A SYSTEM AND METHOD FOR CLEANROOM PARTITION OF WALL PANEL

FIELD OF INVENTION

The present invention relates to a cleanroom partition wall panel system and a method for constructing a cleanroom partition wall panel thereof. In particular, the cleanroom partition wall panel of the present invention utilizes self-locking vertical capping with snap-fit mechanism for holding and positioning wall panels without the presence of any fastening means.

BACKGROUND ART

Generally, a typical cleanroom wall component comprises studs to which wall panels are fastened by fastening means. The wall panels are connected to form a large structural wall requires the capping to be positioned on one side or both sides of the walls. Conventional fastening means for connecting wall panels together requires complex installation method whereby the capping is tightened to the stud using mechanical fastening system involving screws, rivets and bolts.

In a demountable wall system, the wall panels may be held in a framework by a stud or by snap-in arrangements wherein the capping means have edge flanges engaging recesses in the frame members. Therefore, it would be desirable to eliminate the use of mechanical fastening system so as the wall panels can be demounted easily to facilitate allocation of various types of machinery and facilities in the cleanroom.

United States Patent No. US 3570205 (hereinafter referred to as US'205 Patent) entitled "Panel Jointure" having a filing date of 7 November 1968 (Patentee: AMERICAN AIR FILTER COMPANY) discloses a panel seal that is adapted for environmentally controlled enclosures and that is easily mounted and demounted. US' 205 Patent discloses that at least two panels are joined by the batten whereby the batten is a U-shaped insert having an aperture at two outwardly extending arms. The US' 205 Patent further discloses that a capping is made to be driven into the aperture of the U-shaped batten. It is further provided in the US' 205 Patent that the capping comprises ribs on one side of spline and the U-shaped batten having grooves made to interlock with ribs of the capping.

International Publication No. WO 2017/113007 A1 (hereinafter referred to as WO'007 A1 Publication) entitled "Cleanroom Panel System" having a filing date of 13 December 2016

(Applicant: CONCEPTS BIO-SECURITE INC.) discloses a cleanroom panel system comprises a plurality of panels having a hermetically-sealed connection between the plurality of panel by utilizing a plurality of first thermoplastic welded junctions. The cleanroom panel system of WO'007 A1 Publication further comprises a plurality of elongated snap-in panel anchoring units whereby each unit includes complementary first and second members to be latched together through an interfering engagement. The WO'007 A1 Publication provides the first member of snap-in panel anchoring unit is made of a thermoplastic material and the first members are attached to outboard major surface of the panels utilizing a plurality of second thermoplastic welded junctions.

United Kingdom Patent Application No. GB 2346627 A (hereinafter referred to as GB' 627 A Publication) entitled Partition Seal" having a filing date of 12 February 1999 (Applicant: TREVOR IAN DRUMMOND) relates to a system for sealing a joint between two panels in a cleanroom environment. The GB' 627 A Publication discloses a system which comprises a seal device whereby the seal device further comprises at least one compressible gasket and attachment means. The attachment means of GB'627 A Publication comprises a stud that may be push-fitted into a retaining clip. The retaining clip has inwardly facing protrusions to engage the stud. The GB' 627 A Publication provides that the gasket may be flush with the edge of the stud or recessed from the edge of the stud to form a channel into which a sealant can be inserted.

Reference is made to FIG. 1.0 which illustrates a conventional capping tightening mechanism utilizing screws whereby a plurality of screws is utilized to tighten the capping to a vertical post. The interconnection of panels through mechanical fastening system causes difficulty in assembling and disassembling the panels. Therefore, it would be desirable to eliminate the use of mechanical fastening system to enable the wall panels to be demounted easily to facilitate allocation of various types of machinery for easy facilitation in a cleanroom environment. Further, as illustrated in FIG. 1.0, the capping is tightened at one side which enable panels to be installed and dismantled only at one side.

