

AIR-TIGHT CLEANROOM CEILING: TRIM DEVICE, MOUNTING FRAME AND SUSPENDED CEILING SYSTEM

Technical field

5 The present application relates to the technical field of air-tight cleanroom application of buildings, and in particular to a trim device, a mounting frame and a suspended ceiling system.

Background technique

10 The suspended ceiling is generally located at the top part of the building interior.

 In interior design, the ceiling can be written on, drawn on, painted on etc. to improve the indoor environment. A ceiling light, light tube, ceiling fan, skylight, air conditioner, etc. can also be installed on the ceiling to improve indoor lighting and air circulation.

15 During installation of the suspended ceiling panels, their edges are generally trimmed and fixed to the wall.

 The inventor found from research that there are at least the following disadvantages in conventional ceiling installation:

 The ceiling panels are poorly sealed along the edges after installation due to
20 unevenness of surface on the wall;

 The sealing of the ceiling is not properly done, it causes higher energy consumption due to the leakage of air from the air conditioning and ventilation system, the overall performance of the ceiling application is not satisfactory.

25 Application contents

 The purpose of the present application is to provide a trim device with advance provision of a groove on the fixing member of the wall trim. Sealant is applied along the groove during installation, which will bond the front surface edges of the trimmed ceiling panel with the trim device. During installation of the trim device, not only are the front
30 and back side of the ceiling panel space set apart, but a better sealing effect along the ceiling perimeter is also created.

 The objective of the present application also includes the provision of a mounting frame which is capable of clamping the four edges of the ceiling panels by the crisscross

arrangement of the first structural members and second structural members. The entire mounting frame is therefore enhanced in terms of stability after the suspended ceiling installation is completed.

5 The objective of the present application also includes the provision of a suspended ceiling system comprising the above-mentioned trim device and mounting frame with all its advantages.

To achieve at least one of the above-mentioned objectives, the present application provides the following technical solutions:

10 A trim device comprising a mounting member configured to be mounted on a wall and a fixing member configured to be fixed and bonded with the trimmed ceiling panels. The mounting member and the fixing member are connected or integrally shaped. A mounting space for providing the ceiling panel is delimited between the mounting member and the fixing member. The side of the fixing member close to the mounting space is provided with a groove configured to accommodate sealant. Further, in the embodiment
15 of the present application, the groove extends in the longitudinal direction of the fixing member.

Further, in the embodiment of the present application, there are at least two ridges that are located on one side of the fixing member close to the mounting space. The ridges extend in the longitudinal direction of the fixing member, and the groove is located
20 between two adjacent ridges.

Further, in the embodiment of the present application, one end of the fixing member further from the mounting member extends in a direction close to the mounting space and forms an abutting part capable of abutting the trimmed ceiling panel.

25 Further, in the embodiment of the present application, the trim device further includes a sealing member. The sealing member is connected with the mounting member and the fixing member to form as a whole. The sealing member is located between the mounting member and the fixing member, and the side of the sealing member further from the mounting space forms a sealing space capable of accommodating the sealant.

30 Further, in the embodiment of the present application, the plane in which the mounting member is located is relatively perpendicular to the plane in which the fixing member is located, and between the plane where the sealing member is located and the plane where the mounting member is located against the wall, there is a recessed angle edge ranging from 40° to 50°.

Further, in the embodiment of the present application, the sealing member comprises a first planar part and a second planar part connected to each other. The first planar part is connected to the mounting member, and the second planar part is connected to the fixing member. The joint of the first planar part and the second planar part is recessed in the direction close to the mounting space or protrudes in the direction further from the mounting space.

Further, in the embodiment of the present application, the side of the sealing member further from the mounting space is curved, and the side of the sealing member further from the mounting space is recessed or protrudes in a direction close to the mounting space.

Further, in the embodiment of the present application, the trim device further includes a pressing member configured to press against the trimmed ceiling panel. The pressing member is a type of spring metal. One end of the pressing member is connected with or abuts on the mounting member, and the other end of the pressing member has a tendency to move close to and abut on the fixing member.

Further, in the embodiment of the present application, the part of the mounting member further from the fixing member is bent and forms a fixing channel. The fixing channel has a confined space, and the curved edge of the pressing member further from the fixing member is set in the confined space.

A mounting frame of which comprises a first structural member and a second structural member. The first structural member and the second structural member are connected and crisscross with each other, and the first structural member and the second structural member are provided with a confining part capable of clamping the ceiling panel upward flange and keeping it in place.

Further, in the embodiment of the present application, one end of the first structural member is provided with a first engaging part, and the other end of the first structural member is provided with a second engaging part. The first engaging part and the second engaging part are set on opposite sides and form a confining part, and a gap is provided between the first and the second engaging parts and it is configured to clamp the ceiling panel upward flange.

Further, in the embodiment of the present application, one end of the first structural member is bent inward to form the first engaging part, and the other end of the first structural member is bent inward to form the second engaging part.

Further, in the embodiment of the present application, the first structural member is provided with a bent part corresponding to the bend of the first structural member, and the side of the bent part further from the confining part is provided with spacing configured to abut the sealing gasket at the back surface of ceiling panel.

