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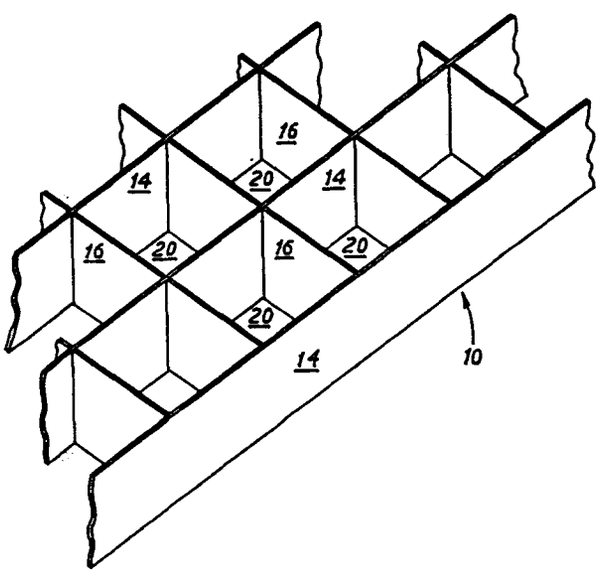
(54) Lighting assembly.

(57) A panel for use in a ceiling comprises a plurality of pairs of electrically conductive members (14; 211), for example, aluminium, spaced from one another by insulating members (16; 214). In use, an electrical supply is connected 5 across the ends of pairs of adjacent conductive members (14; 211). Lamp units (12; 212) comprising a support member (30) for carrying an electric lamp (24) and an associated reflector (26) and provided with contact means for electrical connection to the lamp (24) can be inserted between the conductive members. The support 10 members (30) are so shaped that they are retained between the conductive members with the contact means of the lamp unit (12; 212) engaging them to connect the lamps (24) to the electrical supply.



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LIGHTING ASSEMBLY

The present invention relates to a lighting assembly, in particular, to a lighting assembly which can form part of a suspended ceiling.

The lighting assembly of the invention is characterised in that it comprises at least one pair of electrically conductive members spaced from one another and having an electrical supply connected across their ends, and at least one lamp unit comprising a support member for carrying an electric lamp and being provided with contact means for electrical connection to the lamp; the support member being so shaped that it fits closely, and can be retained, between the conductive members with the contact means of the support member contacting the conductive members to connect the lamp to the electrical supply.

It is envisaged that an entire ceiling may be provided with conductive members, the lamp units being positioned to suit the individual requirements of the room which is to be lit. If, for any reason, it is desired to rearrange the lighting, the lamp units can simply be removed from between the conductive members and re-positioned as required.

In addition to providing a great deal of flexibility in the disposition of the lamp units over the area to be lit, an assembly of this kind is relatively inexpensive and easy to install, it being necessary only to wire the conductive members to the electrical supply, rather than connecting individual lamps. Preferably, the support member frictionally engages the conductive members to retain the lamp unit therebetween. Alternatively, the support member is provided with retaining means; whereby the support member can be inserted between the conductive members and rotated to bring the retaining means into engagement therewith to retain the support member therebetween. Such lamp units can be far more quickly replaced in the event of failure than a conventional lamp with a screw-thread or bayonet fitting. As a result, a lighting assembly utilising lamp units of this kind can be maintained relatively easily and cheaply.

Whilst a ceiling incorporating a lighting assembly in accordance with the invention might employ conventional electric lamps and the 240V a.c. mains supply, such an arrangement would clearly give rise to considerable problems in regard to safety. It is, therefore, proposed to fit the lamp units with low-voltage tungsten-halogen lamps which can be fed from a low-voltage supply of, for example, not more than 25 volts.

In addition to avoiding difficulties in making the installation safe, the use of tungsten-halogen lamps gives rise to a number of other advantages. In particular, tungsten-halogen lamps have a considerably longer lifetime, of the order to 2000-3500 hours, than conventional filament lamps and the cost of replacing lamps is accordingly reduced. Furthermore, tungsten-halogen lamps have three times the light output of such conventional lamps and due to this increased efficiency, a correspondingly lower heat output.

Although, the assembly of the invention is particularly advantageous when utilised in a ceiling, it will be appreciated that a similar arrangement can equally well be used in single-lamp fixtures, for example, spot-lights or down lighters.

The assembly may also be provided with means for securing it across an opening provided in a duct forming part of a space heating or air-conditioning installation.

In a further aspect, the invention also provides a lighting unit comprising a housing having an open end and provided on an interior surface thereof with contact pads connectable to an electrical supply, and a support member for carrying an electric lamp and being provided with contact means for electrical connection to the lamp; the support member being frictionally-engageable with the housing so that it can be retained in the open end of the housing with the contact means of the support member engaging the contact pads of the housing to connect the lamp to the electrical supply.

Embodiments of a lighting assembly in accordance with the invention will now be described in detail, by way of example, with reference to the drawings, in which :-

Figure 1 is a fragmentary perspective view of a portion of a lattice forming part of a lighting panel in accordance with the

invention;

Figure 2 is an exploded view of part of the lattice of Figure 1;

Figure 3 is an exploded perspective view of a lamp unit of the lighting panel of the invention;

Figure 4 is a perspective view of a duct forming part of a second lighting unit in accordance with the invention;

Figures 5 and 6 are perspective views of the two types of conductive strip which form a lattice for use with the duct of Figure 4;

Figures 7 and 8 are schematic sectional views showing how the conductive strips of Figures 5 and 6 respectively engage the duct of Figure 4;

Figure 9 is a perspective view of a third lighting panel in accordance with the invention;

Figure 10 is a fragmentary view of a conductive member forming a part of the panel of Figure 9;

Figure 11 is a top plan view of the lighting unit of Figure 9;

Figure 12 is a sectional view of the lighting unit of Figures 9 and 11;

Figure 13 is a sectional view of a modified lighting unit for use in the lighting panel of Figure 9.

Figure 14 is a top plan view of a further embodiment of a lighting unit for use in the panel of Figure 9;

Figure 15 is a side elevational view of the lighting unit of Figure 14;

Figure 16 is an exploded view of the lighting unit of Figure 14;

Figure 17 is an exploded view of a further embodiment of a lighting unit for use with the panel of Figure 9; and

Figure 18 is a view from below of a stiill further embodiment of a lighting assembly in accordance with the invention;

Figure 19 is a transverse sectional view of the assembly of Figure 18; and

Figure 20 is a perspective view of a lamp unit of the assembly of Figure 18.

The lighting panel shown in Figures 1 to 3 of the drawings is

intended for use in a suspended ceiling. It comprises a lattice 10 which forms the ceiling panel proper and one or more lamp units which can be inserted as desired into the cells defined by the lattice.

The construction of the lattice 10 is shown in detail in Figures 1 and 2. It consists of a plurality of strips 14 of electrically conductive material arranged substantially parallel to one another. The conductive strips 14 are separated and spaced from one another by a second set of strips 16 of insulating material. The conductive strips 14 may be of copper but, in order to reduce the cost of the panel and to make it as light as possible, while still having adequate strength, it is preferred that they are of aluminium. The insulating strips 16 may be of any plastics material having suitable insulating properties. Both sets of strips 14 and 16 are provided with regularly-spaced slots 18 which extend half-way across their width. The slots 18 enable the two sets of strips to be interlocked in a well-known manner to form a generally rigid lattice of open-ended cells 20.

The lattice 10 is in use mounted to form part of a suspended ceiling and may be provided with any suitable arrangement for securing it in place. In general it is more convenient to make the lattice 10 in relatively small sections, say in square sections 0.5m across. The strips 14 and 16 defining the lattice may conveniently be arranged at intervals of 50mm so that each lattice section includes one hundred cells into which the lamp units 12 may be fitted.

In use, a suitable electrical supply (not shown) is connected across the ends of pairs of adjacent conductive strips 14.

A typical lamp unit 12 is shown in Figure 3. It consists of a support member 22 which carries an electric lamp 24, a reflector 26 and, optionally, a diffuser lens 28.

The support member 22 consists of a generally flat front plate 30 of dimensions such that it can be pushed into the open end of a cell 20 of the lattice 10 and is a close fit therein. The front plate 30 has a circular central opening 31 in which is mounted the reflector 26 and the electric lamp 24.

At the rear of the front plate 30 are two elongate posts 32 of

square cross-section. If the front plate 30 is of plastics material the posts 32 may be moulded integrally with it. The posts 32 are positioned at diagonally opposite corners of the front plate 30 and diverge slightly so that they must be flexed towards one another to permit the lamp unit to be positioned in the lattice cells.

