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(54) **Method of mounting a fitting to a ceiling panel, and sleeve member therefor**

(57) This invention relates to a method of mounting a fitting to a ceiling panel, and to a sleeve member therefor. The invention is likely to find its greatest utility in relation to the mounting of light fittings into ceiling panels, for example ceiling panels of gypsum. According to the invention, there is provided a method of mounting a fitting (32) to a ceiling panel (22), comprising the steps of {i} forming an opening (20) in the ceiling panel, {ii} inserting a sleeve member (10) through the opening, the sleeve member having a flange (14; 114) for abutment

with a first surface (24) of the ceiling panel adjacent the opening, {iii} moving a part (16; 116) of the sleeve into engagement with a second surface (26) of the ceiling panel adjacent the opening, and {iv} mounting the fitting into the sleeve. There is also provided a sleeve member for use in the method, the sleeve member comprising a tubular part (12) and a flange (14), the tubular part being sized to receive the fitting (32), a portion of the tubular part being cut to provide a movable or deformable part (16; 116).

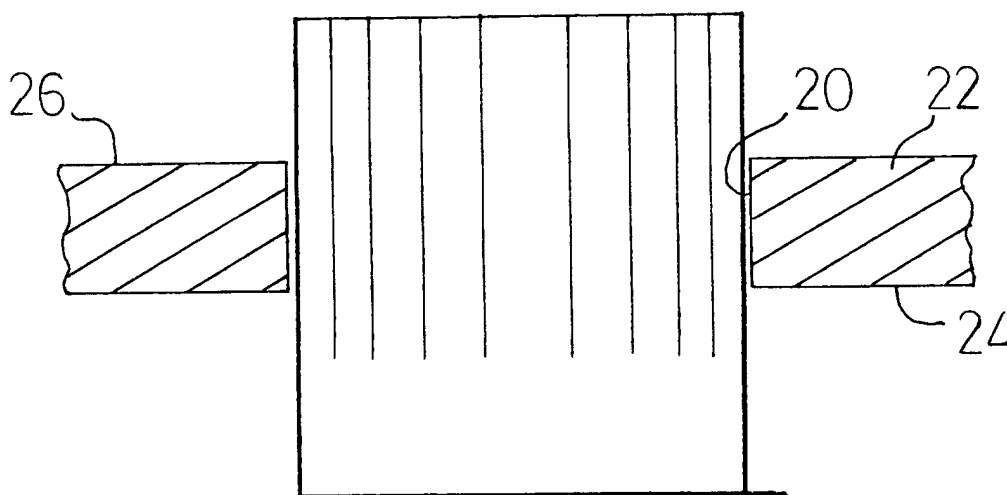


FIG 2

Description

FIELD OF THE INVENTION

[0001] This invention relates to a method of mounting a fitting to a ceiling panel, and to a sleeve member therefor.

[0002] The invention is likely to find its greatest utility in relation to the mounting of light fittings into ceiling panels, for example ceiling panels of gypsum, and much of the following description will therefore relate to such use. However, the use for mounting another fitting such as a smoke detector for example, or for use with ceiling panels of other materials, is not thereby excluded.

BACKGROUND TO THE INVENTION

[0003] When constructing buildings, it is known to provide a framework of beams or joists between adjacent floors, e.g. between a ground floor and the first floor. Often the beams or joists will be of wood, though other materials may be used.

[0004] When the building is completed, the beams are covered by floor boarding above, and by ceiling panels below. The ceiling panels may be secured directly to the beams, or else there may be a suspended or false ceiling in which the ceiling panels are spaced from the beams.

[0005] Fire is a recognised concern in buildings, and the builder and/or designer will usually take precautions and incorporate design features intended to reduce the likelihood of fire taking place, and/or to reduce the severity of any fire which does take place. It is a recognised problem that the space between the beams, and perhaps between the beams and the ceiling panels if there is a false or suspended ceiling, can harbour and promote fire, i.e. a fire can enter into this space and spread throughout large areas of the building, substantially protected from water or other fire suppression means which might be used to seek to extinguish the fire.

[0006] In order to reduce the likelihood that a fire can enter into the space between the beams, ceiling panels are designed to withstand fire for a limited period of time, perhaps one hour or more. However, it is also known that builders wish to mount fittings such as light fittings, smoke detectors and other devices to the ceiling, and in many cases this involves the creation of an opening through the ceiling panel so that the fitting can be "set into" or partly concealed within, the ceiling. Clearly, any opening through a ceiling panel presents a possible path for fire to enter above the ceiling panels and between the beams, and so ideally the fitting must itself be at least as fire resistant as the ceiling panel and so effectively seal the opening.