5 Further, in the embodiment of the present application, the device further includes a fixing device. The fixing device comprises a fixing member and at least two clamping members. The clamping member is connected to the fixing member, and it has a clamping channel configured for clamping the first and second structural members. The first structural member is inserted in a slidable way and placed in the clamping channel of one
10 of the clamping members, and the second structural member is inserted and placed in the clamping channel of the other clamping member, wherein at least two clamping channels extend in a crisscross arrangement.

Further, in the embodiment of the present application, both ends of the clamping member protrude in a direction close to the clamping channel and respectively form a first
15 clamping part and a second clamping part. There is a gap between the first clamping part and the second clamping part, and they are configured to set the edge of the mounting frame.

Further, in the embodiment of the present application, the fixing member is provided with fixing slots and confining members corresponding to the fixing slots. The
20 clamping member is inserted and placed in the fixing slots, and the confining members are configured to abut the clamping member and to keep the clamping member fixed to the fixing member.

Further, in the embodiment of the present application, two fixing slots correspond to one of the clamping members and they are placed side by side. The middle part of the
25 clamping member is bent and the two ends of the clamping member are respectively inserted and placed in the two fixing slots.

Further, in the embodiment of the present application, each end of the fixing slot is correspondingly provided with a confining member.

A suspended ceiling system which is comprising the trim device, the mounting
30 frame, and the ceiling panel. The ceiling panel trim device is configured to keep the ceiling edge fixed, and the mounting frame is configured to provide the confining part which clamps the ceiling upward flanges.

A suspended ceiling system which is comprising the ceiling panel trim device, the

mounting frame, the ceiling panel, and the sandwich material layer. The ceiling panel trim device comprises a Z-shape fixing profile, and the fixing profile comprises a first abutting part, a second abutting part and a third abutting part which are connected in sequence. The first abutting part abuts on the back surface of ceiling panel, and the second abutting part is placed to abut on the side wall of the sandwich material layer. The space formed between the first abutting part and the wall of second abutting part is configured to position a sealing gasket. The third abutting part envelops part of the sandwich material layer and makes the sandwich material layer abut at the back surface of the ceiling panel, and the mounting frame is configured to provide the confining part which clamps the ceiling upward flanges.

Further, in an embodiment of the present application, the sandwich material layer can be made of a material for heat preservation, soundproofing, heat insulation or sound absorption.

The beneficial effects of the trim device, the mounting frame and the suspended ceiling system provided by the embodiments of the present application are:

The trim device can provide a groove in advance on the fixing member. Sealant is applied in the groove during the installation, so that the ceiling panels along the perimeter can be bonded properly. By means of applying the trim device in ceiling installation, not only can both front and back side of the ceiling space to be set apart, but a better sealing effect can also be obtained. The mounting frame is capable of clamping the upward flanges of ceiling through the first and second structural members which crisscross each other. The stability of the entire mounting frame is enhanced after the completion of ceiling installation. Through the joint application of the mounting frame and the trim device, the ceiling system can be very securely fixed and equipped with air-tightness function.

Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present disclosure as it existed before the priority date of each of the appended claims.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

DRAWINGS

In order to illustrate more clearly the specific embodiments of the present application or the technical solutions in the prior art, the following is a brief introduction of the drawings used in the specific embodiments or the description of prior art.

- 5 Obviously, the drawings in the following description are some embodiments of the present application, and those skilled persons in this field can obtain other drawings based on these drawings without any creative work.

Figure 1 is a schematic view of a suspended ceiling system provided by an

embodiment of the present application;

Figure 2 is a schematic view of the first structural member shown in Figure 1;

Figure 3 is a schematic view of the first structural member shown in Figure 1 with the ceiling panel;

5 Figure 4 is a schematic view of the fixing device shown in Figure 1;

Figure 5 is a schematic view of the fixing device / first structural member shown in Figure 1 with the ceiling panel;

Figure 6 is a schematic view from a perspective of type 1 trim device shown in Figure 1;

10 Figure 7 is a schematic view of another perspective of the trim device shown in Figure 6;

Figure 8 is a schematic view of type 1 sealing member shown in Figure 6;

Figure 9 is a schematic view of type 2 sealing member shown in Figure 6;

Figure 10 is a schematic view of type 3 sealing member shown in Figure 6;

15 Figure 11 is a schematic view of type 4 sealing member shown in Figure 6;

Figure 12 is a schematic view of type 5 sealing member shown in Figure 6;

Figure 13 is a schematic diagram of type 2 trim device according to an embodiment of the present application;

20 Figure 14 is a schematic diagram of type 3 ceiling and ceiling panel trim device according to an embodiment of the present application.