The reflector 26 may be formed in any convenient manner from suitable materials. For example, it may be formed by pressing from sheet aluminium or, alternatively, could be a plastics moulding, the interior surface of which has been metallised.

The electric lamp 24 is mounted to the reflector 26 by means of a lamp holder 34 and is provided with wires 36 through which electrical power can be supplied to the lamp. The free ends of the wires 36 are secured to the free ends of the posts 32 of the support member 22 by means of sleeves 38 which are crimped around the posts 32. The sleeves 38 are of electrically-conductive material and serve as electrical contacts for connecting the lamp 24 to a suitable electrical supply.

The lamp unit 12 may also be provided with a diffuser lens 28 which is fitted in the central opening 31 of the front plate 30 of the support member. The lens 28 may, for example, be of polycarbonate material.

In use, the posts 32 at the rear of the lamp unit 12 are flexed slightly towards one another so that the lamp unit 12 can be pushed into any chosen cell 20 of the lattice 10. The front plate 30 of the lamp unit 12 fits closely into the open end of the cell 20. The posts 32 are urged outwardly due to their natural resilience, bringing the conductive sleeves 38 into engagement with the conductive strips 14 of the lattice. Thus the lamp 24 is electrically connected to the lattice 10.

In the lighting panel shown in Figures 1 to 3 the conductive strips 14 and insulating members 16 are in the form of straight strips and are assembled to form a lattice of square cells 20 into which the lamp unit front plate 30 is fitted. This shape is particularly convenient because, if the posts 32 are provided on diagonally opposite corners of the lamp unit 12, electrical contact will automatically be established on inserting the lamp unit 12 whatever its orientation relative to the lattice 10. The same is,

of course, true of other regular quadrilateral shapes. Similarly, contact will be made automatically if the lattice 10 is formed using conductive strips of zig-zag configuration arranged to form an array of hexagonal cells.

It is, of course, possible to utilize a lattice having cells of any desired shape provided it can be formed from a plurality of parallel conducting strips. With many shapes it will, however, only be possible to insert the lamp units 12 in one particular orientation.

As mentioned above, the lamp 24 is preferably a low-voltage tungsten-halogen lamp, for example, a 12 volt/20 watt lamp. Such a lamp requires a twelve-volt supply and it is, therefore, necessary that a suitable transformer be connected between the 240 volt mains supply and the lattice 10. Each lattice section may be provided with its own separate transformer or, alternatively, the lattice sections may be connected through a bus bar to a single transformer.

In some circumstances, it may also be desirable to use 24v lamps and a corresponding supply in order to reduce the amperage through the system and the voltage drop problems.

It must also be ensured that the conductive strips 14 of the lattice 10 are suitably dimensioned to carry current to the lamps 24. For a 12 volt/20 watt lamp, the conductive strips 14 should have a minimum cross-section of 10 mm^2 where they are of aluminium and 4 mm^2 where they are of copper. The 50 mm square cells 20 described above are suitable for housing 20 watt lamps but if higher wattage lamps, for example, 50 watt, are used it may be necessary to make the cells 20 larger, say, 70 mm square to avoid problems over dissipation of the heat generated.

The lattice section 10 described above may support up to one hundred lamp units 12. Clearly, it is unlikely that so many lamps would be needed and, indeed, it is possible that if too many lamps were used, the system would be overloaded. In order to avoid any risk of overload, the lattice might be mounted so that only some of its conductive strips 14 are connected to the electrical supply. This would, of course, have the disadvantage that the range of positions in which lamp units could be mounted would be restricted. Alternatively, the lattice 10 could be provided with a suitable cut-

out device to prevent overloading.

As mentioned above, although particularly advantageous in relation to panels for suspended ceilings, it is also envisaged that a similar lamp unit 12 to that shown in Figure 3 could be used in the context of a single lighting unit: in effect, a lattice having a single cell 20. The construction described could, thus, be utilized in spotlights, downlighters fitted to conventional ceilings, or other single light sources.

Furthermore, a lighting panel of the general type described above may be modified relatively easily for incorporation into heating or air-conditioning systems. A panel modified for this purpose is shown in Figures 4 to 8 of the drawings.

As in the panel of Figures 1 to 3, the panel of Figures 4 to 8 consists of a lattice 50 and at least one lamp unit (not shown). The lattice 50 is, however, supported by means of a duct 52 forming part of a space-heating or air-conditioning installation. The duct 52, shown in Figure 4 is of sheet metal shaped into a three-sided rectangular channel-section. It is supported in use so that the open side of the channel faces downwards into the room below.

The lattice 50 is mounted so that it extends across the open side of the duct 52. Since the lattice 50 is of open construction, air passing through the duct 52 can easily flow through the lattice 50 into the space below.

Whilst the duct 52 may form part of any of a number of different types of heating or air-conditioning installations, it must be provided with means both for supporting, and for making electrical connections to, the lattice 50. Conveniently, the lattice 50 may connected to the electrical supply through the duct 52 itself. One arrangement for achieving suitable electrical connections is illustrated in Figures 5 to 8.

The duct 52 is provided on one side with an integrally-formed, inwardly-directed flange 54. The opposite side wall of the duct 52 also provided with an inwardly-directed flange 56 but the flange 56 is formed separately from the duct 52. A layer of insulating material 58 is interposed between the flange 56 and the duct wall to isolate the flange 56 from the duct wall 52. The flange 56 and duct 52 may thus be connected across an electrical supply to effect

electrical contact to the lattice 50.

In order to ensure that proper connections are made to the lattice 50 it is constructed using two different types of conductive strip 60 and 62.

The strips 60 shown in Figure 5 are provided at one end with a narrow slot 64 which, in use, receives and contacts the flange 54 formed integrally with the duct 52. At their other ends the strips 60 are formed with a recess or cut-out 66 so that when they are in their operative position, extending transversely across the duct 52, they do not contact the flange 56.

Conversely, the strips 62 (as shown in Figure 6) are provided at one end with a tab 68 extending perpendicularly to the strip such that, in use, the tab 68 abuts the underside of the flange 56 to make electrical contact with it. The other ends of the strips 62 are again shaped to form a recess 70 which surrounds, but is spaced from, the flange 54 so that no electrical contact is made.

The two different types of strip 60 and 62 are arranged alternately and separated from one another by slotted insulating members to form the lattice 52 in the manner described in relation to Figures 1 to 3. When the lattice 50 is mounted across the open side of the duct 52, the strips 60 contact the flange 54 but not the flange 56 while the alternate strips 62 contact the flange 56 but not the flange 54, as shown in Figures 7 and 8. The engagement of the strips 60 with the flange 54 of the duct 52 also assists in holding the lattice 50 in place. Also, the tabs 68 are secured to the flange 56 by, for example, self-tapping screws 72.

The mounting of the lattice 50 across an opening in a duct forming part of a space heating or air-conditioning installation has the further advantage that heat generated by the lamps or by a transformer associated with the lattice can be drawn off through the duct. The hot air can then either be simply discharged into the atmosphere or, preferably, utilised in the heating system. Using the heat generated by the lamps in this way enables considerable savings in energy to be effected. Where the lattice is to be mounted as part of a space-heating or air-conditioning system, it is preferred to use tungsten/halogen lamps in combination with dichroic reflectors which allow around 60% of the heat generated by the lamps

to pass back into the duct.

Figures 9 to 13 show an alternative form of lighting panel in accordance with the invention.

As in the arrangement shown in Figures 1 to 8, the panel comprises of a lattice 110 and one or more lamp units 112.

As in the panel of Figure 1, the lattice 112 consists of a plurality of slotted insulating members 116 which interlock with, and space apart from one another, a plurality of conductive elements 114. However, the conductive elements 114 differ from those of Figure 1 in that they are not formed from strips of conductive material but are instead of insulating material 115, for example, plastics, similar to the insulating members 116. The conductive part, through which electrical contact is made between the lamp units and the electrical supply, is provided by means of a strip of conductive material 117 which is crimped over the edge of each insulating strip 115, as shown in Figure 10. The conductive strip 117 thus provides means for making electrical contacts on both faces of the conductive element 114.