[0007] However, even if the fitting is itself fire resistant, the weight of the fitting might itself cause the ceiling panel adjacent the opening to fracture and give way, especially in the presence of intense heat caused by an

adjacent fire. In this way, the fitting can indirectly cause the ceiling panel integrity to be lost.

DESCRIPTION OF THE PRIOR ART

[0008] A light fitting designed for use in fire-rated ceilings, particularly suspended ceilings, is disclosed in my patent application WO97/13999.

[0009] A support member for a light fitting for use in suspended ceilings is disclosed in my patent applications WO97/13999 and WO98/12472.

[0010] Despite the utility of the light fitting and support member as disclosed in those earlier applications, it has been discovered that a light fitting mounted into a gypsum ceiling panel cannot satisfy a one hour fire test, i.e. cannot prevent the passage of fire through the ceiling panel for more than one hour, the failure being caused by the ceiling panel fracturing and giving way adjacent the opening into which the fitting is mounted.

STATEMENT OF THE INVENTION

[0011] It is the object of the present invention to seek to provide a method of mounting a fitting into a ceiling panel to overcome the above disadvantage, i.e. to provide a method of mounting the fitting which can exceed the one hour test requirement. Notwithstanding that the method is particularly suitable for, and has been primarily designed for use with, light fittings in gypsum panels, it is also applicable to ceiling panels of other materials, and also to other fittings.

[0012] According to the invention there is provided a method of mounting a fitting to a ceiling panel, comprising the steps of {i} forming an opening in the ceiling panel, {ii} inserting a sleeve member through the opening, the sleeve member having a flange for abutment with a first surface of the ceiling panel adjacent the opening, {iii} moving a part of the sleeve into engagement with a second surface of the ceiling panel adjacent the opening, and {iv} mounting the fitting into the sleeve.

[0013] Thus, following fitment of the sleeve, a part of the ceiling panel adjacent the opening will be clamped between the flange and the moved part of the sleeve, and the sleeve will be secured to the ceiling panel. Thereafter, the fitting such as a light fitting or the like can be mounted into the sleeve, which will be sized to receive the fitting.

[0014] The sleeve member may be resilient, and may be compressed prior to its insertion into the opening, thereafter resiliently to expand into engagement with the first and second surfaces of the ceiling panel. Preferably, however, the sleeve member is substantially non-resilient and deformable, and preferably includes a part or parts adapted to be deformed following fitment of the sleeve member into the opening.

[0015] Usefully, the sleeve member has parts adapted to be deformed around the full extent of the opening. Usefully also, parts of the sleeve are deformed so as to

lie upon the second surface of the ceiling panel. Notwithstanding that the deformed parts of the sleeve will usually not totally cover the second surface of the ceiling panel adjacent the opening, they will provide added reinforcement to the ceiling panel surrounding the opening, and will act to spread the load of the fitting across a greater area of the ceiling panel, so that the panel is better able to withstand heat and fire.

[0016] In the event that further reinforcement is required, the method can include the additional step of {ia} inserting a support member through the opening and positioning this to have a portion adjacent the opening, and {iia} ensuring that whilst the sleeve is moved, the portion of the support member is retained thereby. Thus, when the sleeve is moved, the support member will be retained by the sleeve member, for example being held between the moved or deformed part of the sleeve member and the second surface of the ceiling panel. In this way, the weight of the fitting can be spread over an even greater area of the ceiling panel, corresponding approximately to the size of the support member. In certain embodiments, the support member can be adapted to engage the beams or joists upon which the ceiling panel is secured.

[0017] Usefully, more than one support member can be utilised.

[0018] There is also provided a sleeve member for use in the method of mounting a fitting to a ceiling panel, the sleeve member comprising a tubular part and a flange, the tubular part being sized to receive the fitting, a portion of the tubular part being cut to provide a movable or deformable part.