Icons: 100 – suspended ceiling system; 10 - mounting frame; 11- first structural member; 111- confining part; 1111-first engaging part; 1112 - second engaging part; 112 - bent part; 12 - second structural member; 13 - third structural member; 131 - fixing rod; 14 - fixing device; 140 - first fixing member; 1401 - fixing slot; 1402 - confining member; 25 141 - first clamping member; 1410 - clamping channel; 1411 - first latching part; 1412 - second latching part; 142 - second clamping member; 143 - third clamping member; 144 - fourth clamping member; 15 – sealing gasket; 20 - trim device; 201 - mounting space; 21 - mounting member; 210 - mounting hole; 211- fixing part; 2111- confined space; 22 - sealing member; 220 - sealing space; 221- first planar part; 222 - second planar part; 30 23 - second fixing member; 230 - groove; 231- first ridge; 232 - second ridge; 233 - abutting part; 24 - pressing member; 25 - extending member; 40 - trim device; 400 - fixing profile; 461- first abutting part; 462 - second abutting part; 463 - third abutting part; 30 - ceiling panel; 31- ceiling flange; 310 - concealed buckle; 32 - sandwich material layer

Detailed Implementation

The technical solutions of the present application will be clearly and completely described below with reference to the drawings. It is evident that the described embodiments are a part of the embodiments of the present application, and not all the
5 embodiments. According to the embodiments of the present application, all other embodiments, obtained without creative work by those with general skill in the art, shall come under the purview of protection of the present application.

In the description of the present application, it is to be noted that the orientation or positional relationship of the terms "on," "below," "perpendicular," "in," etc. is based
10 on the orientation or positional relationship shown in the drawings, or the conventional orientation or positional relationship during the use of product in the application. It is merely for the convenience of description of the present application and for a simplified description, and is not intended to indicate or imply that the device or member referred to has to be in a specific orientation and be produced and operated in a specific orientation.
15 Therefore, it should not be construed as a limitation to the present application. Moreover, the terms "first," "second," "third," etc. are used merely for independent descriptions, and are not to be construed as indicating or implying a relative importance.

Moreover, the term "perpendicular" does not mean that the component is required to be absolutely horizontal or vertical, but it can be slightly inclined. For example,
20 "horizontal" simply means that the direction is more horizontal relative to "perpendicular," and does not mean that the structure must be completely horizontal, but can be slightly inclined.

In the description of the present application, it should also be stated that the terms "device," "mounting" and "connecting" should be understood in a broad sense, unless
25 otherwise specifically stated and defined. For example, it can be a fixed link, and it can also be a detachable connection or an integral connection; it can be a mechanical connection or an electrical connection; it can be directly connected or indirectly connected through a medium, and can be an internal link between two components. For technical persons in this field, the specific meanings of the above terms in the present application
30 can be understood within their specific cases of utilization.

Figure 1 is a schematic diagram of a suspended ceiling system according to an embodiment of the present application. Referring to Figure 1, a suspended ceiling system 100 in accordance to the present embodiment, comprises a mounting frame 10, a trim

device 20 and a ceiling panel 30.

The mounting frame 10 comprises first structural member 11, second structural member 12 and third structural member 13. The first structural member 11 and the second structural member 12 are in relative fixation through a fixing device 14, and the third structural member 13 are in relative fixation with the first structural member 11 through other fixing means, for instance, by bolting. The third structural member 13 is provided with a fixing rod 131, and the fixing rod 131 is set to be connected to the floor slab above, and the first structural member 11 and the second structural member 12 are set in suspension through connection with the third structural member 13. Both the first structural member 11 and the second structural member 12 are capable of keeping the ceiling panel 30 fixed. The first structural member 11 and the second structural member 12 are located in the same plane, and the third structural member 13 and the ceiling panel 30 are located adjacent to first and second structural member on both sides.

The trim device 20 is configured to fix the edge of the ceiling panel 30 to the dividing wall of the room for the effect of ceiling perimeter sealing. The ceiling panel 30 is finally installed at the upper part of the room by means of the mounting frame 10 and the trim device 20.

Referring to Figure 1, the first structural member 11 and the second structural member 12 are arranged in a crisscross configuration. Multiple second structural members 12 are placed on both sides of the first structural member 11, and each of the second structural members 12 and the first structural member 11 are perpendicularly interlocked, and a number of second structural members 12 are placed in parallel to each other.

There are also multiple first structural members 11, and the second structural members 12 which are connected between two adjacent first structural members 11, and multiple first structural members 11 are placed in parallel to each other.

The length of the projected line of two adjacent second structural members 12 on the same first structural member 11 is equal to the length of the second structural member 12.

Figure 1 is a partial structural schematic diagram of the suspended ceiling system 100, i.e. the number of the first structural member 11, the second structural member 12, and the third structural member 13 mentioned in the embodiment may be two, three and four respectively, or more.

The adjacent first structural members 11 and the adjacent second structural members 12 may form in rectangular, or may be in square configuration.

The mounting frame 10 achieves an overall frame stability by the first structural members 11 and second structural members 12 interlocked in a crisscross arrangement.

5 It is even more stable after the installation of ceiling panels 30.

Please refer to Figure 2, which is a schematic structural view of the first structural member 11. The second structural member 12 and the first structural member 11 in the embodiment are structurally identical or similar. The first structural member 11 is introduced here, and the first structural member 11 can be referenced for the structure of
10 the second structural member 12.

One end of the first structural member 11 is bent inward to form a first engaging part 1111, and the other end of the first structural member 11 is also bent inward to form a second engaging part 1112. The first engaging part 1111 and the second engaging part 1112 have a gap in between and form a confining part 111 capable of clamping the upward
15 flange of the ceiling panel 30.