As discussed above, various systems have been developed to improve the cleanroom wall assembly system. However, it is desirable for a cleanroom wall system to have a self-locking mechanism by utilizing self-locking capping means with snap-fit mechanism for holding and positioning wall panels without the presence of any fastening means. Further, it is desirable for the capping to be capped and taken off at both sides and enable panels to be installed and dismantled at either side.

SUMMARY OF INVENTION

The present invention relates to a cleanroom partition wall panel system and a method for constructing a cleanroom partition wall panels thereof. In particular, the cleanroom partition wall panel of the present invention utilizes self-locking vertical capping with snap-fit mechanism for holding and positioning wall panels without the presence of any fastening means. The capping means are capped and removed at both sides and enable panels to be installed and dismantled at either side.

One aspect of the present invention provides a cleanroom partition wall panel system (200, 300, 400). The cleanroom partition wall panel system (200, 300, 400) comprising a top track (202) affixed to a bottom of a ceiling; a plurality of wall panels (204a, 204b, 204c, 204d) spaced apart juxtaposed at opposite side to each other, each wall panel having a coplanar surface; a bottom track (206) affixed to a flooring layer as an end post for positioning the wall panels of the cleanroom partition system; at least one vertical post affixed to the top and bottom tracks to engage with the plurality of wall panels (204a, 204b, 204c, 204d); at least one horizontal mullion (212, 800, 404) being affixed to the at least one vertical post (506) as horizontal support and as a divider to the partition wall panel; self-locking capping means provides capping to the at least one vertical post (506) for holding at least two of the plurality of wall panels in between; spacing means (210, 406) affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion; a plurality of brackets (502) affixed to the vertical post (506); and a plurality of corner posts (1300) with suspension grid openings for holding and supporting cleanroom partition wall panel at corners of the cleanroom partition. The self-locking capping means (402, 504, 700) provides capping to the at least one vertical post (506) for holding at least two of the plurality of wall panels in between further comprises vertical capping (402, 204) with extending flanges (702) having at least a pair of inwardly protruding ribs with snap-fit locking means of positive panel lock-in type (704a, 704b) for locking the at least one vertical post (600) for holding the plurality of wall panels (204a, 204b, 204c, 204d)).

Another aspect of the invention provides that a top track (1100) affixed to a bottom of a ceiling further comprises a corrugated slot for affixing fastening means enabling the top track to be affixed to the top of the ceiling; and a plurality of ears for holding the at least one vertical post.

A further aspect of the invention provides that the bottom track (1200) affixed to a flooring layer as an end post for positioning the mounting frames of the cleanroom partition wall

panel further comprises a corrugated slot for affixing fastening means enabling the top track to be affixed to the flooring layer as an end post.

Yet another aspect of the invention provides that the at least one vertical post (600) affixed to the top and bottom tracks to engage with the plurality of wall panels further comprises snap-fit locking means (602a, 602b, 602c, 602d)) at each side of a top portion and a bottom portion of the vertical post for interconnecting with the self-locking capping (700) means; a receiving recess (604) at each side of an inner portion of the vertical post; and corrugated threaded slots (606a, 606b) recessed into a side surface of the inner portion of the vertical post; the corrugated threaded slots having continuous grooves for fastening means to be threaded between the corrugated threaded slots enabling fastening of the vertical post with the top and bottom tracks by using the brackets (208).

Still another aspect of the invention provides that the at least one horizontal mullion (800) being affixed to the at least one vertical post as horizontal support and as a divider to the partition wall panel further having suspension grid openings (802) for supporting and holding the wall panels in position.

Another aspect of the invention provides that spacing means (210, 406) affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion is a L-shaped spacer (900); the L-shaped spacer is affixed to each end sides of the horizontal mullion.

A further aspect of the invention provides that the plurality of brackets affixed to the self-locking capping means further comprises panel type brackets (1000); the panel type brackets are affixed to the vertical capping for holding the wall panels with thickness less than 45 mm in position.