[0019] Preferably, the tubular part is cut in several places, to provide several movable or deformable parts. Preferably also, the flange is continuous around one end of the sleeve member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Fig.1 is a side view of a first embodiment of sleeve member prior to fitment into the opening;

Fig.2 is a sectional side view of part of a ceiling panel, during fitment of a sleeve member thereto;

Fig.3 is a plan view of the sleeve member of Fig.1 in position within the opening;

Fig.4 is a plan view of a support member for use with the sleeve member;

Fig.5 is a side view of the support member of Fig.3;

Fig.6 is a side view of a light fitting mounted in a ceiling panel using the method according to the invention;

ing panel using the method according to the invention;

Fig.7 is a plan view of the light fitting of Fig.6;

Fig.8 is a plan view of an alternative design of sleeve member, and

Fig.9 is a side view of the sleeve member of Fig.8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] The sleeve member 10 is manufactured of metal, suitably steel or aluminium. The sleeve member is coated all over with an intumescent material, i.e. a material which expands in the presence of heat, so as to provide a fire-proof seal around the sleeve member. The intumescent material may suitably be painted on to the sleeve member 10.

[0022] The sleeve member comprises a tube portion 12 with a flange 14 at one end. At the end opposed to the flange the tube has been cut to form a number of fingers 16.

[0023] The length 1 of the tube portion which is not cut corresponds approximately to the thickness of the ceiling panel, i.e. it is not necessary, or preferred, to cut the tube portion 12 more than is necessary to permit the fingers 16 to be deformed to overlie the upper surface of the ceiling panel in use. The overall length of the tube portion can be chosen to suit the requirements, e.g. a longer tube portion providing longer fingers which in use will overlie a greater area of the ceiling panel.

[0024] The tube portion 12 of the sleeve member may be inserted through an opening 20 created in the ceiling panel 22 (Fig.2), the size of the tube portion being predetermined to be a close sliding fit within the opening 20. The flange 14 is larger than the opening 20 and so limits the insertion of the tube portion. Following engagement of the flange 14 with the undersurface 24 of the ceiling panel 22, the fingers 16 are bent over to lie against the upper surface 26 of the ceiling panel 22, so as to sandwich a part of the ceiling panel 22 between the flange 14 and the fingers 16.

[0025] It will be understood that the sleeve member 10 should be made of a material which is thick enough and strong enough so that the fingers 16 are able to support the weight of the fitting after they have been bent to overlie the ceiling panel (including in the presence of extreme heat), but also be able to be bent to that position by the installer, without undue difficulty, and ideally without the use of specialist tools.

[0026] Following fitment of the sleeve member 10 as above described, the sleeve will present an aperture 30 (Fig.3) of predetermined size for receiving a fitting such as a light fitting 32 (Fig.6).

[0027] It will be understood that Fig.6 shows the sleeve member 10 prior to deformation of the fingers 16

into engagement with the ceiling panel 22; in practice the fingers 16 would be deformed prior to insertion of the fitting 32.

[0028] The light fitting 32 carries a mounting means in the form of two springs 34 (Figs. 6,7), which are of known form. Following insertion of the light fitting 32 into the aperture 30, the springs 34 are resiliently biased outwardly and engage upon the second surface 26 of the ceiling panel 22. It will be understood that in normal conditions it is the springs 34 which support the weight of the light fitting 32 and maintain it in contact with the ceiling panel 22; in the absence of fire the fingers 16 are not performing any supporting function.

[0029] However, in the presence of fire, and the intense heat generated thereby, it is known that the gypsum of the ceiling panel 22 which surrounds the opening 20 breaks down sufficiently for the fitting 32 (with its springs 34) to fall out of the ceiling panel; once this has occurred there is a clear path for the fire to enter above the ceiling and between the beams.

[0030] It is been shown in tests with a ceiling panel of gypsum that a sleeve member similar to that of Figs. 1-3 can extend the time for which the ceiling panel can resist the breakthrough of fire, i.e. can extend the time before the gypsum adjacent the opening breaks down sufficiently for the light fitting to fall out. Thus, the springs 34 which lie above the fingers 16 in the position of use (Fig.7) will engage the sleeve member 10 before the light fitting falls out of the aperture. In addition, the fingers 16 support the gypsum immediately adjacent the opening 20 and act to spread the load of the light fitting over a relatively large area of the ceiling panel 22.

[0031] The aperture 30 in this embodiment is circular and does not contain any discontinuities or deformations; however in other embodiments the aperture 30 created by the fitted sleeve member 10 can be other than circular, and can contain discontinuities or deformations suitable to receive and cooperate with a part or parts of the fitting to enable ease of mounting of the fitting.

[0032] In order to increase further the time for which the ceiling panel can resist the breakthrough of fire, a support member 36 such as that of Figs. 4 and 5 can be used. As described below, the support member 36 acts to spread the load of the fitting over an even greater area of the ceiling panel 22, and perhaps can even engage the beams or other support structure of the ceiling panels.