The first engaging part 1111 and the second engaging part 1112 are flexible. The first structural member 11 can be made of galvanized steel material, and it becomes flexible after being bent. The first engaging part 1111 and the second engaging part 1112 tend to move close to each other so that they can grip the upward flanges of the ceiling
20 panel 30.

Referring to Figure 3, and in conjunction with Figure 2, the first structural member 11 is bent at several places. The bends of the first structural member 11 which form the first engaging part 1111 and the second engaging part 1112 are provided with bent parts 112, and the bent parts 112 are placed to abut on the sealing gasket 15.

25 The structural schematic view of the first structural member 11 and the ceiling panel 30 is shown in Figure 3.

The sealing gasket 15 can be made of an elastic material, which carries certain elasticity. It is fixed to the back surface of ceiling panel 30 by bonding or other fixing means, for a better cushioning and sealing effect.

30 The first engaging part 1111 and the second engaging part 1112 grip the flanges 31 of the adjacent two ceiling panels 30, and under such action, achieve close contact of the two adjacent ceiling panels 30.

It should be stated that the sides of the first engaging part 1111 and the second

engaging part 1112 that are relatively close to each other with curved edges, close contact with the ceiling upward flanges 31 can be achieved during the clamping process, resulting in reduced wear or damage. The side of the bent part 112 near the sealing gasket 15 is curved edge, and is capable of close contact with the sealing gasket 15 without causing heavier wear or possible damage on the sealing gasket 15 or the first structural member 11.

Referring to Figure 4, in order to stabilize the first structural member 11 and the second structural member 12 more effectively, the present embodiment provides a fixing device 14 for the stable interlocked connection of the first structural member 11 and the second structural member 12.

The fixing device 14 comprises a first fixing member 140, a first clamping member 141, a second clamping member 142, a third clamping member 143 and a fourth clamping member 144. The first clamping member 141, the second clamping member 142, the third clamping member 143 and the fourth clamping member 144 are all connected to the first fixing member 140, and it can be a fixed link or a detachable connection.

The structure of the four clamping members is the same or similar. The first clamping member 141 is described here, and the first clamping member 141 can be a reference for the structure of the other clamping members.

The first clamping member 141 has a clamping channel 1410 configured to clamp the first structural member 11 or the second structural member 12, and both ends of the first clamping member 141 protrude in a direction close to the clamping channel 1410 to form a first latching part 1411 and a second latching part 1412 respectively. The first latching part 1411 and the second latching part 1412 have a gap between them and can engage with the edges of the first structural member 11 or the second structural member 12. The edge can also be understood as the above-mentioned bent part 112.

The first clamping member 141 can be made of a rigid material, i.e. the first latching part 1411 and the second latching part 1412 are flexible. They have a tendency to move close to each other, whereby the first structural member 11 or the second structural member 12 can be clamped tightly.

As shown in Figure 4, the clamping channel 1410 of the first clamping member 141 and the clamping channel 1410 of the third clamping member 143 extend in alignment, and the clamping channel 1410 of the second clamping member 142 and the clamping channel 1410 of the fourth clamping member 144 extend in alignment. It can be

understood as that the first clamping member 141 and the third clamping member 143 are arranged in opposite directions, and the second clamping member 142 and the fourth clamping member 144 are also arranged in opposite directions. The clamping channel 1410 of the first clamping member 141 and the clamping channel 1410 of the second clamping member 142 are crisscross to each other, and the crisscross arrangement can be a perpendicular setting.

It should be stated that the first structural member 11 and the second structural member 12 crisscross each other. The number of clamping members for the fixing device 14 can be two, and it can be understood that it comprises only the first clamping member 141 and the second clamping member 142, or the first clamping member 141 and the fourth clamping member 144, by which the first structural member 11 and the second structural member 12 can be stably fixed.

The number of clamping members for the fixing device 14 may also be three, and it can be understood that there can be only the first clamping member 141, the second clamping member 142 and the third clamping member 143, or the first clamping member 141, the third clamping member 143 and the fourth clamping member 144, by which the first structural member 11 and the second structural member 12 can be stably fixed.

When the number of clamping members for the fixing device 14 is four, i.e. the structure shown in Figure 4, it can be understood that the clamping channels 1410 of the four clamping members form a cross shape. The opposing ends of the first structural member 11 and the second structural member 12 are fixed in the four clamping channels 1410 of the four clamping members, so that a better fixing effect can be obtained, with better overall stability.

The first fixing member 140 is provided with fixing slots 1401 and confining members 1402 corresponding to the fixing slots 1401. The first fixing member 140 can be in a cross shape, and each of its edges is provided with two fixing slots 1401. The two ends of the clamping member 141 are inserted and placed in the two fixing slots 1401. The confining member 1402 is placed to abut on one end of the first clamping member 141 further from the first latching part 1411 and set to form the first fixing member 140.

The two corresponding fixing slots 1401 of the first clamping member 141 are positioned side by side. The structure of the first clamping member 141 can be understood as a type of spring metal formed by bending, with the middle part and the two end parts respectively located at two sides of the first fixing member 140.

