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

(11) Publication number: **0 306 463 A1**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **88850278.8**

(22) Date of filing: **24.08.88**

(51) Int. Cl.[4]: **E 04 B 5/55**

(30) Priority: **04.09.87 SE 8703444**

(43) Date of publication of application:
08.03.89 Bulletin 89/10

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

(71) Applicant: **ECOPHON Aktiebolag**
p.O. Box 500
S-260 61 Hyllinge (SE)

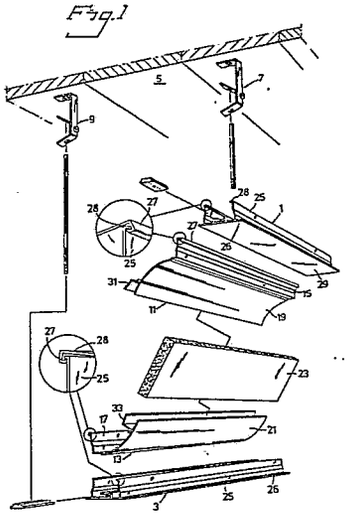
(72) Inventor: **Olsson, Ulf Karl Gustav**
Degerögatan 6
S-253 72 Helsingborg (SE)

(74) Representative: **Henningsson, Gunnar et al**
Bergling & Sundbergh AB Box 7645
S-103 94 Stockholm (SE)

(54) **Suspended ceiling structure.**

(57) The invention relates to a suspended ceiling structure including elongate carrying elements suspended so that their longitudinal directions are mutually parallel, and flat ceiling panels carried by the elements. Two elements (1, 2) are arranged at different heights and carry between them a sloping ceiling panel (23). The higher element (1) is extended (11) on its side facing towards the ceiling panel (23) to form a downwardly curved, concave (as seen from below) ceiling surface (19), on to the back of the lower portion of which the ceiling panel (23) joins, so that a substantially uniform junction between element and panel is obtained. The lower element (3), on its side facing towards the ceiling panel (23), is correspondingly extended (13) to form an upwardly curved, convex (as seen from below) ceiling surface (21), on to the back of the upper portion of which the ceiling panel (23) joins, so that a substantially smooth junction between element and panel is obtained. The lower element (3) has, at the back of its upper part, retaining means (33) for receiving and retaining the lower edge of the ceiling panel (23) at the upper edge of the element.

Fig.1



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Description

Suspended ceiling structure

TECHNICAL FIELD

The present invention relates to a suspended ceiling structure of the type including elongate carrying elements, suspended so that their longitudinal directions are parallel and preferably horizontal, and flat ceiling panels carried by the elements, at least two elements being arranged at different heights and carrying between them one or more sloping ceiling panels, the plane of which forms an angle to the horizontal plane.

BACKGROUND ART

Suspended ceiling structures of the general kind mentioned above normally provide a flat, horizontal, suspended ceiling. This means that the carrying elements all lie in a single plane. However, for different reasons it sometimes may be desired to provide a false or suspended ceiling which does not lie in the same plane everywhere. It can thus be desirable locally to form the suspended ceiling with a downwardly curved part, so that piping, a ventilation duct or other structure which it is desired to hide can be placed behind the curved part. In addition, it may be desirable to give the ceiling a wave-like configuration, e.g. with the object of arranging illumination in the valleys thereof, or to give improved acoustic properties. There is often a need of arranging suspended ceilings at different levels in a single space, and it is then natural to try and obtain junctions between the different ceiling levels which are as attractive as possible.

Ceiling slabs which are formpressed to the desired curved shape, have been proposed for achieving suspended ceilings with at least partially curved portions. This involves, however, an expensive and troublesome method which lacks the desired flexibility.

It is also known (cf. US-A-321 877) to have an acoustic suspended ceiling which is sharply corrugated and comprises sloping acoustic slabs upwardly and downwardly joining each other via conventional carrying sections.

OBJECT OF THE INVENTION

The object of the present invention is to provide a suspended ceiling structure of the kin mentioned in the introduction, which enables providing smooth junctions between different ceiling levels in spite of solely using flat ceiling panels, obtaining great flexibility with respect to curvatures and slopes in different ceiling portions and obtaining excellent adaptation to existing carrying section systems.

SUMMARY OF THE INVENTION

The above-mentioned objects are achieved in accordance with the invention by a suspended ceiling structure having the distinguishing features disclosed in the accompanying claims.

