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Glass panel suspension of a glass light ceiling

The invention concerns a glass panel suspension of a glass light ceiling, according to the pre-characterising portion of Claim 1.

In glass light ceilings, according to the state of the art glass panels are laid on sections. With this system, however, partial shadows are cast by the glass panel suspension in an undesired way.

In a glass panel suspension system known from FR-A-2 676 768, which is suitable for a glass light ceiling, at least one glass panel is suspended on at least one suspension element only at approximately selected points. At the top, the suspension element is suspended elastically. At the bottom, connecting elements that support the glass panels and which pass essentially freely through holes in the glass panel, are removably fitted to the suspension elements. In detail, the suspension element is formed as a claw which, with two arms at the end, which form a one-piece unit with an essentially horizontal middle section, rests on the top of the glass panel or on a damping perforated disc positioned on it. Besides the relatively complex shape of the suspension element, an unfavourable feature of this system, particularly when the distance between the glass panel and the suspension element above it is large, is that shadows are cast on the glass panel by the arms at the end of the suspension element. In the transfer of the glass panel's weight to the suspension element above it, not only easily withstandable tensile forces are produced in the suspension element, but bending moments as well.

The purpose of the invention is therefore to arrange the glass panels of a glass light ceiling such that although they are securely held, the least possible shadowing occurs.



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This objective is achieved by the glass panel suspension with the features specified in the characterising portion of Claim 1. By suspending the glass panel on suspension rods, which can be positioned not just near the edges of the glass panel but also distributed over its area, virtually shadow-free glass panel suspension of the glass light ceiling can be achieved. In this system, the glass panels are held securely and largely free from stress by removable connecting elements attached to the bottom sections of the suspension rods. The supporting element made of acrylic glass holds the suspension rods a predetermined distance apart from one another, these rods passing through and being in contact with the acrylic glass panel. This arrangement facilitates the stress-free suspension of the glass panel on the suspension rods. At the same time, the shadow-freeness of the entire glass panel suspension system is not appreciably compromised by the acrylic glass supporting element.

In a detail according to Claim 2, the design of the glass panel suspension is uncomplicated and easy to assemble, being so constructed that the bottom section of the suspension rods has an external thread onto which in each case a nut is screwed, against which the acrylic glass panel of the supporting element rests from underneath, and a spacer bolt with an internal thread is screwed on under the acrylic glass panel such that the acrylic glass panel is held between the spacer bolt and the nut. Further, the connecting elements that hold the glass panel under the supporting element are designed to be fitted to the bottom of the spacer bolts such that the glass panel is pushed up from beneath towards the spacer bolts. In this way the suspension rods can first be fitted through the acrylic glass panel of the essentially plate-shaped acrylic glass supporting element and the glass panel can then be brought up from beneath against the spacer bolts under the acrylic glass supporting element and fixed in place. The holes provided to allow the fastening elements to pass through the silicate glass panel can be larger than the outer diameter of the connecting elements, so that the connecting elements only support the glass panel but do not exert any sideways displacement forces or moments upon it.

In a detail according to Claim 3, assembly is facilitated by the fact that the connecting elements holding the glass panel are screwed into an internal thread at the bottom of the spacer bolts.

According to Claim 4, the connecting elements can consist of two parts, a threaded pin which is screwed into the internal thread of the suspension rods and a pin disc screwed onto the bottom of the threaded pin, having a central threaded hole and suitable for the glass panel to rest upon. In this, the central threaded hole receives a lower section of the threaded pin which, at the top, is screwed into the suspension rod.

To stiffen the supporting element without casting shadows and to support and maintain the spacing of the glass panels at their edges, the supporting element has acrylic webs screwed onto the underside of the acrylic glass panel and projecting vertically downwards therefrom, which extend in part beyond the edges of the acrylic glass panel and are designed to support the underlying glass panels at their edges.