Another aspect of the invention provides a method (1600) for constructing a cleanroom partition wall panel. The method comprising steps of affixing a top track to a bottom of a ceiling (1602); affixing a bottom track to a flooring layer as support to wall panels (1604); affixing corner post to the top track and the bottom track at corner joints of the top and bottom tracks (1606); affixing at least one vertical post to the top and bottom tracks (1608); affixing at least one horizontal mullion to at least one vertical post as horizontal support to the partition wall panel (1610); affixing spacing means affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion (1612); positioning a plurality of wall panels spaced apart juxtaposed at opposite side to each other

to form a partition wall system (1614); providing self-locking capping means to the at least one vertical post for holding the plurality of wall panels in position (1616).

The present invention consist of features and a combination of parts hereinafter fully described and illustrated in the accompanying drawings, it being understood that various changes in the details may be made without departing from the scope of the invention or sacrificing any of the advantages of the present invention.

BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS

To further clarify various aspects of some embodiments of the present invention, a more particular description of the invention will be rendered by references to specific embodiments thereof, which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail through the accompanying drawings.

FIG. 1.0 illustrates a conventional capping mechanism using screws.

FIG. 2.0 illustrates an exploded view of an assembly of cleanroom partition wall panel system of the present invention.

FIG. 3.0 illustrates an exploded view of vertical capping and vertical post track assembly of the present invention.

FIG. 4.0 illustrates the joining of vertical capping and horizontal mullion.

FIG. 5.0 illustrates the attachment of the panel bracket to the vertical post of the present invention.

FIG. 6.0 illustrates the vertical post of the present invention.

FIG. 7.0 illustrates the self-locking capping means of the present invention.

FIG. 8.0a illustrates a cross-sectional view of the horizontal mullion.

FIG. 8.0b illustrates a perspective view of the horizontal mullion.

FIG. 9.0 illustrates a L-spacer utilized in the present invention.

FIG. 10.0 illustrates a panel bracket utilized in the present invention.

FIG. 11.0 illustrates a top track of the present invention.

FIG. 12.0 illustrates a bottom track of the present invention.

FIG. 13.0 illustrates a corner post of the present invention.

FIGs. 14.0a and 14.0b illustrates a top track joining of the present invention utilizing fastening means.

FIGs. 15.0a and 15.0b illustrates a bottom track joining of the present invention utilizing fastening means.

FIG. 16.0 is a flowchart illustrating the method of the present invention for constructing a cleanroom partition wall panel.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to a cleanroom partition wall panel system and a method for constructing a cleanroom partition wall panel thereof. In particular, the cleanroom partition wall panel of the present invention utilizes self-locking vertical capping with snap-fit mechanism for holding and positioning wall panels without the presence of any fastening means. The capping means are capped and removed at both sides and enable panels to be installed and dismantled at either side. Hereinafter, this specification will describe the present invention according to the preferred embodiments. It is to be understood that limiting the description to the preferred embodiments of the invention is merely to facilitate discussion of the present invention and it is envisioned without departing from the scope of the appended claims.

Reference is made to FIG. 2.0 which illustrates an exploded view of an assembly of cleanroom partition wall panel system of the present invention together with FIG. 3.0, FIG. 4.0, FIG. 8.0a, FIG. 8.0b and FIG. 13.0 on the relevant parts of the cleanroom partition wall panel system. The present invention provides a self-locking capping without utilizing any fastening means. As illustrated in FIG. 2.0 and all relevant figures, the cleanroom partition wall panel system (200, 300, 400) of the present invention comprising a top track (202) affixed to a bottom of a ceiling; a plurality of wall panels (204a, 204b, 204c, 204d) spaced apart juxtaposed at opposite side to each other, each wall panel having a coplanar surface; a bottom track (206) affixed to a flooring layer as an end post for positioning the wall panels of the cleanroom partition wall system; at least one vertical post affixed to the top and bottom tracks to engage with the plurality of wall panels (204a, 204b, 204c, 204d); at least one horizontal mullion (212, 800, 404) being affixed to the at least one vertical post as horizontal support and as a divider to the partition wall panel; self-locking capping means provides capping to the at least one vertical post for holding at least two of the plurality of wall panels in between; spacing means (210, 306) affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion; a plurality of brackets (402) affixed to the vertical post (506) to hold panels less than 45mm; and a plurality of corner posts (1300) with suspension grid openings for holding and supporting cleanroom partition at corners of the cleanroom partition. The self-locking capping means (300, 700) provides capping to the at least one vertical post for holding at least two of the plurality of wall panels in between (204a, 204b, 204c, 204d) further comprises vertical capping (402, 504) with extending flanges (702) having at least a pair of inwardly protruding ribs with snap-fit locking means of positive panel lock-in type (704a, 704b) for locking of the at least one vertical post for holding the plurality of wall panels (204a, 204b, 204c, 204d).