Particularly distinguishing for the suspended ceiling structure is thus that with the two carrying elements arranged at different heights, the higher element, on its side facing towards said sloping ceiling panels, is extended laterally to form a downwardly curved, concave (as seen from below) ceiling surface, on to the back of the lower portion of which said sloping ceiling panels join, so that a substantially continuous, uniform junction therebetween is obtained, and the lower element, on its side facing towards said sloping ceiling panels, is extended laterally in a corresponding manner to form an upwardly curved, convex (as seen from below) ceiling surface, on to the back of the upper portion of which said sloping ceiling panels join, so that a substantially continuous, uniform junction is obtained therebetween, the lower element having on the back of its upper part retaining means for receiving and retaining the lower edge por tions of the sloping ceiling panels at the upper edge of the element. In this way there is obtained a substantially continuous, softly rounded ceiling surface from the higher element via the sloping ceiling panels to the lower element, the respective extended element being decisive for the curvature upwards or downwards. There are no sharp corners or angles. As will be readily understood, the curvature at the respective place can be easily controlled, and decided by the selection of a suitable carrying element from an assortment thereof. What is essential is that in relation to previously utilized sections, the elements have a notably greater width laterally, and form a clearly noticeable part of the ceiling surface achieved. Since the elements can be made thin (they can consist of extruded light metal, for instance) the junctions between the elements and the connecting ceiling panels will have very little prominence. Advantageously, the elements have at least substantially circular, single curvature. The amount of curvature of the elements will be decisive for the slope given to the connecting ceiling panels. The slope of these panels to the horizontal plane is advantageously either 45 or 60 degrees, although other slopes are of course conceivable. It will be understood in this connection that the sloping panels should be direct extensions of the respective elements, i.e. they should be in a tangential direction from the element.

The exposed, preferably substantially part cylindrical surfaces of the elements can be quite smooth, or patterned for matching remaining ceiling surfaces. The sloping ceiling panels can be of the acoustic slab type, but due to their slope they can also advantageously comprise illumination fittings, advertising signs or the like.

For the purpose of facilitating erection of the sloping panels and to ensure that they remain in their desired positions, in accordance with the invention the higher element preferably has retaining means

on the back of its lower portion for receiving and retaining the upper edges of the pa nels, at the lower edge of the element, said retaining means being adapted for receiving, when the panels are fitted, a part of the upper edge portion of the panels of a size such that the lower edges of the panels can be taken up over the upper edge of the lower element, and into engagement with associated retaining means on the back of it.

As will be understood, the other sides of the elements can be implemented in an optional manner, although for joining on to further ceiling panels or a wall, or the like. Accordingly, an inventive element can be symmetrical, for example, i.e. it can have a corresponding extension on its other side for connection to similarly sloping (although to opposite hand) ceiling panels, so that a crest or valley in a wave-like configuration is formed. The element can also be arranged for conventional connection to a horizontal ceiling panel on its other side. In addition, the element can be provided with an extension of reverse curvature on its other side, for connecting to higher, or alternatively, lower ceiling panels with the same slope, or a different slope, whereby a step configuration is obtained directly, without intermediate horizontal ceiling panels. Since the inventive elements can furthermore be advantageously arranged for suspension in the same way as conventional carrying sections in suspended ceiling structures, and can thereby be integrated into known suspended ceiling systems, very good flexibility is achieved, simultaneously as extra costs for providing deviations from the horizontal plane are heavily reduced.

In accordance with a preferred embodiment of the invention the respective extended element comprises a conventional section with a preferably at least substantially flat, horizontal underside, a curved extension part being laterally connected to this section, preferably hung on it, so that the exposed underside of the extension part is a substantially continuous curved extension of the exposed underside of the section. It will be understood that an extension part can then be readily selected, with this part curved upwards or downwards to the extent as required. The existing suspending ceiling system thus only needs to be supplemented by a suitable assortment of extension parts.

The elements in accordance with the invention can, of course, also be made in one piece, suitably as a modified element section.

The invention will now be described in more detail with the aid of exemplified embodiments, and with reference to the accompanying drawings.

SHORT DESCRIPTION OF DRAWINGS

Figure 1 is a perspective, exploded view of a first embodiment of a suspended ceiling structure in accordance with the invention.

Figure 2 is a perspective view of a second embodiment of a suspended ceiling structure in accordance with the invention.