[0033] The support member 36 of Figs. 4 and 5 comprises a length of spring steel wire. In this embodiment the support member is of circular cross section, 2 mm in diameter, and has an overall length L of approximately 700 mm (though other cross sections and overall lengths could be used to suit the particular application).

[0034] At the approximate centre of the support member 36 it is bent into a part-circular shape 40, the diameter of which is sized to be slightly larger than the diameter of the opening 20. Accordingly, when the support

member is placed adjacent the opening 20, the fingers 16 of the sleeve member 10 can be bent over part or all of the part-circular shape 40, trapping that part of the support member 36 between the fingers 16 and the ceiling panel 22.

[0035] Accordingly, following fitment, and in the presence of fire, the tendency of the light fitting 32 to fall through the ceiling panel as the ceiling panel gives way in the presence of fire, is resisted by the support member 36, the ends of which perhaps engage the beams or support structure of the ceiling. Even if the support member 36 does not engage the beams or support structure of the ceiling, it will be understood that the length of the support member acts to spread the load of the fitting 32 over a far greater area of the ceiling panel 22.

[0036] In certain applications, a support member may not be required. Alternatively, one or more support members 36 may be used with a single sleeve member as desired or required to suit the application. For example, two support members 42,44 may be substantially orthogonally arranged, as shown in Fig.7. It will be understood that the support members 42,44 of Fig.7 are not identical to the support member 36 of Figs. 4 and 5. Thus, several different forms of support member would be possible to fulfil the requirements for this component. In addition, it is not necessary that the support member have a part-circular shape adjacent its centre, the shape could be other than part-circular, provided that it could be engaged by at least some of the fingers 16 of the sleeve member.

[0037] The support member(s) may be coated with an intumescent material; it is believed that such a coating will improve the resistance of the wire to relaxation in the presence of heat and load.

[0038] Figs. 8 and 9 show an alternative design of sleeve member, which is made of resilient material, again coated with an intumescent material. In this embodiment, the fingers 116 are preformed, and are spaced from the flange 114 by a distance approximately equal to the thickness of the ceiling panel to which it is to be fitted. The sleeve member is split at 100, and this split allows the sleeve member to be compressed so as to reduce its overall diameter D so that it may be inserted into the opening 20 in the ceiling panel 22. When the sleeve member has been appropriately positioned within the opening 20 it is released, and its resilience causes it to expand, with the fingers 16 lying against the surface 26 of the panel 22, and the flange 14 lying against the surface 24 of the panel. The fingers 16 may be arranged to trap and retain a part of a support member as above described, if desired.

[0039] In yet another embodiment, the sleeve member may be made in two halves, i.e. effectively with two splits 100, each half being inserted into the opening separately, but both halves together substantially completely surrounding the opening.

[0040] In the resilient embodiments including one or more split, the fingers 116 could of course be replaced

by a continuous flange similar to the flange 114. However, this is not believed to be necessary since the discrete fingers have been found to provide adequate additional support to the ceiling panel.

[0041] As above indicated, tests have been conducted to show the utility of the invention. Specifically, in test number TE92663 conducted by The Loss Prevention Council, Melrose Avenue, Borehamwood, WD6 2BJ, England, on 19 April 1999, a gypsum ceiling panel having a light fitting mounted therein was subjected to a fire test. The light fitting was supported within a sleeve member similar to that of Figs. 1-3, which was itself supported by a support member similar to that of Figs. 4 and 5. The support member was of "Ocean Brand" (TM) fire grade 3 wire provided by Webster & Horsfall, Hay Mills, Birmingham, B25 8DW, and was coated with intumescent material. The ceiling panel passed a 1.5 hour fire test.

Claims

1. A method of mounting a fitting (32) to a ceiling panel (22), comprising the steps of {i} forming an opening (20) in the ceiling panel, {ii} inserting a sleeve member (10) through the opening, the sleeve member having a flange (14; 114) for abutment with a first surface (24) of the ceiling panel adjacent the opening, {iii} moving a part (16; 116) of the sleeve into engagement with a second surface (26) of the ceiling panel adjacent the opening, and {iv} mounting the fitting into the sleeve.
2. A method according to claim 1 in which parts (16) of the sleeve are deformed during step {iii} so as to overlie the second surface (26) of the ceiling panel.
3. A method according to claim 1 characterised by the additional steps of: {i} inserting a support member through the opening and positioning the support member to have a portion adjacent the opening, prior to the step of inserting a sleeve member (10) through the opening, and {ii} ensuring that whilst the part (16; 116) of the sleeve is moved, the portion of the support member is retained between the second surface (26) and the part.
4. A method according to claim 1 characterised in that more than one support member is inserted through the opening.
5. A sleeve member for use in the method according to any of claims 1-5, the sleeve member comprising a tubular part (12) and a flange (14), the tubular part being sized to receive the fitting (32), a portion of the tubular part being cut to provide a movable or deformable part (16; 116).
6. A sleeve member according to claim 5 in which the