Both ends of the first clamping member 141 protrude relative to the first fixing member 140 to form the above-mentioned clamping channel 1410.

It should be stated that the confining member 1402 can be placed at both ends of each fixing slot 1401, i.e. four confining members 1402 correspond to each clamping member. By fixing the four corners of the middle part of the first clamping member 141,
 5 the first clamping member 141 can be interlocked to the first fixing member 140.

The confining member 1402 and the first fixing member 140 are connected or integrally formed in one piece, and it can be fabricated in one production process with the first fixing member 140, and an engaging effect with the clamping member is achieved by
 10 bending.

Please refer to Figure 5. Figure 5 is a schematic view showing the fixing device 14 with the first structural member 11 and the ceiling panel 30.

The first clamping member 141 is interlocked on the first fixing member 140, and its clamping channel 1410 is configured to accommodate the first structural member 11.
 15 The edges of the first clamping member 141 (which can be understood as the first latching part 1411 and the second latching part 1412) clamp the edges of the first structural member 11 (which can be understood as the bent part 112 of the first structural member 11) by a clamping action.

The first engaging part 1111 and the second engaging part 1112 of the first structural member 11 clamp the ceiling upward flanges 31 of two adjacent ceiling panels 30 by the engaging action. It should be stated that the ceiling flange 31 has a concealed buckle 310. The concealed buckle 310 is equivalent to a recess formed on the ceiling flange 31 by stamping or pressing, with the ceiling upward flange protruding on the other side of the recess, forming the concealed buckle 310. The first engaging part 1111 and
 20 the second engaging part 1112 have the tendency to move close to each other. The two ceiling upward flanges 31 are fixed relatively tight by the clamping action of the first engaging part 1111, the second engaging part 1112 and the concealed buckle 310.

The elastic action of the sealing gasket 15 not only seals the first engaging part 1111 and the second engaging part 1112 of the first structural member 11, but also seals
 30 the first latching part 1411 and the second latching part 1412 of the first clamping member 141.

The second structural member 12 is structurally the same or similar to the first structural member 11. When the first clamping member 141 is clamping the first structural

member 11, then the third clamping member 14 is also clamping the first structural member 11. Similarly, the second clamping member 142 and the fourth clamping member 144 are clamping the second structural member 12. The first structural member 11 and the second structural member 12 are interlocked through the cross-shaped fixing device 14, and the ceiling flanges 31 of the two adjacent ceiling panels are fixed by the clamping action of the first engaging part 1111 and the second engaging part 1112. The overall fixing effect is better, with greater stability.

It should be stated that the number of the first structural member 11 and the second structural member 12 fixed by one fixing device 14 can be two each, and it can also be one first structural member 11 with two second structural members 12.

The four clamping channels 1410 of the four clamping members form a cross shape. It can also be understood that the extending directions of the four clamping channels 1410 are relatively perpendicular. When the first structural member 11 and the second structural member 12 are mounted, the first structural member 11 and the second structural member 12 also show a cross shape.

It should be noted here that all the perpendiculars mentioned here do not mean that they must be absolutely perpendicular but appropriate deviations can be allowed.

Please refer to Figure 6 and Figure 7. Figure 6 and Figure 7 are schematic views of the trim device 20 in different perspectives.

The trim device 20 of Figure 6 is mounted on the wall, whereas the trim device 20 of Figure 7 is in three-dimension, and it facilitates the understanding of the present embodiment.

The trim device 20 includes a sealing member 22, a mounting member 21 and a fixing member (the fixing member here is the second fixing member 23), and the three are connected to each other or integrally formed.

The mounting member 21 is provided with a mounting hole 210 for fixing it to the wall with a bolt or screw or other means. Generally, the side walls are perpendicular and the mounting member 21 and the second fixing member 23 can be located perpendicular to each other in order to keep the ceiling 30 reasonably horizontal when connecting to the side wall.

The sealing member 22 is located between the mounting member 21 and the second fixing member 23, and the three delimit the mounting space 201 for mounting the ceiling panel 30. It can also be understood that the three enclose in such a way as to form

the mounting space 201.

One side of the sealing member 22 further from the mounting space 201 forms a sealed space 220. When the mounting member 21 is fixed on the wall, sealant is applied in the sealed space 220 to achieve relative recessed sealing between the sealing member
 5 22 and the wall. After installing the ceiling panel 30, the room is divided into two separated spaces on either side of the ceiling 30, isolated by the sealant.

The trim device 20 further includes a pressing member 24. After the installing of ceiling panel 30 , its edge is trimmed and it is laid flat on one side of the second fixing member 23 near the mounting space 201, and the pressing member 24 is configured to
 10 press against the trimmed edge of the ceiling panel 30 to prevent lifting.

It should be stated here that flat end of the pressing member 24 can press against the ceiling panel 30, and the curved end can be connected or abutted on the mounting member 21, the sealing member 22, the second fixing member 23 or even the wall.

The pressing member 24 is flexible. It can be a type of spring metal piece, which
 15 provides tight press by its own restorative action.

