red, blue and green guns.

3. Automated lighting as claimed in any one of the preceding claims, wherein the support member is planar.

4. Automated lighting as claimed in claim 1 or claim 2, wherein the support member is non-planar.

5. Automated lighting as claimed in claim 1 or claim 2, wherein the support member is movable between a planar and a non-planar configuration.

6. Automated lighting as claimed in any one of the preceding claims, wherein each light emitting diode is pivotable in directions which are at right angles to each other.

7. Automated lighting as claimed in any one of the preceding claims, wherein the light emitting diodes are pivotably mounted on the support member via universal joints.

8. Automated lighting as claimed in any one of the preceding claims, wherein the adjustment of the diodes is performed by an electric motor.