tubular part is cut in several places, to provide several movable or deformable parts (16).

7. A sleeve member according to claim 5 in which the sleeve member is resilient, and may be compressed prior to its insertion into the opening.
8. A sleeve member according to claim 5 or claim 6 in which the sleeve member is substantially non-resilient and is deformable.
9. A sleeve member according to claim 8 having a part or parts (16) adapted to be deformed following fitment of the sleeve member into the opening.
10. A sleeve member according to claim 9 in which the sleeve member has parts (16) adapted to be deformed around substantially the full extent of the opening, and in which the flange (14) is continuous.

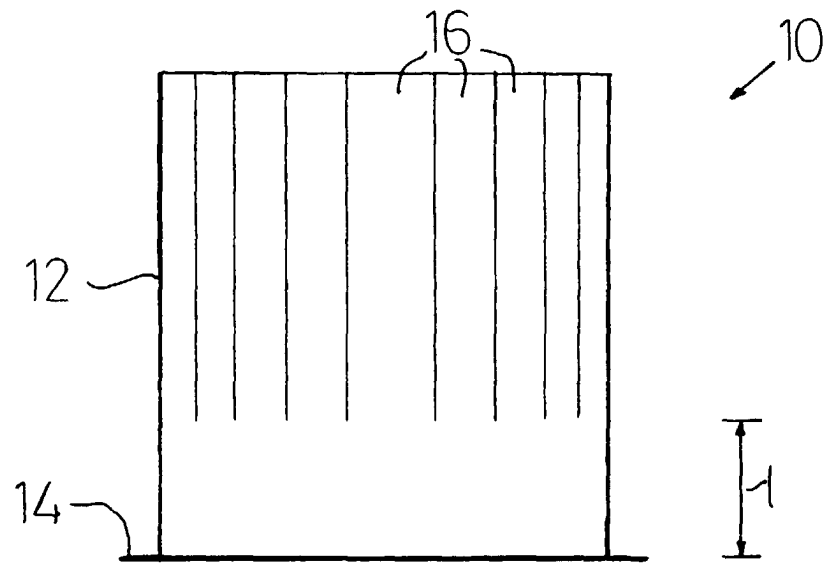


FIG 1

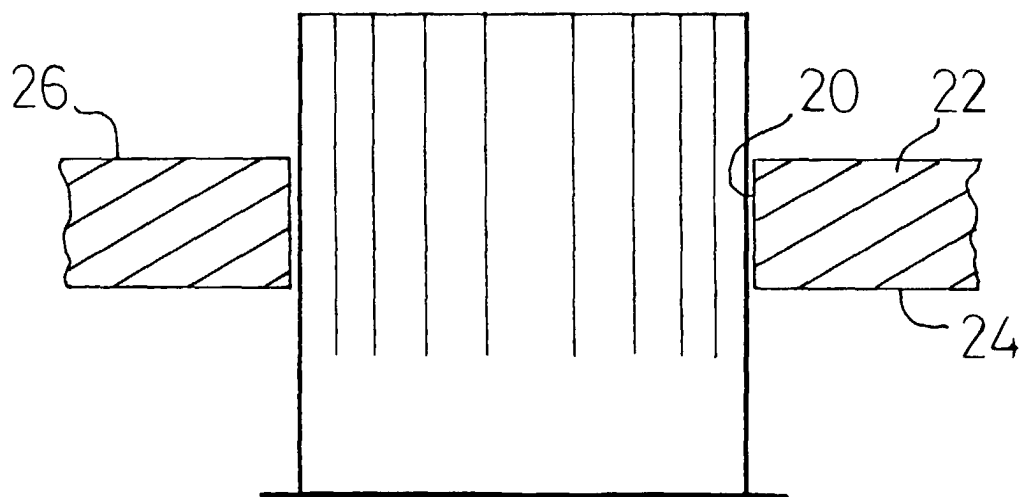


FIG 2

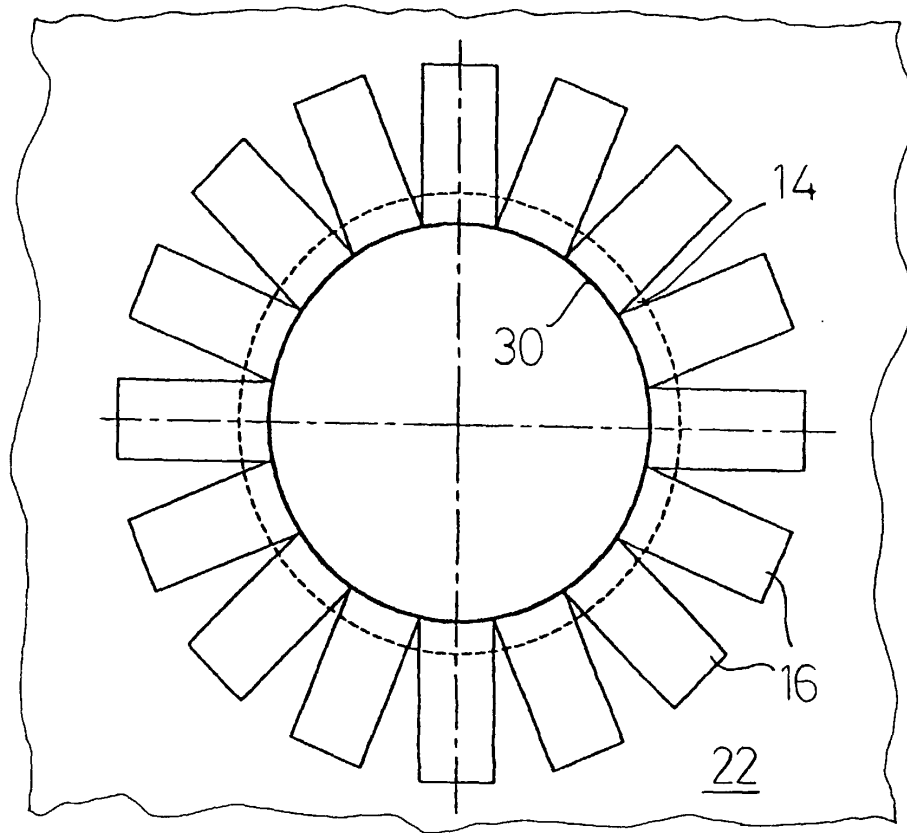


FIG 3

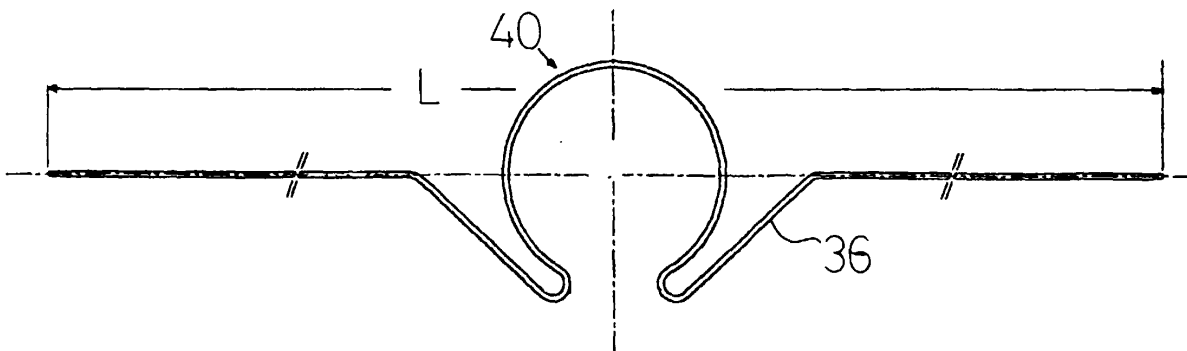


FIG 4