One end of the mounting member 21 further from the sealing member 22 is bent and a fixing part 211 is formed. The fixing part 211 has a confined space 2111. The curved end of the pressing member 24 is latched in the confined space 2111. By its own engaging action, the curved end of the pressing member is fixed relative to the mounting member
 20 21. The middle part of the pressing member 24 is bent and a restorative force is generated, and its one end corresponds to the second fixing member 23. When the trimmed edge of the ceiling panel 30 is placed on the second fixing member 23, the compressive action of the pressing member 24 on the ceiling panel 30 is achieved.

The side of the second fixing member 23 adjacent to the mounting space 201 is
 25 provided with a groove 230. The groove 230 can be formed by metal pressing or extruding directly on the second fixing member 23, and is configured as confined location for prior application of sealant. When the trimmed edge of the ceiling panel 30 is placed on the second fixing member 23, it is fixed on the second fixing member 23 by the bonding action of the sealant, and the pressing member 24 can effectively prevent lifting of the trimmed
 30 edge. Then the trimmed edge is firmly fixed on the second fixing members 23, with a sealing function.

The presence of the groove 230 ensures that the trimmed edge of the ceiling panel 30 in close contact with the second fixing member 23, with a better sealing effect.

The groove 230 extends in the longitudinal direction of the second fixing member 23. For a specific structure, refer to Figure 7.

In an optional manner, at least two ridges are located on the side of the second fixing member 23 close to the mounting space 201. The ridges extend in the longitudinal direction of the second fixing member 23, and the groove 230 is formed between the two adjacent ridges.

Two ridges are shown in the drawing, which are the first ridge 231 and the second ridge 232. In a specific implementation, three ridges or more can be chosen.

The side of the ridge further from the second fixing member 23 has a flat part. It can also be understood that the side of the ridge further from the groove 230 is flat, and it facilitates the contact of the ceiling panel 30 with the ridge for a tight fit.

The end of the second fixing member 23 further from the mounting member 21 projects in a direction close to the mounting space 201 and forms an abutting part 233 capable of abutting on the ceiling panel 30. The abutting part 233 can function not only as a support but also play a certain sealing function.

A groove similar to groove 230 can also be formed between the second ridge 232 and the abutting part 233. It can also be applied with sealant. After the sealant is applied in groove 230, some overflow is often required. Under the compressive action on the trimmed edge of the ceiling panel 30, part of the sealant can overflow to the side of the first ridge 231 further from the second ridge 232 or the side of the second ridge 232 further from the first ridge 231.

By applying sealant in the sealed space 220 and the groove 230, a better sealing effect can be obtained.

Please refer to Figure 8. Figure 8 shows a type 1 trim device 20 in the present embodiment.

The plane in which the mounting member 21 is located is perpendicularly positioned to the plane in which the second fixing member 23 is located. The plane in which the sealing member 22 is located forms an angle with the plane in which the mounting member 21 is located, and the angle thus formed ranges from 40° to 50°. In its specific embodiment, 40°, 45° or 50° can be chosen.

It can be understood that the mounting member 21 and the second fixing member 23 are integrally formed, and a chamfer is formed at the joint between the two, and the chamfered part is the sealing member 22.

Please refer to Figure 9. Figure 9 shows a type 2 trim device 20 in this embodiment.

The plane in which the mounting member 21 is located is perpendicularly positioned to the plane in which the second fixing member 23 is located, and the sealing member 22 comprises a first planar part 221 connected to the mounting member 21 and
5 a second planar part 222 connected to the second fixing member 23. The joint between the first planar part 221 and the second plane is recessed in the direction close to the mounting space 201.

It can also be understood as protruding from the sealed space 220.

Please refer to Figure 10. Figure 10 shows a type 3 trim device 20 in the present
10 embodiment.

The plane in which the mounting member 21 is located is perpendicularly positioned to the plane in which the second fixing member 23 is located, and the sealing member 22 comprises a first planar part 221 connected to the mounting member 21 and a second planar part 222 connected to the second fixing member 23. The joint between
15 the first planar part 221 and the second plane protrudes from the mounting space 201. It can also be understood as being recessed relative to the sealed space 220.

Please refer to Figure 11. Figure 11 shows a type 4 trim device 20 in the present embodiment.

The plane of the mounting member 21 is perpendicular to the plane in which the
20 second fixing member 23 is located, and the side of the sealing member 22 further from the mounting space 201 is curved. The side of the sealing member 22 further from the mounting space 201 is recessed in a direction close to the mounting space 201.

It can also be understood as protruding to the sealed space 220.

Please refer to Figure 12. Figure 12 shows a type 5 trim device 20 in the present
25 embodiment.

The plane of the mounting member 21 is perpendicular to the plane in which the second fixing member 23 is located, and the side of the sealing member 22 further from the mounting space 201 is curved. The side of the sealing member 22 further from the mounting space 201 protrudes in a direction close to the mounting space 201.

30 It can also be understood that it is recessed relative to the sealed space 220.

It should be stated that the trim device 20 shown in Figures 8 to 12 is only a simple schematic diagram. For a specific structure, they can be read in conjunction with the trim device 20 shown in Figure 6.