This construction has the advantage that the conductive elements 114 of the lattice 110 are cheaper to produce than the conductive strips 14 of Figure 1. Furthermore, if the lattice panels are mounted to form a ceiling with the conductive strips 117 uppermost, none of the parts of the lattice 110 which are immediately accessible from the space below are electrically conductive. Thus the danger of electric shocks to persons in the room below, which is minimised by the use of a 24 volt supply, is even further reduced.

The lattice construction of Figures 9 and 10 can also be adapted easily for use where the lattice panels 110 are to be incorporated into air-conditioning or ventilating systems as described above. The ends of the insulating strips 115 are slotted to engage the flanged edges of the air duct. The conductive strips 117 crimped onto the edges of the insulating strips 115 are shorter in length than the insulating strips 115 and are arranged so that each overlays only one of the slots 164 in the strip 115. So, each conductive element 114 is such that electrical contact is made at one end through the engagement of the conductive strip 117 with the

duct flange but, because the conductive strip 117 does not extend to the other slot, the conductive strip is electrically-isolated from the flange at the other side of the duct. The required electrical connections to the lattice 110 can easily be made by alternating the orientation of the conductive elements 114 so that alternate strips make electrical contact with each of the two flanges provided on the duct.

Figures 11 to 17 show various forms of lamp unit 112 and 113 which are adapted for use with a lattice panel 110 formed using conductive 30 elements 114 of the type shown in Figure 10.

Each of the lamp units 112 and 113 shown in Figures 11 to 13 is provided with a front plate 130 and a retaining plate 160 which are spaced from one another by a distance slightly greater than the thickness of the lattice 110 by means of a yoke 162. The yoke 162 may be secured to the front and retaining plates 130 and 160 in any convenient manner, for example, by welding or by means of rivets or screws.

Lamp unit 112 is intended to function as a downlighter and, consequently, its yoke 162 is provided with widely-spaced legs 164 so that it can accommodate a lamp 124 and, if desired, a reflector.

Again, where the lattice 110 is mounted across an air-conditioning or space-heating duct, a tungsten/halogen lamp mounted in a dichroic reflector is used.

The front plate 130 of lamp unit 112 is provided with a large central opening 131 through which light from the lamp 124 can pass.

Lamp unit 113, on the other hand, has only a small central opening 131 in its front plate 130. The opening 131 is provided only to enable electrical leads from a lighting device, for example, a spot-lamp suspended from the front plate 130, to pass through the front plate 130 to the rear of the lamp unit 113.

In both lamp units 112 and 113, the front plate 130 is square and is of dimensions such that it is slightly larger than the cells 120 of the lattice 110 into which the lamp unit is to be fitted. The retaining plate 160 is also square in shape but is of dimensions such that it can be inserted into the cells 120 of the lattice 110. However, the distance between diagonally-opposite corners of the retaining plate 160 is greater than the distance between opposite

walls of the lattice cell 120. Furthermore, in each case the retaining plate 160, is rotated through 45° relative to the front plate 130 so that the corners of the retaining plate 160 are in line with the midpoints of the edges of the front plate 160.

The lamp unit 112 or 113 can be readily positioned in the lattice 110 by inserting the retaining plate 160 into a lattice cell 120 and pushing the unit 112 or 113 into the cell 120 until the rearmost surface of the front plate 130 butts up against the edges of the insulating members 116 and conductive elements 114 defining the cell. The lamp unit 112 or 113 is then rotated through 45° until the edges of the front plate 130 are parallel to the walls of the cell 120. In this position, the corners of the retaining plate 160 overhang the walls of the cell 120 to hold the lamp unit 112 or 113 in place. As mentioned above, the front and retaining plates 130 and 160 are spaced apart by a distance slightly greater than the depth of the members forming the lattice 110 so that when the corners of the retaining plate 160 overhang the lattice walls, the front plate 130 lies snugly against their opposite edges.

The lamp units 112 and 113 can be removed from the lattice 110 by reversing the "push-and-twist" action described above. The lamp unit 112 or 113 is rotated until the retaining plate 160 is aligned with the walls of the lattice cell 120; in this position, the lamp unit 112 or 113 can easily be withdrawn from the cell 120.

The necessary electrical connections between the lamp unit 112 or 113 and the conductive elements 114 of the lattice 110 are made by means of conductive posts 132 secured to the underside of the retaining plate 160. Each post 132, of which there are four, is mounted adjacent a corner of the retaining plate 160 but is spaced from it by a distance such that, when the retaining plate 160 is oriented so as to hold the lamp unit 112 or 113 in place in the lattice 110, the posts 132 contact the conductive strips 117 along the uppermost edges of the elements 114 of the lattice 110. The posts 132 may be connected to a lamp holder 134 in the lamp unit 112 or to a lighting fitting mounted on the front plate 130 of lamp unit 113 in any convenient manner. Preferably, the posts 132 are connected together by means of contact strips 133 to form two pairs, so that the lamp unit is properly connected to the electrical supply

through the lattice 110 whatever its orientation on insertion into the lattice.

The lamp units 150 and 180 shown in Figures 14 to 16 and 17, respectively are provided with similar forms of contact and retaining arrangement to the units 112 and 113 shown in Figures 11 to 13. However, the construction of both is sufficiently simple and the manufacturing costs correspondingly low, that both forms of unit 150 and 180 are disposable. That is to say, the lamp unit as a whole is to be discarded when the lamp fails rather than merely the lamp itself.

The lamp unit 150 shown in Figures 11 to 13 comprises a lamp capsule 152, an aluminium reflector 154 of generally parabolic shape and a lens 156. The lamp capsule 152 is mounted in a central opening 158 of the reflector 154 and is bonded to it. The contact pins 160 of the lamp capsule 152 project from the reflector opening 158. The wider end of the reflector 154 is closed by means of the lens 156, the reflector 154 being crimped onto the lens 156 to hold it in place.

The reflector 154 is provided with a cylindrical neck portion 162 defining the central opening 158. The end of the neck 162 is stepped to form a portion of small radius 164. The small radius portion 164 is just small enough to pass through a hole 166 formed at the centre of a square retaining plate 168. Once the retaining plate 168 is properly located on the reflector 154, the end of the small radius portion 164 is turned outwards to hold the retaining plate 168 in place.

Contact with the conductive parts 117 of the panel is made by means of a pair of contact plates 170. Each contact plate 170 is generally L-shaped and is shaped to form a downwardly directed tab 172 at the end of each limb of the L. Each tab 172 has its edges bent round so that they are at 90° to one another. When properly positioned in the lattice the edges of each tab 172 contact the two perpendicular members forming one corner of a lattice cell. Each contact plate 170 is cut away at its vortex so that it does not contact the other contact plate 170 when the two are mounted on the retaining plate 168.

The contact plates 172 are mounted on the upper surface of the

retaining plate 168 with tabs 172 projecting downwards through appropriately positioned slots 174 formed in the retaining plate 168. The contact pins 160 of the lamp capsule 152 pass through the contact plates 172, thus making electrical contact with them. The contact plates 172 are rivetted (not shown) to the retaining plate 168.

The assembled lamp unit 168 is inserted into and removed from the lattice in the same manner as the lamp units 112 and 113 described above.

The lamp unit 180 shown in Figure 17 is similar to that of Figure 14 to 16 in that it includes a lamp capsule 182, a reflector 184, a lens 186 and a retaining plate 188. However, the contact plates 190 are secured to the underside of the retaining plate 188 by means of rivets.

Where the lighting assembly of the invention is to be used in, for example, retail premises, it may be desired, for reasons of fashion, to change the appearance of the ceiling or display lighting panel at fairly frequent intervals. Clearly, if the whole lighting assembly has to be discarded each time the ceiling is changed, the costs involved could become prohibitively high. The assembly shown in Figures 18 to 20 is intended to meet this difficulty by providing an assembly whose appearance can be changed without necessitating complete replacement of the lighting assembly. This is achieved by separating the functional parts required for connection to the electrical supply from the decorative lattice panel used to form the ceiling proper.

In the assembly shown in Figures 18 to 20, the conductive members with which the lamp units make contact are in the form of conductive track units 210 each consisting of a pair of parallel conductive elements 211 spaced from one another by insulating blocks 214 at the ends of each track unit.

The track units 210 shown in the drawings are adapted for mounting across the downwardly-directed open face of a heating or air conditioning duct 252 in a similar manner to that illustrated in Figures 4 to 8. However, as shown in Figure 18 the duct 252 itself is of insulating material and is provided with a pair of inwardly-directed conductive flanges 254 which act as rails along which the

track units 210 can slide. The insulating blocks 214 of each track unit 210 are provided with slots 256 in which the flanges 254 lodge, thus enabling the track units 210 to be positioned anywhere along the length of the duct 252 at will. In each track unit 210, each of the conductive elements 211 is cut short at one of its ends so that it only contacts one of the pair of flanges 254.