According to Claim 6, the stress-free assembly of the supporting element and the glass panel is facilitated by the fact that the acrylic glass panel is clamped between polyamide perforated discs on its upper and lower sides, in each case between the nut above it and the spacer bolt below. To hold the suspended glass panel securely but free from stress, according to Claim 7 it is additionally provided that the glass panel is held between EPDM perforated discs respectively between the spacer bolts and the connecting elements, in particular the supporting discs.

EPDM is the abbreviation for olefin-diene-terpolymer, which has rubber-like properties.

An example embodiment of the glass panel suspension is illustrated in Fig. 1 and explained below, whereby further essential features are disclosed.

Fig. 1 shows a partial section viewed from the side through a glass panel suspension system, at a point where two adjacent glass panels abut, the panels consisting in particular of silicate glass.

In Fig. 1 a horizontal supporting plate is indexed as 1, which is part of a larger light ceiling building element in which several such supporting plates are arranged next to one another. In particular, the supporting plates extend parallel to the edges 2, 3 of the glass panels 4, 5, in particular ones made of silicate glass, which – if needs be, together with other glass panels – form essentially the whole of the lower surface of the light ceiling. Instead of silicate glass, the glass panels 4 and 5 can consist of another material transparent to light. Along their edges the glass panels are suspended as described below, whereby the edges of the glass panels 4, 5 extending perpendicularly to the edges 2, 3 are provided with suspensions in principle of the same type.

The panels are suspended on suspension rods positioned in rows parallel to the edges 2, 3, of which the suspension rods 6 and 7 can be seen in Fig. 1. At its upper end and lower end each suspension rod has an outer thread (not indexed). At the lower end there is in addition an internal thread (also not indexed) in the suspension rod.

At the top end, each suspension rod is attached between two hexagonal nuts 8, 9 and 10, 11 respectively screwed onto the outer thread on one side, with nuts 12 and 13 respectively on the other side, with some elastic 'give' in each case since between the hexagonal nuts and the supporting plate there are rubber pads 14, 15 and 16, 17 respectively. Thus, the suspension rods 6, 7 are able to swing somewhat in a pendular manner.

At their lower end the pendular suspension rods, namely 6, 7, carry a supporting element made of acrylic glass, which is indexed as a whole as 18. This consists

essentially of an acrylic glass panel 19 that can span across several of the glass panels 4, 5, and acrylic glass webs 20, 21 projecting vertically downwards from the underside of the acrylic glass panel, which are adhesively bonded to one another and to the acrylic glass panel 19 with an intermediate web 22 between them, such that the webs 20, 21 extend partly beyond the edges 2, 3 of the glass panels 4, 5 to be fitted and such that the intermediate web 22 is located between these edges 2, 3.

The suspension rods are solidly connected to the supporting element 18 through whose acrylic glass plate 19 they extend downwards, in each case between a nut 23 or 24 respectively on the upper side of the acrylic glass panel and a spacer bolt 25 or 26 respectively on its underside. For this, the nuts 23, 24 and the spacer bolts 25, 26 are screwed onto the outer thread of the suspension rods 6, 7.

The glass panels 4, 5 are fitted to the supporting element 18 assembled as described, in that as a connecting element in each case a threaded pin 27 is screwed into the internal thread of the spacer bolts 25, 26 and a supporting disc 27, 29 with a central threaded hole, which receives the threaded pin, is screwed up from underneath against the glass panels 4 and 5. In the respective cases, a rigid perforated disc 30 and a perforated disc 31 made of EPDM underneath it are positioned against the upper side of the glass panel 4 and a rigid perforated disc 32 and a perforated disc 33 made of EPDM are positioned against the upper side of the glass panel 5, such that the said perforated discs are respectively held between one of the glass panels 4, 5 and its associated spacer bolt 25 or 26. The underside of the glass panels 4 and 5 do not rest directly against the supporting discs 28, 29, but have between the panel and the disc in the respective cases a perforated disc 34 or 35 made of EPDM, each of which has a sleeve 36 or 37 also made of EPDM, respectively located within holes 38, 39 in the glass panels through which, in each case, a threaded pin 27 passes. In this way the glass panels are held securely but in a stress-free

way and it is ensured that the threaded pins are not in contact with the holes of the glass panel.