DESCRIPTION OF EMBODIMENTS

The suspended ceiling structure illustrated in Figure 1 includes an upper and a lower conventional channel ceiling section 1 and 3, each suspended in a ceiling structure 5 above them with the aid of conventional dependent means 7 and 9. The sections 1, 3 extend horizontally, and mutually parallel and at a predetermined mutual spacing. An extension part 11 is mounted on the left side of the section 1. An extension part 13 is mounted on the right side of the section 3. The extension parts 11, 13 are extruded aluminum sections (which also applies to the sections 1, 3) and each consists of a mounting portion 15 or 17, and a circularly curved ceiling part 19 or 21. Between the ceiling parts 19, 21 there extends a flat mineral wool ceiling slab 23.

The respective mounting portion 15, 17 is made directly complemental to the substantially vertical side wall 25 and horizontal lateral flange 26 of the associated channel section, for being mounted thereon. The mounting portions each have a folded hookshaped edge 27 at their free ends for gripping around the inwardly folded edge 28 of the side wall 25. After being fitted, the respective ceiling part 19, 21 will be a direct extension of the underside 29 of the channel section 1, 3. The ceiling part 19 is formed in a circular single curve downwardly away from the mounting portion 15, while the ceiling part 21 is formed as a circular single curve upwards, i.e. in the same general direction in which the mounting portion 17 projects. When both extension parts 11 and 13 are fitted, the free edges of the ceiling parts 19, 21 are in a single sloping plane, which also includes the respective associated tangent to the exposed ceiling surfaces.

The spacing between the free edges of the fitted ceiling parts 19, 21 is less than the width of the ceiling panel 23. The ceiling panel is fitted so that its edge portions are behind the free edge portions of the ceiling parts, i.e. on the unexposed side (see also Figure 2). For retaining the ceiling panel 23 in place the ceiling parts 19 and 21 are provided on their back sides with hookshaped retaining elements 31, 33 forming channels at the free edges. The width of the channels of elements 31, 33 corresponds to the thickness of the ceiling panels 23. The depth of the channel of element 31 is sufficient to allow pushing up the ceiling panel into the channel - during fitting of the panel - sufficiently for the lower edge of the panel to be free from the free edge of the ceiling part 21, so that the panel can then be inserted in the retaining element 33.

The embodiment illustrated in Figure 2 of the suspended ceiling structure in accordance with the invention has parts which are the same as or correspond to those in the structure according to Figure 1 and these parts have therefore been given the same reference denotations.

Carrying elements 41, 43 are utilized in the structure according to Figure 2, these elements integrating ceiling section and extension part and being conventionally suspended with the aid of dependent means 5, 7. The exposed ceiling part surface 45 or 47 thus includes in a single continuous

surface what could be said to be the combination of an exten sion surface and the underside of a modified ceiling carrying section. On their sides facing away from the sloping ceiling panel 23 the elements are implemented in the same way as the channel sections 1, 3 in Figure 1, and associated horizontal flanges 26 are utilized here for conventionally mounting horizontal ceiling panels 49, although at two different levels. The portions of the elements facing towards the sloping ceiling panel 23 have an extension of the same kind as corresponding elements in Figure 1.

The invention is of course not restricted to the illustrated and described embodiments, and alterations and modifications are possible within the scope of the following claims.

Claims

1. Suspended ceiling structure of the type including elongate carrying elements which are suspended so that their longitudinal directions are parallel and preferably horizontal, and flat ceiling panels carried by the elements, at least two elements being arranged at different heights and between them carrying one or more sloping ceiling panels, the plane of which forms an angle to the horizontal plane, *characterized in* that the higher element on its side facing towards said sloping ceiling panels is extended to form a downwardly curved, concave (as seen from below) ceiling surface, on to the back of the lower part of which said sloping ceiling panels join, so that a substantially continuous, uniform junction between element and panel is obtained, and in that the lower element on its side facing towards said sloping ceiling panels is extended in a corresponding manner to form an upwardly curved, convex (as seen from below) ceiling surface, on to the back of the upper portion of which said sloping ceiling panels join, so that a substantially continuous, uniform junction is obtained between element and panel, the lower element having on the back of its upper portion retaining means for receiving and retaining the lower edges of the sloping ceiling panels at the upper edge of the element.

2. Structure as claimed in claim 1, *characterized* in that the higher element has on the back of its lower portion retaining means for receiving and retaining the upper edge portions of the sloping ceiling panels at the lower edge of the element, said retaining means being adapted such as to receive when fitting the ceiling panels, an upper edge portion of the ceiling panels, such that the lower edge of the ceiling panels can be taken past the upper edge of the lower element and into engagement with associated retaining means at the back of this element.

3. Structure as claimed in claim 1 or 2, *characterized* in that the tangential directions of the element edge portions are in line with each other and in the plane of the sloping ceiling panels.