Although the track units 210 shown in the drawings are mounted by means of the duct 252 it will be appreciated that they coulld be fixed equally easily in place by a variety of other methods.

As illustrated in Figure 19, the track units 210 are mounted across the open face of the duct 252 and a purely decorative lattice panel 240 is suspended beneath the track units 210 in any convenient manner so as to mask the track units 210 from view. The lattice panel 240 is preferably of insultaing material.

The lamp units 212 for use with the assemblly of Figures 18 to 20 are provided with a support member 230 similar to that of Figures 14 to 17 in that each has a front plate 231, which lodges against the underside of the lattice panel, 240 and a retaining plate 244, offset by 45° to the front plate. However the lamp itself 224 is suspended below the front plate 231 rather than being disposed between the front and retaining plates. The retaining plate 244 is spaced from the front plate 231 by means of a spacer 246 of smaller dimension than either plate. The contact tabs 272 are mounted on the rear of the front plate 231 and extend towards the retaining plate 244.

The manner in which the lamp unit 212 is mounted on the ceiling is the same as that described in relation to Figures 9 to 17. However, the retaining plate 244 is passed through the lattice panel 240 and between the conductive elements 211 of the track unit 210 above. The lamp unit 212 is then twisted to engage the corners of the retaining plate 244 over the edges of the conductive elements 211 and to bring the contact tabs 272 into contact with them to connect the lamp unit 212 to the electrical supply.

With this arrangement, the lattice panel 240 can be removed and replaced as required without needing to replace the entire lighting assembly.

Whilst the constructions described above are intended primarily for use in ceilings, it will be apparent that they can equally well be mounted vertically or in any other orientation for use in other lighting applications, for example, in display lighting.

CLAIMS

1. A lighting assembly for use in a ceiling characterised in that the assembly comprises at least one pair of electrically conductive members (14; 60, 62; 114; 211) spaced from one another and having an electrical supply connected across the ends, and at least one lamp unit (12; 112; 150; 180; 212) comprising a support member (30; 130; 231) for carrying an electric lamp (24; 124; 224) and being provided with contact means (38; 132; 172; 272) for electrical connection to the lamp; the support member being so shaped that it fits closely, and can be retained, between the conductive members with the contact means of the support member contacting the conductive members to connect the lamp to the electrical supply.

2. An assembly according to claim 1 characterised in that it comprises a plurality of pairs of electrically conductive members (14; 60; 62; 114) spaced from one another by a plurality of insulating members (16; 116) to form a cellular lattice; the electrical supply being connected across the ends of pairs of adjacent conductive members; the support member of the lamp unit (12; 112; 150; 180) being shaped to fit closely into and to be retained in the cells of the lattice.

3. An assembly according to claim 2 characterised in that the lattice cells are of quadrilateral or hexagonal shape; the support member (30; 130) having its contact means (38; 132; 172) disposed at diagonally opposite corners thereof, whereby the support member can be inserted into the cells in a plurality of different orientations relative thereto with the contact means (38; 132; 172) engaging the conductive elements (14; 60; 62; 114).

4. An assembly according to claim 1, 2 or 3 characterised in that the conductive members (60; 62; 211) are provided with means for securing them across an opening provided in a duct (52; 252) forming part of a space heating or air conditioning installation.

5. An assembly according to claim 4 characterised in that the electrical supply is connected to the conductive members (60, 62; 211) by means of the walls of the duct (52; 252).

6. An assembly according to claim 4 or 5 characterised in that the conductive members (211) engage the duct (252) so as to be slidable lengthways thereof.

7. An assembly according to any preceding claim characterised in that it further includes a lattice panel (240) for mounting over the conductive members whereby the support member extends through an opening of the lattice cell to engage the conductive members (211).

8. An assembly according to any preceding claim characterised in that each conductive member (114) includes an insulating body (115) having a longitudinally-extending conductive strip (117) mounted thereon at the side of the body which, in use, is remote from the region to be lit.

9. An assembly according to claim 8 characterised in that each strip (117) of conductive material is crimped over an edge of the body (115) so as to provide conductive contact means on both sides of the conductive member.

10. A lighting unit characterised in that it comprises a housing having an open end and provided on an interior surface thereof with contact pads connectable to an electrical supply, and a support member for carrying an electric lamp and being provided with contact means for electrical connection to the lamp; the support member being frictionally-engageable with the housing so that it can be retained in the open end of the housing with the contact means of the support member engaging the contact pads of the housing to connect the lamp to the electrical supply.

11. Apparatus according to any preceding claim characterised in that the support member frictionally engages the housing or

conductive members (14; 60, 62; 114; 211) to retain the lamp (24; 124; 224) therein.

12. Apparatus according to any of claims 1 to 9 characterised in that the support member is provided with retaining means (160; 168; 224); whereby the support members can be inserted between the conductive members (14; 60, 62; 114; 211) and rotated to bring the retaining means into engagement therewith to retain the support member therebetween.

13. Apparatus according to claim 12 characterised in that the contact means (132; 172; 272) are carried by the retaining means (160; 168; 244) and are positioned so as to be brought into engagement with the conductive members (14; 60, 62; 114; 211) on bringing the retaining means into engagement therewith.

14. Apparatus according to claim 13 characterised in that the retaining means (160; 168; 244) includes a lateral projection engageable with the edges of the conductive members.

15. Apparatus according to claim 12, 13 or 14 in which the contact means (132; 172; 272) are of resilient material and are, in use, resiliently biassed into engagement with the conductive members.

16. Apparatus according to any preceding claim characterised in that each contact means (172; 272) comprises a pair of contact members each having two contact surfaces extending perpendicular to one another, each contact surface of one member being spaced from a contact surface of the other member by a distance not less than the distance between pairs of conductive members.

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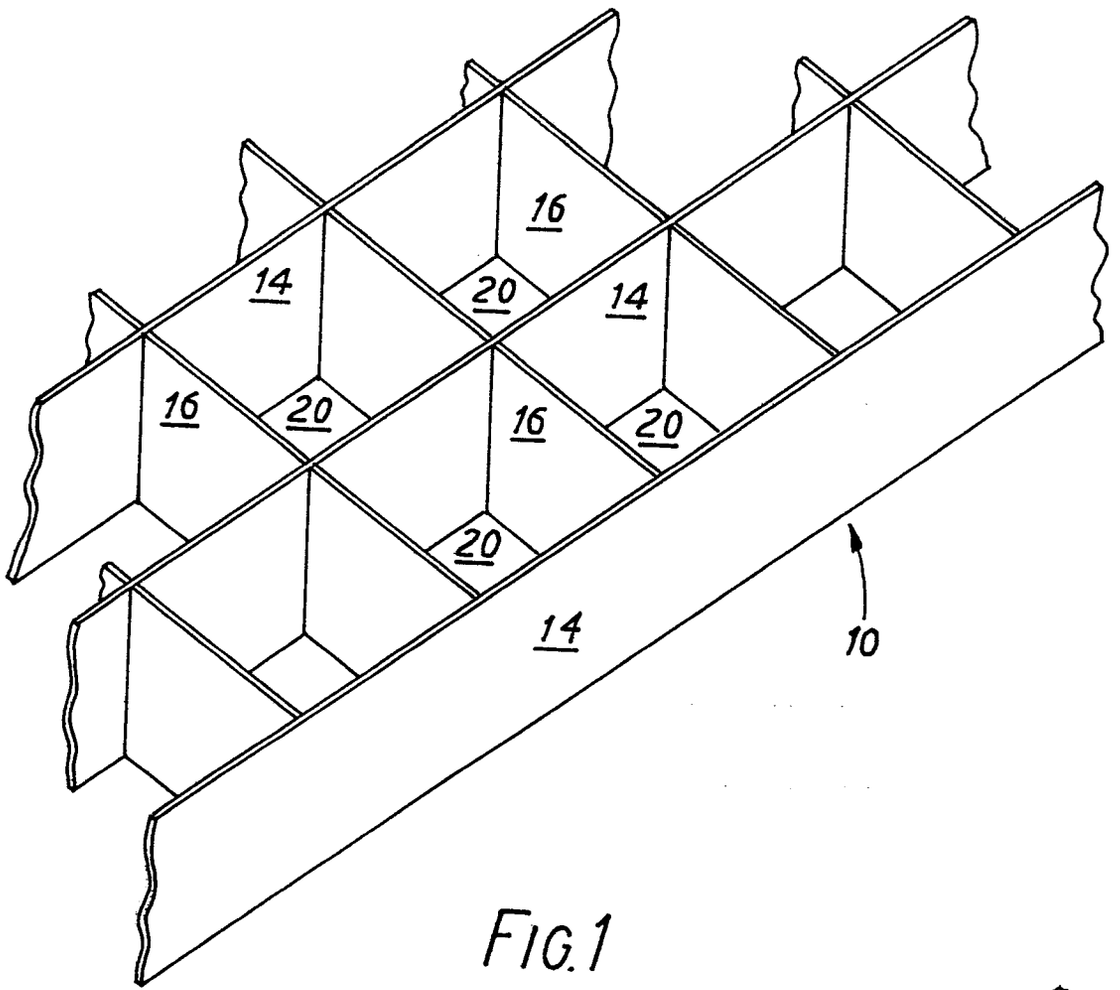