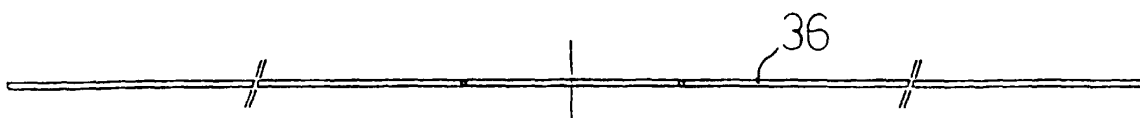


FIG 5

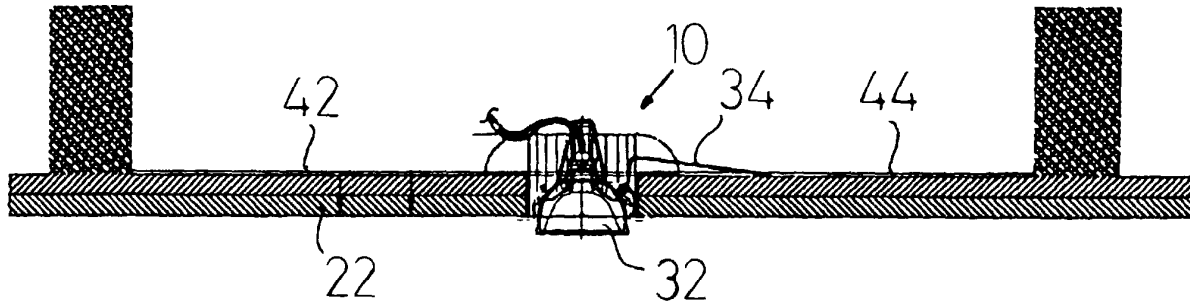


FIG 6

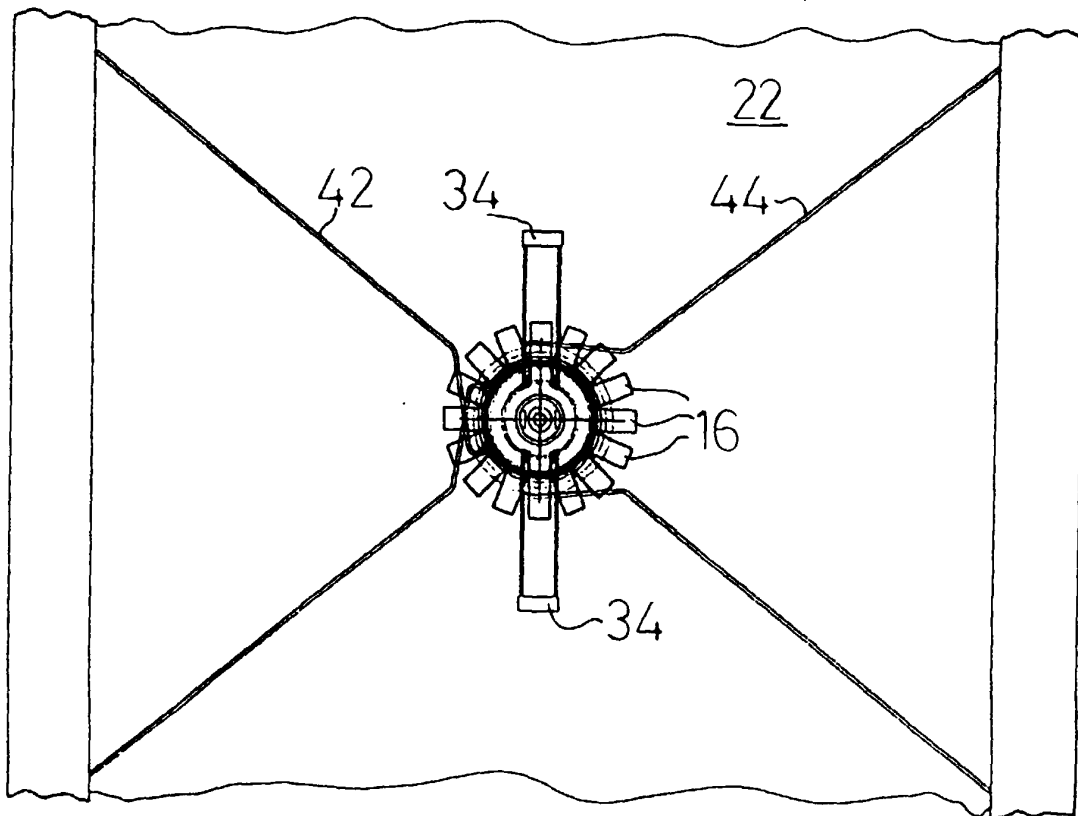


FIG 7

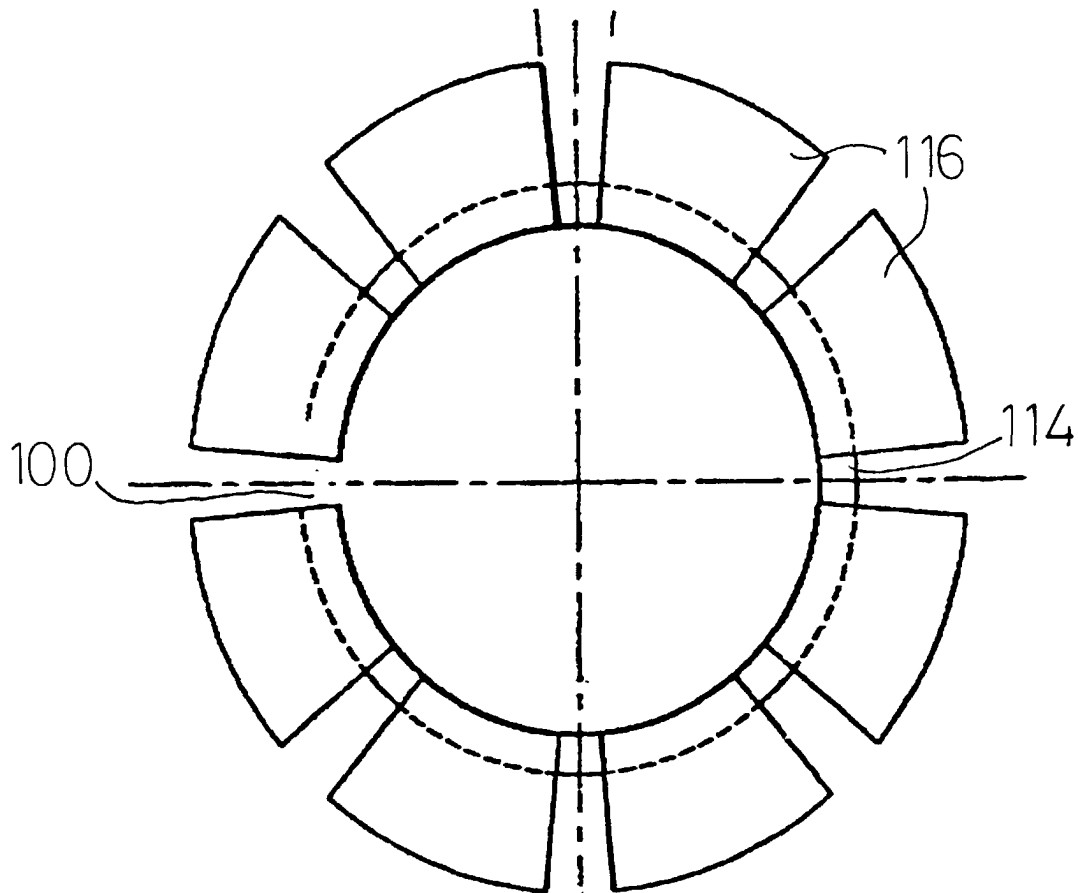


FIG 8

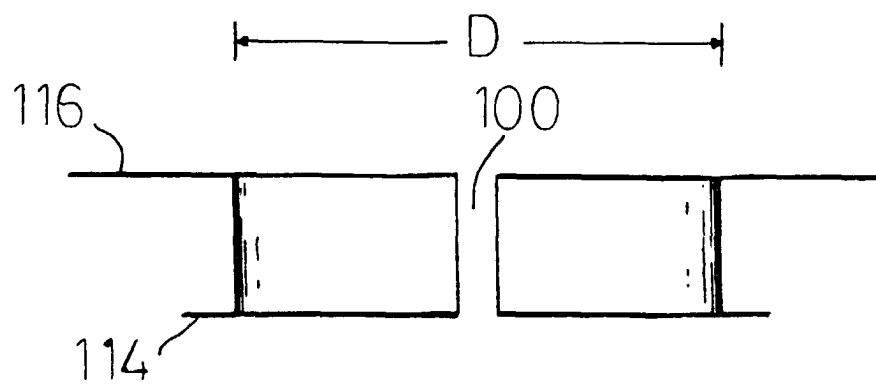


FIG 9



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 3644

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.7)
X	BE 631 841 A (ATELIERS VAN GINNEKEN PVBA) 2 September 1963 (1963-09-02)	1,2	F21V21/04
Y	* page 4, line 6 - line 10; figures * ---	3,4	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F21V
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		24 July 2000	Demeester, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background 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 D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 3644

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-07-2000

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