Fig. 1 also shows that the webs 20, 21 and the intermediate web 22 of the supporting element 18, besides being adhesively bonded onto the acrylic glass plate 19, are also firmly screwed thereto by means of screws; a screw-head 40 is shown.

Polyamide perforated discs 41-44 positioned at the clamping points of the acrylic glass panel 19 between the nuts 23, 24 and the upper side of the acrylic glass panel 19 and between the spacer bolts 25, 26 and the underside of the acrylic glass panel 19, serve to ensure that the acrylic glass panel is clamped in a careful, non-damaging way.

Claims

1. Glass panel suspension of a glass light ceiling, in which at least one glass panel (4, 5) is suspended only at selected points on suspension elements (6, 7) which are suspended elastically at the top in a pendular manner and to the bottom of which connecting elements (25, 26, 27, 28; 29) that pass freely through holes in the glass panels (4, 5) and support the panels (4, 5) are removably fitted, characterised in that the suspension elements are formed as suspension rods, the suspension rods (6, 7) extend downwards and pass through at least one supporting element (18) of acrylic glass comprising an acrylic glass panel (19), the acrylic glass panel (19) having for this purpose an arrangement of holes essentially aligned with the holes (38, 39) in the glass panels (4, 5), and the panels (4, 5) are held by spacer elements (25, 26) a vertical distance below the supporting element with the acrylic glass panel.
2. Glass panel suspension according to Claim 1, characterised in that on their lower sections the suspension rods (6, 7) have an outer thread onto which in each case a nut (23, 24) is screwed, against which the acrylic glass panel (19) of the supporting element (18) rests from underneath, and a spacer bolt (25, 26) provided with an internal thread is screwed as a spacer element under the acrylic glass panel (19), such that the acrylic glass panel is held between the spacer bolts (25, 26) and the nuts (23, 24), and the connecting elements (25; 26, 27, 28; 29) that hold the glass panels (4, 5) under the supporting element (18) are fitted under the spacer bolts in such a way that the glass panels (4, 5) are pushed up from beneath towards the spacer bolts (25, 26).

3. Glass panel suspension according to Claim 2,
characterised in that
the connecting elements (27) holding the glass panels (4, 5) are screwed into an
internal thread in the bottom of the spacer bolts (25 or 26).
4. Glass panel suspension according to Claim 3,
characterised in that
the connecting elements consist of threaded pins (27) screwed into the internal
thread of the suspension rods (6, 7) and of supporting discs (28; 29) with a central
threaded hole screwed onto the threaded pins (27), the said discs being suitable for
the support of the glass panels.
5. Glass panel suspension according to any of the preceding claims,
characterised in that
the supporting element (18) comprises acrylic glass webs (20-22) extending
vertically downwards from the underside of the acrylic glass panel (19) and
adhesively bonded thereto, the said webs extending partly beyond the edges (20, 21)
of the acrylic glass panels (4, 5) and supporting the underlying glass panels (4, 5) at
their edges.
6. Glass panel suspension according to any of Claims 1 to 4,
characterised in that
the acrylic glass panel (19) of the supporting element (18) is clamped between the
upper nuts and the lower spacer bolts (25, 26), in each case with a polyamide
perforated disc (41, 42, 43, 44) against its upper and lower sides.
7. Glass panel suspension according to any of Claims 1 to 4,
characterised in that

the glass panels (4, 5) are held between the spacer bolts (25, 26) and the connecting elements, in particular the supporting discs (28, 29) thereof, in each case with perforated discs (31, 33) made of EPDM between the bolts and the panels and with perforated discs (34, 35) between the panels and the supporting discs (28, 29), the discs (34, 35) comprising sleeves (36, 37) located within the holes (38, 39) in the glass panels (4, 5) through which the connecting elements (27) pass.