FIG.1

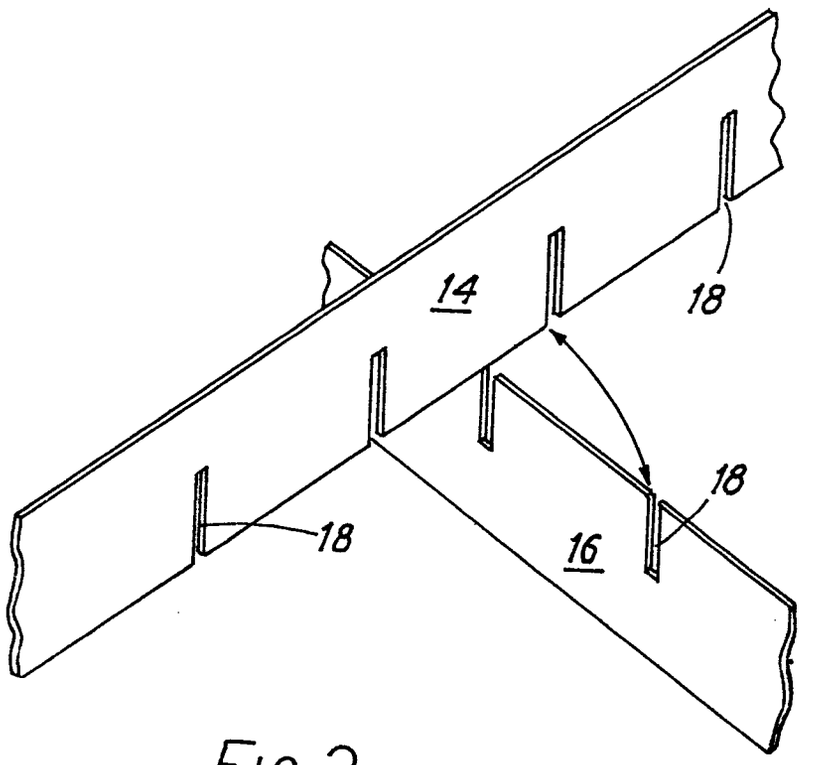

FIG.2

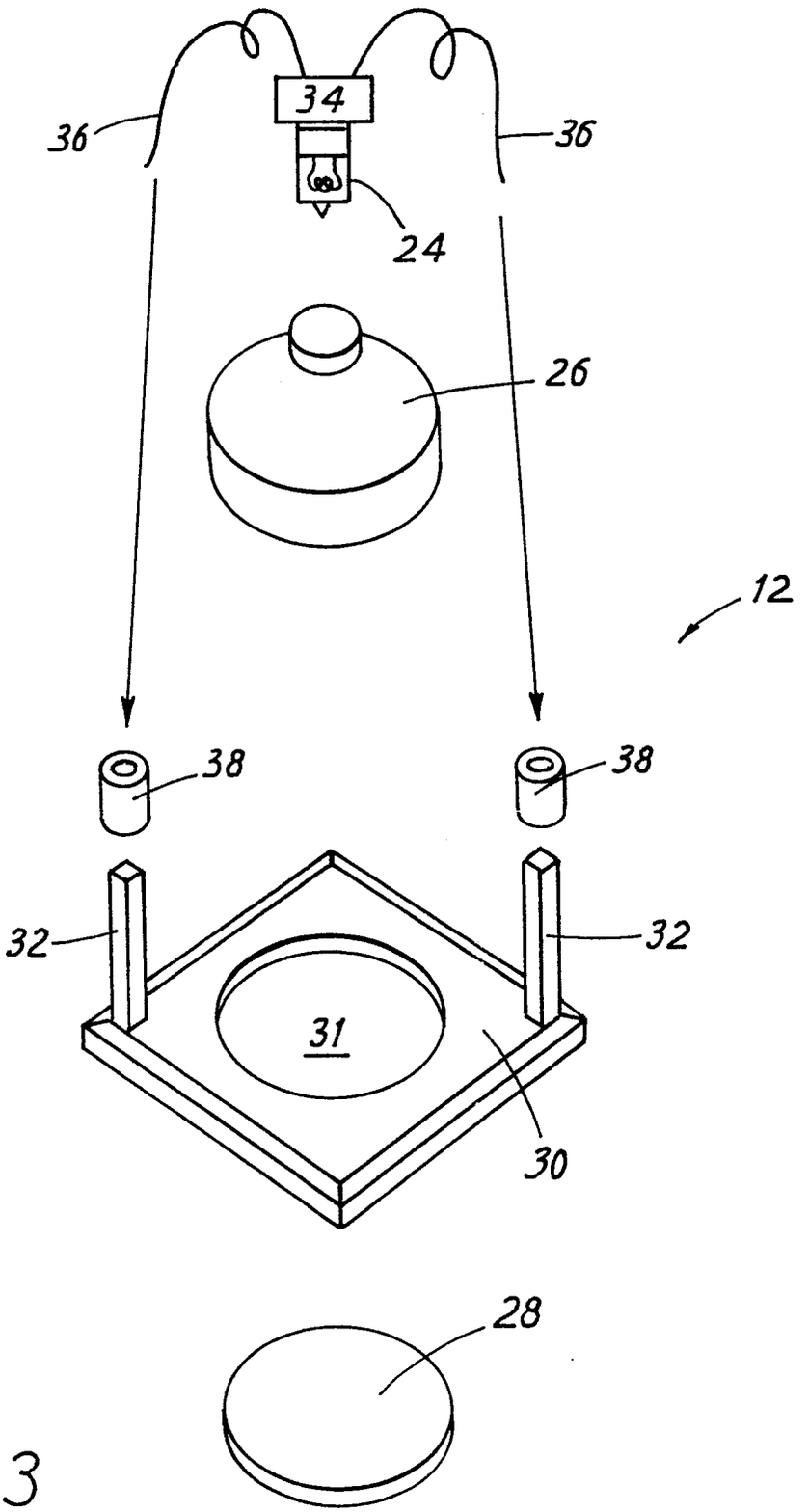

FIG.3

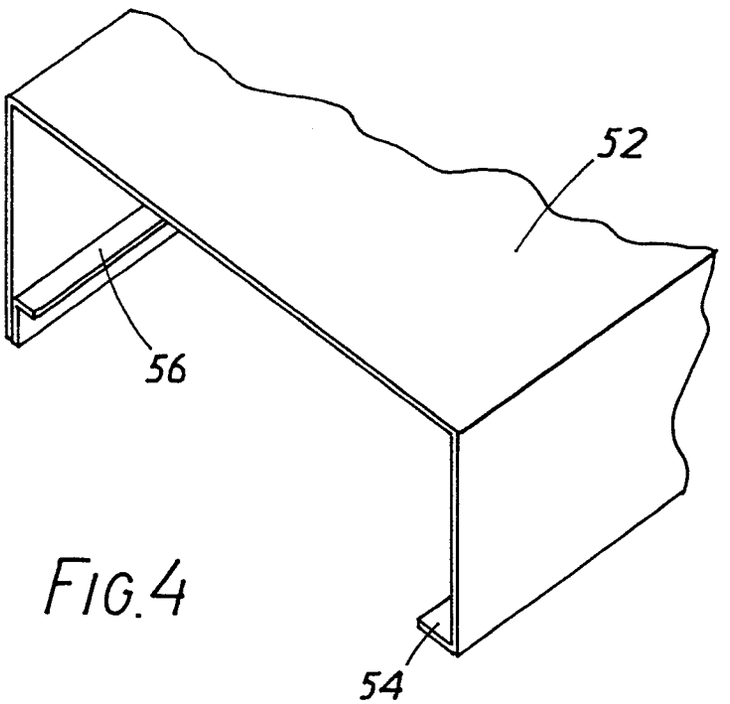

FIG.4

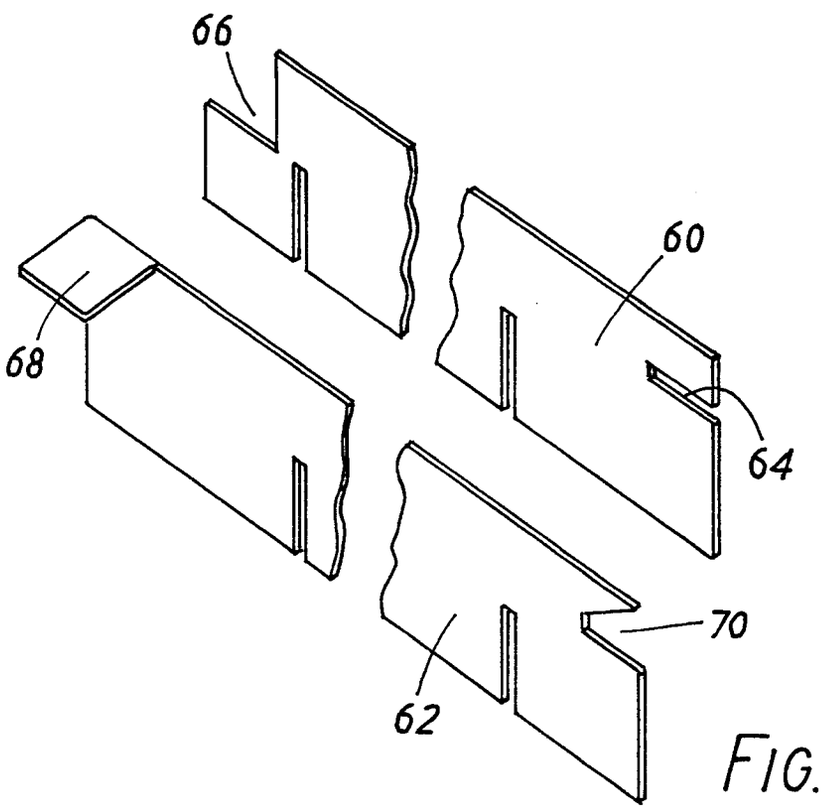

FIG.5