Referring to Figure 13, the present embodiment further provides another trim device 20, which is different from the above-mentioned trim device 20 in that the above-mentioned trim device 20 is in an "L" shape, whereas the trim device 20 in the embodiment is in a "W" shape. The fixing part 211 of the above-mentioned trim device 20 is located at one end of the entire trim device 20, whereas the fixing part 211 in the present embodiment is located at the middle of the trim device 20. The specific structure is as follows:

The trim device 20 comprises a mounting member 21, a sealing member 22, an extending member 25 and a fixing member (where the fixing member is the second fixing member 23).

One end of the extending member 25 is connected to the sealing member 22, and the other end is connected to the second fixing member 23. The extending member 25 is located at the middle of the entire trim device 20. The middle of the extending member 25 is bent in a direction close to the second fixing member 23 to form the fixing part 211. The fixing part 211 has a confined space 2111 after being bent. The confined space 2111 is configured to engage the pressing member 24 (which is of the same principle as the pressing member 24 in Figure 6).

After the mounting member 21 is mounted on the wall, sealant is applied along the recessed side of the sealing member 22 near the wall and to the groove 230 of the second fixing member 23, by which means a better sealing effect can be obtained.

The above-mentioned trim device 20 can be referred to for other structures of the trim device 20.

In addition, the ceiling panel trim device 40 may be set in such a manner. Referring to Figure 14, the ceiling panel trim device 40 comprises a fixing profile 460, and the fixing profile has a "Z" shape as a whole. The fixing profile 460 includes a first abutment part 461, a second abutting part 462 and a third abutting part 463 connected in sequence. The first abutting part 461 abuts on the back surface of the ceiling panel 30, and the second abutting part 462 abuts on the side wall of the sandwich material layer 32. The sealing gasket 15 can be mounted in the space formed by the first abutting part 461 and the wall of the second abutting part 462, and the third abutting part 463 wraps part of the sandwich material layer 32 and causes the sandwich material layer 32 to abut on the ceiling panel 30, thereby firmly fixing the ceiling panel 30 upon the first structural member 11. The sandwich material layer 32 can be firmly adhered to the ceiling panel 30 by the action of

the fixing profile 460, the sealing gasket 15 and the first structural member 11. Among them, the fixing profile 460 is attached to the periphery of the back surface of the ceiling panel 30. A sealing strip can be adopted for the sealing gasket 15, and the sealing strip can play a better role in the present embodiment. The first abutting part 461 and the
5 second abutting part 462 are perpendicularly positioned to each other, and the second abutting part 462 and the third abutting part 463 are perpendicularly positioned to each other. It should be stated that the relative position of the first abutting part 461 to the second abutting part 462, and the relative position of the second abutting part 462 to the third abutting part 463 can be chosen specifically according to the outer shape of the
10 ceiling panel 30.

The sandwich material layer 32 on the ceiling panel 30 can be made of gypsum board material, or made of sound absorbing, soundproofing, heat preserving, heat insulating or aluminum honeycomb panel material. Different materials can achieve different functions of the ceiling panel 30. It should be stated that the material of the
15 sandwich layer of the ceiling panel 30 is not confined to the contents mentioned in the embodiment. Other materials can be selected to match the functionality.

According to the suspended ceiling system 100 provided by the present embodiment, its mounting process is as follows:

The first structural member 11 and the second structural member 12 are relatively
20 fixed by the clamping members of the fixing device 14;

The ceiling flanges 31 are clamped by the confining part 111 of the first structural member 11 or the second structural member 12 so that they are fixed relative to the mounting frame 10;

The fixing rods 131 on the third structural member 13 are mounted to the above
25 floor slab of the room to achieve suspension;

The trim device 20 is mounted on the side wall of the room. The trim is achieved by tight press of the trimmed edge of the ceiling panel 30 and by application of sealant.

The above-mentioned steps can be appropriately adjusted in sequence according to specific operations.

30 The above description is only for the preferred embodiment of the application, and is not intended to limit the application. For technical persons in this field, the (patent) application can have various modifications and changes. Any modifications, equivalent substitutions, improvements, etc., made within the spirit and principles of the application

should be included in the scope of protection of the application.

Industrial Applicability

5 The Air-tight Cleanroom Ceiling: trim device, the mounting frame and the suspended ceiling system provided by the present application improve the technical problems of the poor performance of air-tightness of existing ceiling systems. Therefore, the application has important value for widespread functional application such as air-tightness, energy saving, heat preservation, sound proofing, heat insulation and sound absorption.

CLAIMS

1. A mounting frame, comprising first structural members and second structural members;

5 wherein the first structural members are connected and in a crisscross arrangement with the second structural members in the same plane, and are arranged to receive ceiling panels therebetween;

wherein all the first and second structural members are provided with bent confining parts capable of clamping an upward flange of a four-sided ceiling panel, abutting a sealing gasket along the unexposed backside of the upward flange and keeping them fixed at confined positions.

2. The mounting frame according to Claim 1,

wherein the side of the bent part that is further from the confining part is configured to abut the sealing gasket along the unexposed backside of each upward flange of a four-sided ceiling panel.