4. Structure as claimed in any one of the preceding claims, *characterized* in that the respective extended element is implemented such as to form an integrated element section.

5. Structure as claimed in claim 4, *characterized* in that the respective extended element is horizontal on its other side and arranged to receive a horizontal ceiling panel in a conventional manner.

6. Structure as claimed in any one of claims 1-3, *characterized* in that the respective element comprises a conventional section having a preferably flat horizontal underside, a curved extension part being connected to said section, and preferably suspended thereon, so that the underside of the extension part comprises a substantially continuous extension of the underside of said section.

Fig.1

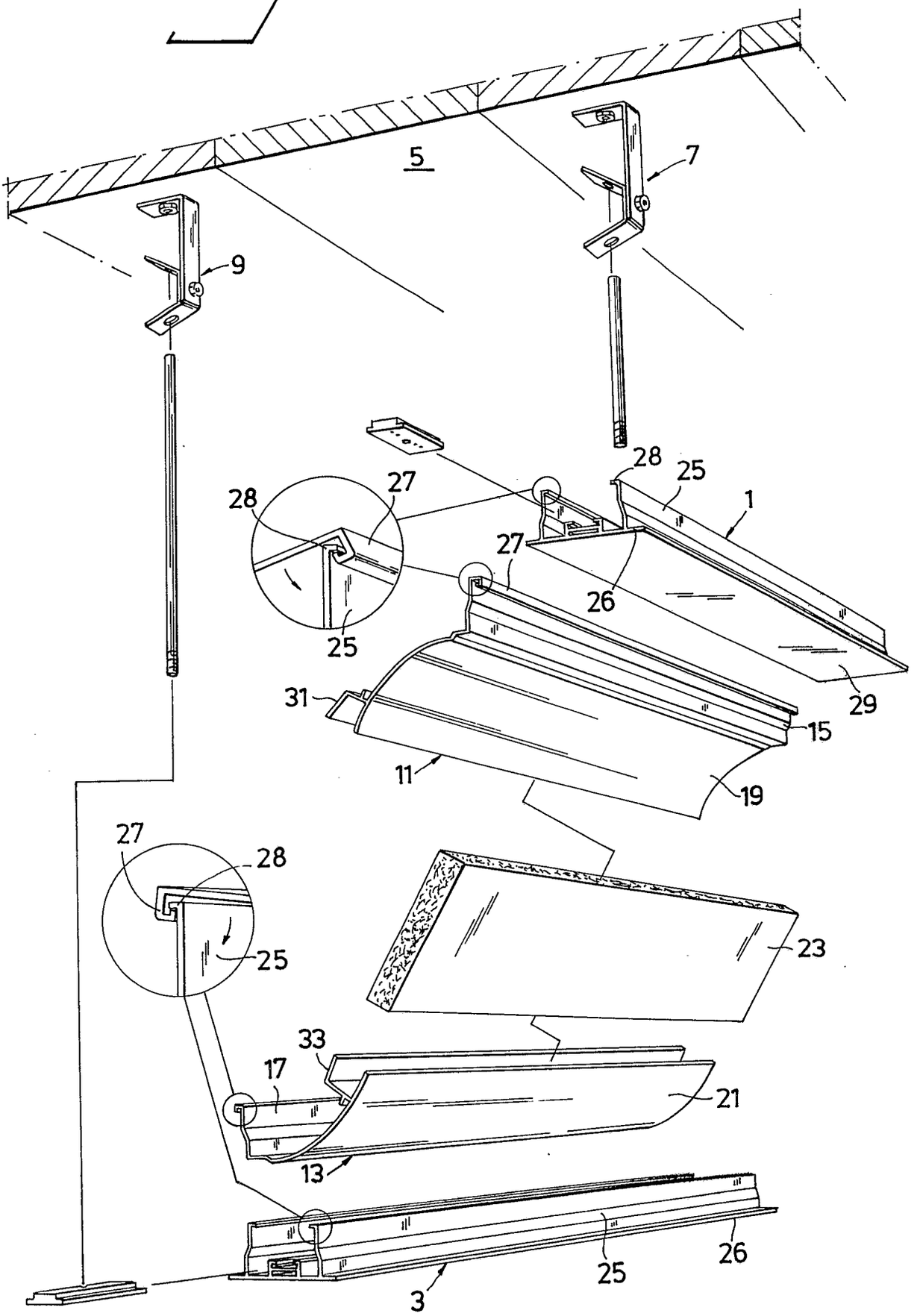
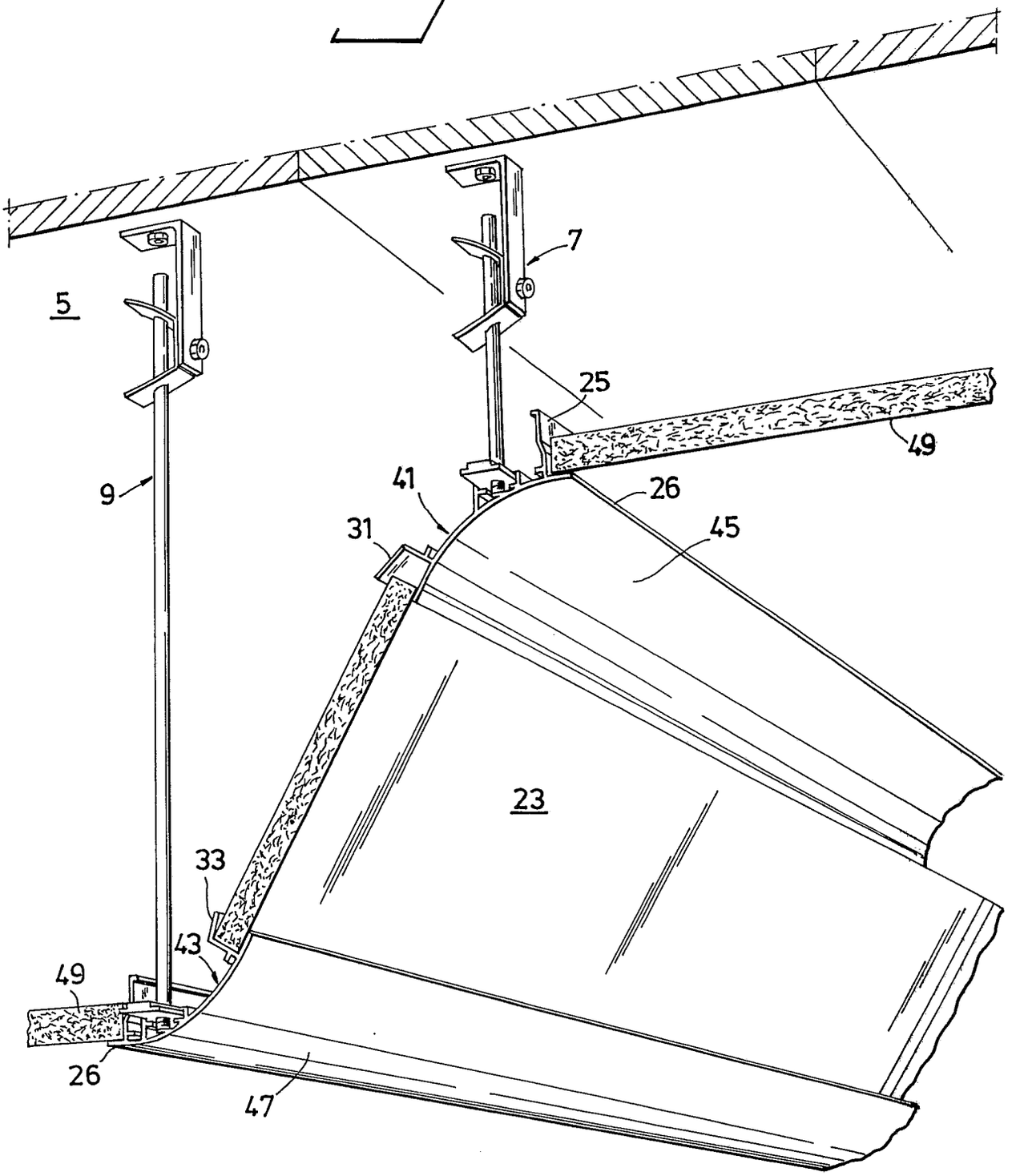


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 88 85 0278

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)
A	LE BATIMENT BATIR, vol. 9, no. 12, December 1983, page 49, Paris, FR; "Plafond suspendu à ossature apparente, courbe ou plan" * Figure * ---	1,2	E 04 B 5/55
A,P	DE-U-8 709 026 (PAG PRESSWORK AG) * Figures 5,6,7 * ---	1	
A	BE-A- 684 541 (ZWICKERT) * Figure 10 * -----	1,2	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

E 04 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24-11-1988	CHESNEAUX J.C.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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