FIG.6

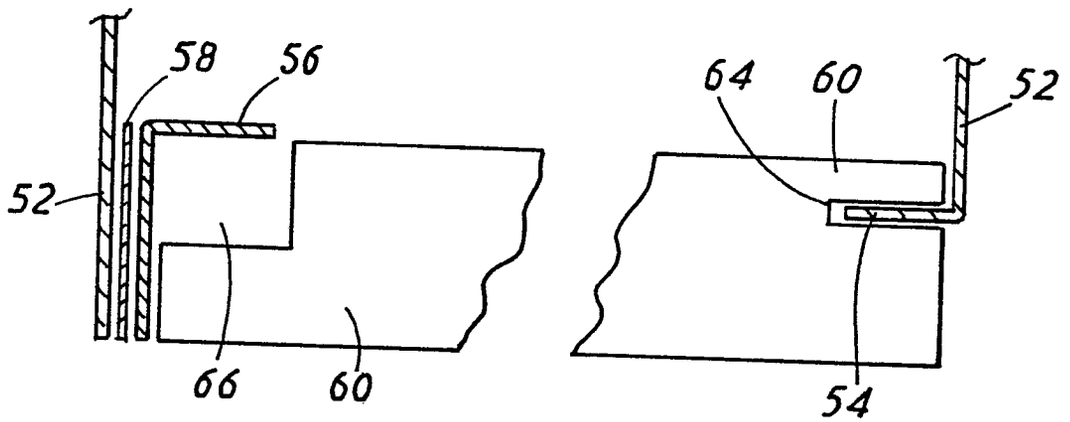

FIG.7

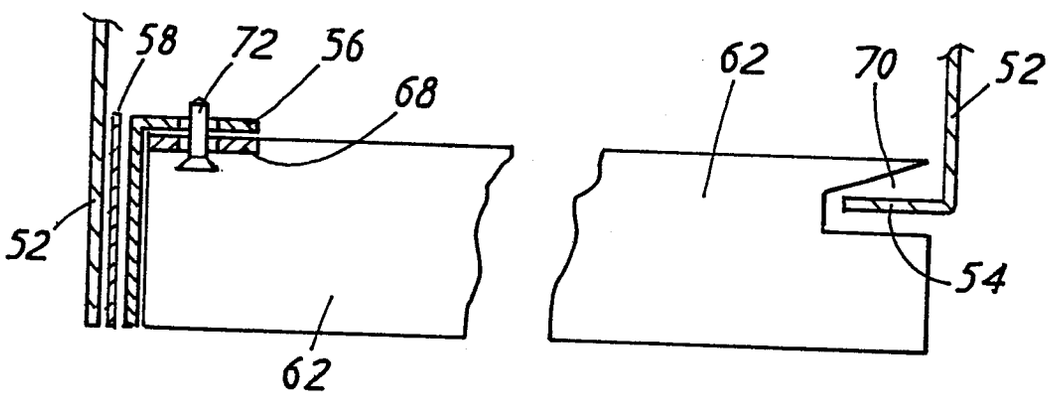

FIG.8

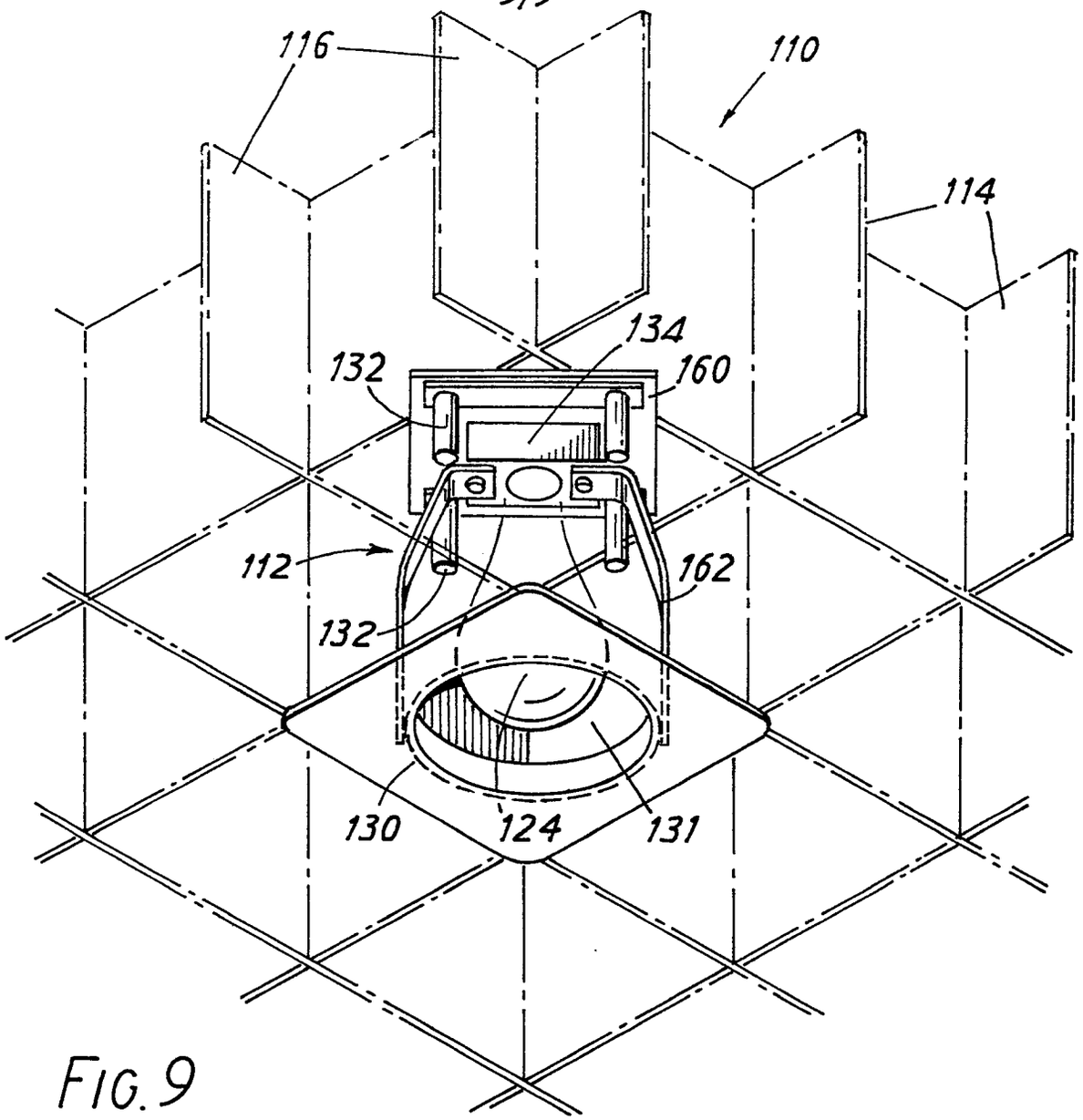
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FIG. 9