3. The mounting frame according to Claim 1 or Claim 2, wherein the mounting frame further includes a fixing device;

20 wherein the fixing device comprises a fixing member and at least two clamping members;

wherein the clamping members are connected to the fixing member;

wherein the clamping members have clamping channels configured to clamp the first structural member and the second structural member;

25 wherein the first structural member is inserted in a slidable manner and placed in the clamping channel of one of the clamping members;

wherein the second structural member is inserted in a slidable manner and placed in the clamping channel of the other of the clamping members, where at least two of the clamping channels extend in a crisscross disposition.

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4. The mounting frame according to Claim 3, wherein both ends of the clamping member protrude in a direction close to the clamping channel and respectively form a first latching part and a second latching part;

wherein the first latching part and the second latching part have a gap space

between them and are formed to define the positions of the mounting frame.

5. The mounting frame according to any one of Claims 3 or 4, wherein the fixing member is provided with fixing slots and confining members corresponding to the fixing slots;

wherein a clamping member is inserted and put through the fixing slots;

wherein the confining members are placed to abut on the clamping member and to set the clamping member to the fixing member.

6. The mounting frame according to Claim 5, wherein the number of fixing slots corresponding to one of the clamping members is two and they are arranged side by side; wherein the middle part of the clamping member is bent and both ends of the clamping member are inserted and put through the two fixing slots respectively.

7. The mounting frame according to Claim 5 or Claim 6, wherein both ends of the fixing slot are correspondingly provided with confining members.

8. A suspended ceiling system, comprising:

a trim device comprising:

a mounting member configured to be mounted on the wall; and
a fixing member configured to be fixed and bonded to a ceiling panel;
wherein the mounting member is connected or integrally formed with the fixing member; and
wherein a mounting space suitable for mounting ceiling panel is delimited between the mounting member and the fixing member, and the side of the fixing member close to the mounting space is provided with a groove configured to accommodate sealant;

a mounting frame according to any of Claims 1 to 7, the mounting frame comprising a ceiling panel;

wherein the trim device is configured to seal and clamp the edges of the ceiling panel along the ceiling perimeter, and the mounting frame is configured to form confining parts which clamp the upward flanges of the ceiling panel.

9. The suspended ceiling system according to Claim 8, wherein at least two ridges

are located on the side of the fixing member adjacent to the mounting space of the trim device; and wherein the ridges extend in the longitudinal direction of the fixing member, and the groove is located between two adjacent ridges.

- 5 10. The suspended ceiling system according to Claim 8 or Claim 9, wherein the end of the fixing member of the trim device further from the mounting member protrudes in a direction close to the mounting space and forms an abutting part capable of abutting the ceiling panel.
- 10 11. The suspended ceiling system according to any one of Claims 8 to 10, wherein the trim device further includes a sealing member, and the sealing member is connected or integrally formed with the mounting member and the fixing member; and wherein the sealing member is located between the mounting member and the fixing member, and the side of the sealing member further from the mounting space forms a sealed space
15 capable of accommodating sealant.
12. The suspended ceiling system according to Claim 11, wherein the plane of the trim device in which the mounting member is located is positioned perpendicular to the plane in which the fixing member is located, and there is an angle between the plane in which the sealing member is located and the plane in which the mounting member is located,
20 and the angle ranges from 40° to 50°.
13. The suspended ceiling system according to Claim 11 or Claim 12, wherein the sealing member of the trim device comprises a first planar part and a second planar part that are connected to each other; wherein the first planar part is connected to the
25 mounting member, and the second planar part is connected to the fixing member; wherein the joint between the first planar part and the second planar part is recessed in a direction close to the mounting space or protrudes in a direction further from the mounting space.
14. The suspended ceiling system according to any one of Claims 11 to 13, wherein
30 the side of the sealing member of the trim device further from the mounting space is curved, and the side of the sealing member further from the mounting space is either recessed or protruding in the direction close to the mounting space.

15. The suspended ceiling system according to any one of Claims 11 to 14, wherein the trim device further includes a pressing member configured to press upon the ceiling panel; and wherein the pressing member is a type of spring metal, and one end of the pressing member is connected to the mounting member or abuts on it, whereas the other
5 end of the pressing member has a tendency to move close to and abut on the fixing member.

16. The suspended ceiling system according to Claim 15, wherein the end of the mounting member of the trim device further from the fixing member is bent to form a
10 fixing part; and wherein the fixing part has a confined space, and one end of the pressing member further from the fixing member is latched in the confined space.

17. A suspended ceiling system comprising a ceiling panel trim device, a mounting frame according to any one of Claims 1 to 7, a ceiling panel and a sandwich material layer;
15 wherein the ceiling panel trim device comprises a fixing profile, and the fixing profile comprises a first abutting part, a second abutting part and a third abutting part that are connected in sequence;

wherein the first abutting part abuts the back surface of ceiling, and the second abutting part is positioned to abut the side wall of the sandwich material layer;

20 wherein the space formed between the first abutting part and the wall of the second abutting part is configured to position sealing gasket;

wherein the third abutting part wraps part of the sandwich material layer and makes the sandwich material layer abut at the back surface of the ceiling panel;

25 wherein the mounting frame is configured to form confining parts which clamp the upward flanges of the ceiling panel.

18. A suspended ceiling system according to Claim 17, wherein the sandwich material layer comprises one or more of thermal protecting, soundproof, heat insulating or sound absorbing material.