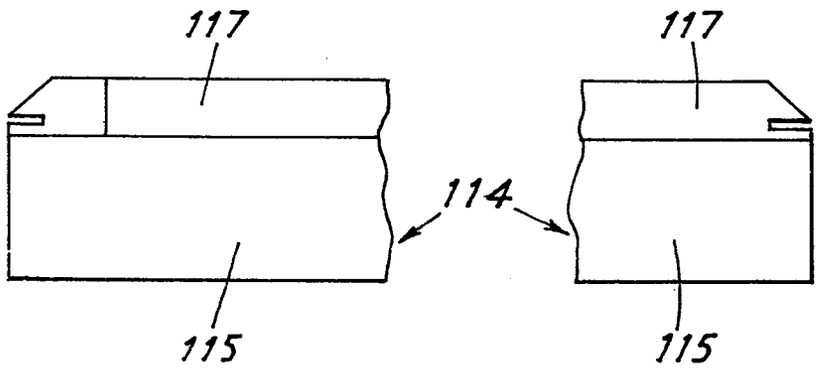
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FIG. 10

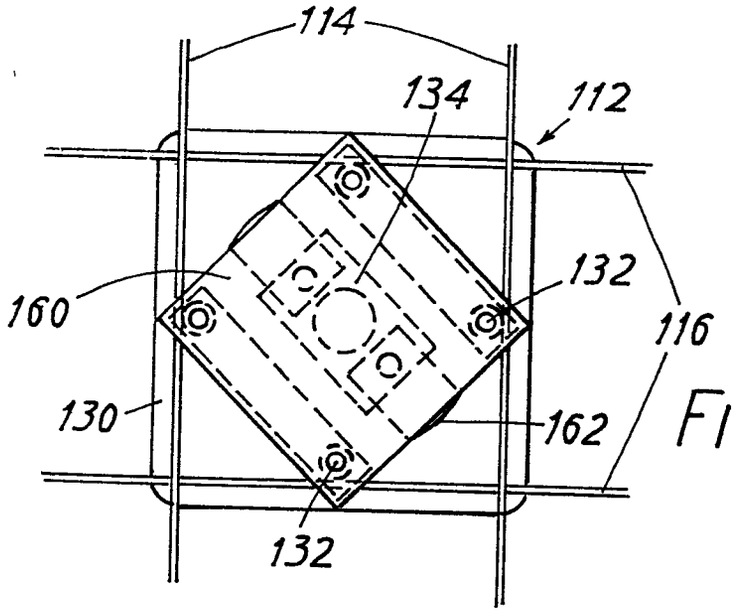

FIG.11

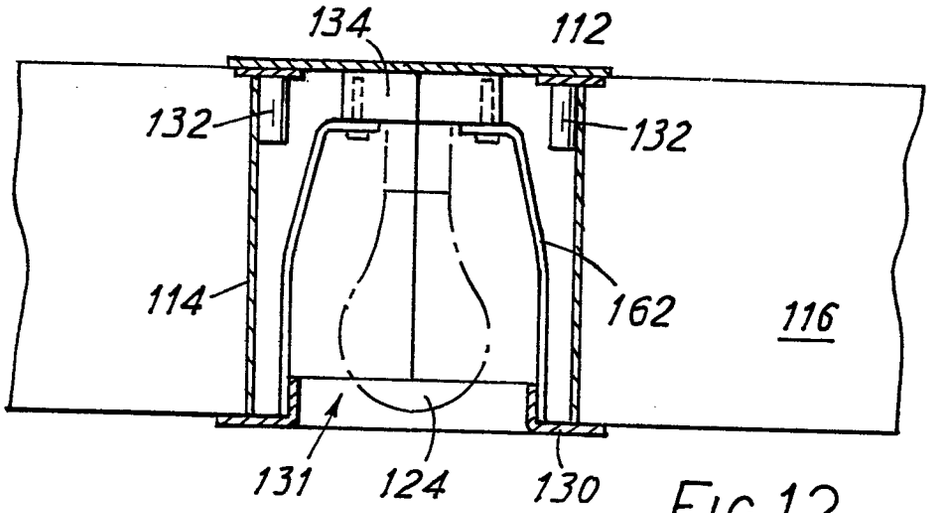

FIG.12

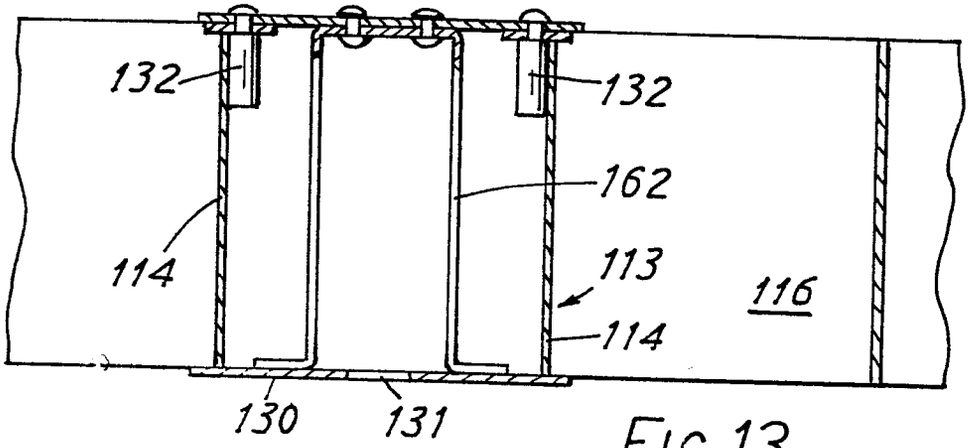

FIG.13

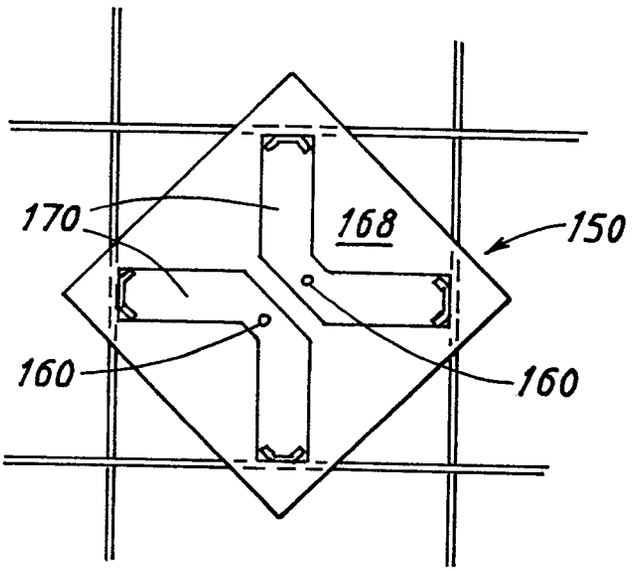

FIG. 14

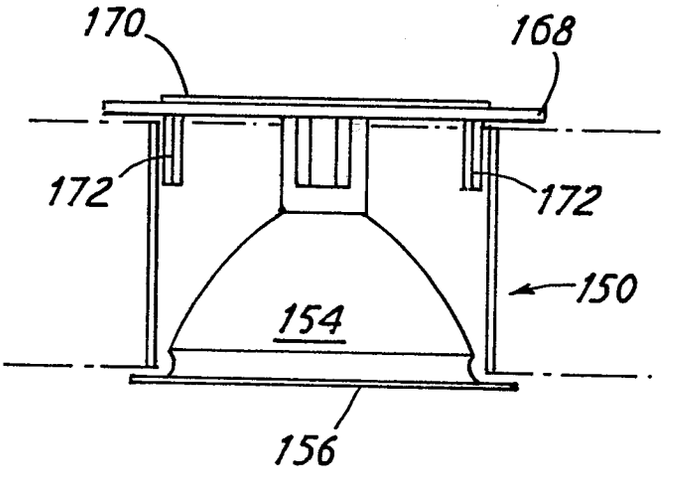

FIG. 15

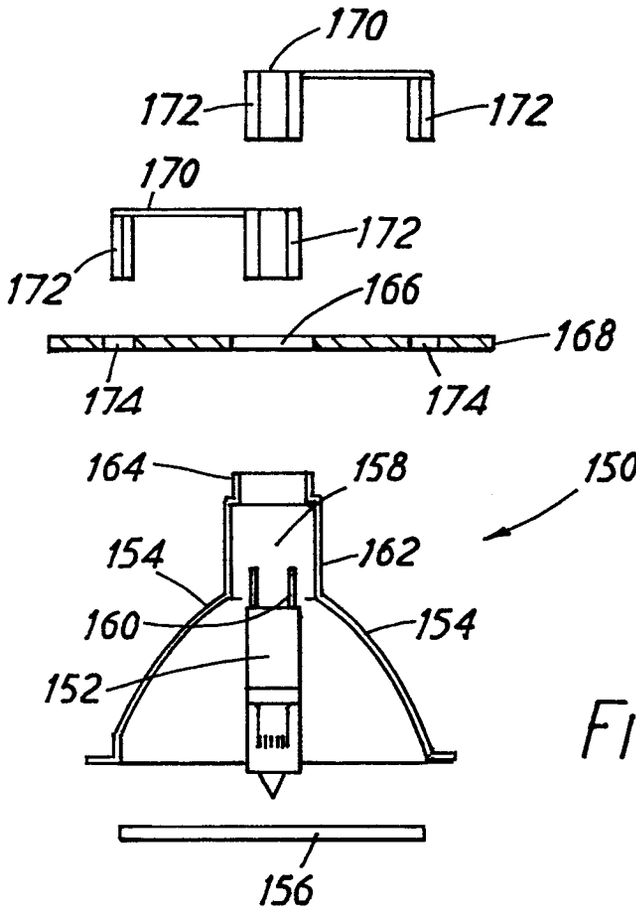
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FIG.16

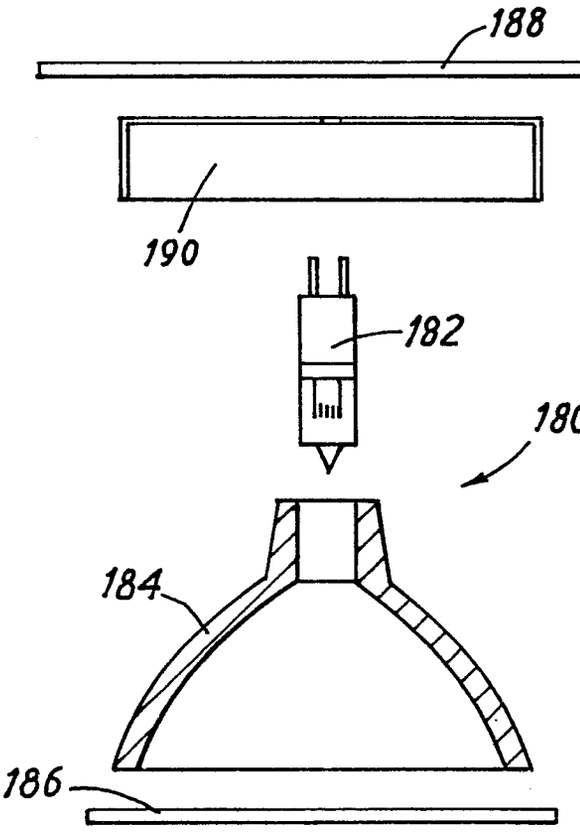
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FIG.17

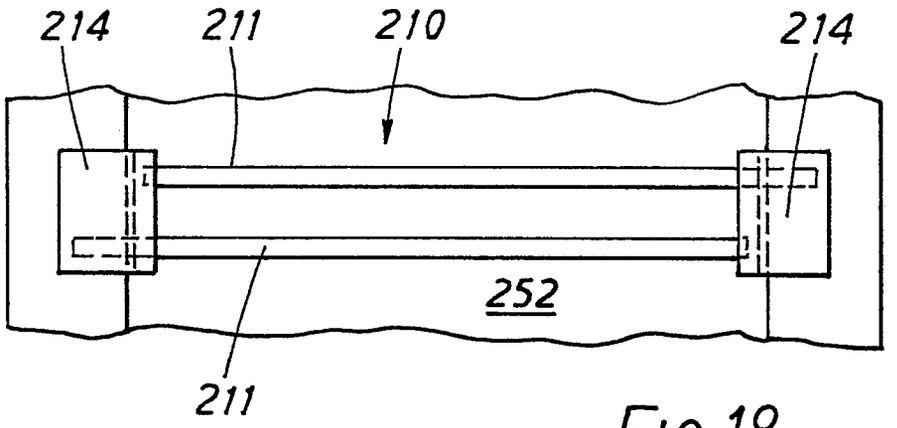

FIG.18

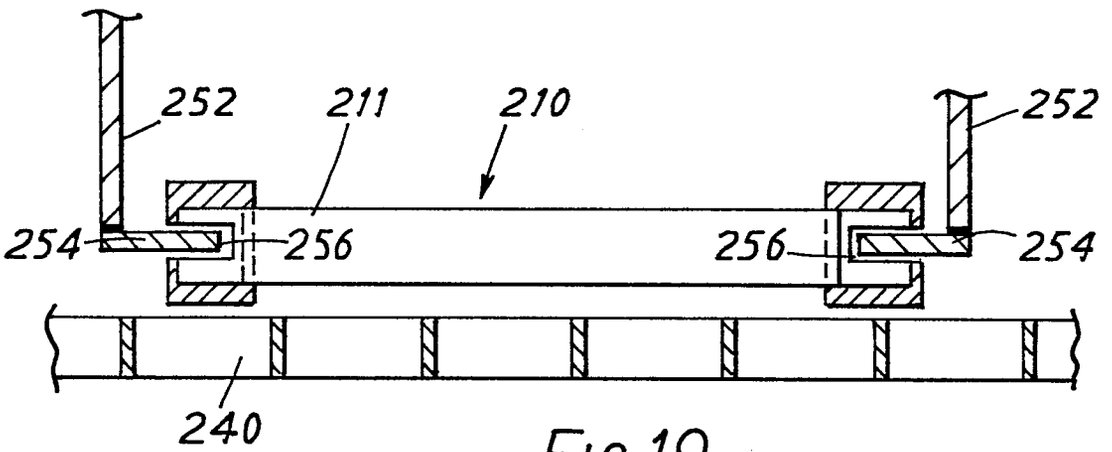

FIG.19

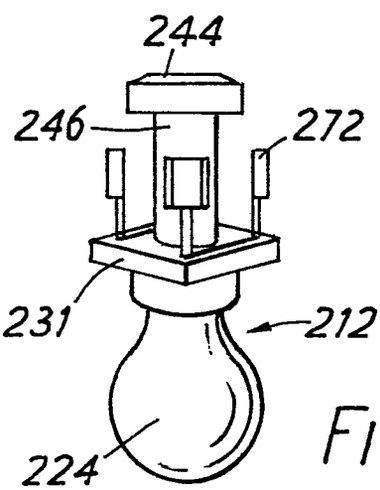

FIG.20

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European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 85 30 7012

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A- 319 570 (BEAU) * Figures 1-4 *	1,2,11-15	F 21 V 21/02
A	US-A-3 194 954 (LOCKE) * Figures 1-4 *	1,2	
A	FR-A-2 349 100 (ARMSTRONG) * Figure 5 *	1,2	
A	DE-A-2 852 618 (BERKENHOFF) * Figures 1,2 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 21 V
F 21 P
F 21 S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-01-1986	FOUCRAY R.B.F.

CATEGORY OF CITED DOCUMENTS

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O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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