All parts which forms the cleanroom partition wall panel system of the present invention is illustrated further in the relevant figures. FIG. 6.0 illustrates the vertical post of the present invention. As illustrated in FIG. 6.0, the at least one vertical post affixed to the top and bottom tracks to engage with the plurality of wall panels further comprises snap-fit locking means (602a, 602b, 602c, 602d) at each side of a top portion and a bottom portion of the vertical post for interconnecting with the self-locking capping means (700); a receiving recess (604) at each side of an inner portion of the vertical post; and corrugated threaded slots (606a, 606b) recessed into a side surface of the inner portion of the vertical post; the corrugated threaded slots having continuous grooves for fastening means to be threaded between the corrugated threaded slots enabling fastening of the vertical post with the top and bottom tracks by using spacing means. The vertical post (600) acts as a supporting frame to the wall panels. The vertical post (600) is affixed to a top track and a bottom track using the brackets (208) and screws.

The structure of the capping means is illustrated in FIG. 7.0. The self-locking capping means (300, 700) comprises vertical capping (402, 504) with extending flanges (702) having at least a pair of inwardly protruding ribs with snap-fit locking means of positive panel lock-in type (704a, 704b) for locking of the at least one vertical post for holding the plurality of wall panels (204a, 204b, 204c, 204d). The self-locking capping means (300, 700) holds the wall panels firmly without utilizing any screws. FIG. 3.0 illustrates an exploded view of vertical capping and post track assembly of the present invention. As illustrated in FIG. 3.0, the capping means is easily removed during dismantle process by utilizing forceps. Further, the joining of vertical capping (402) and horizontal capping (404) is illustrated in FIG. 4.0.

Reference is now made to FIGs. 8.0a and 8.0b which illustrates a cross-sectional view of a horizontal mullion and a perspective view of horizontal mullion respectively. The horizontal mullion (800) being affixed to the at least one vertical post as horizontal support and as a divider to the partition wall panel further having suspension grid openings (802) for supporting and holding wall panels of the wall panel in position. The horizontal mullion (800) further acts as a horizontal support for windows and door installation.

The spacing means is illustrated in FIG. 9.0. In the cleanroom partition wall panel system (200) of the present invention, the spacing means (210, 306) is affixed at both ends of the at least one horizontal mullion (800) for fixing and supporting a position of the horizontal mullion. The spacing means is a L-shaped spacer (900) whereby the L-shaped spacer is affixed to each end sides of the horizontal mullion. The panel bracket utilized in the present

invention is illustrated in FIG. 10.0. The panel type brackets (1000) are affixed to the vertical capping for holding the wall panels in position. The panel bracket (1000) utilized in the present invention is affixed to a wall panel of thickness less than 45mm. FIG. 5.0 illustrates the attachment of the panel bracket to the vertical post of the present invention. As illustrated in FIG. 5.0, the panel bracket is attached to the H-section of vertical post. The sizes of panel bracket varies in accordance to the thickness of the wall panels ranging from at least 13 mm to 45 mm. A corner post is illustrated in FIG. 13.0 with suspension grid openings for holding and supporting corners of the cleanroom partition wall panel.

Reference is now made to FIG. 11.0 which illustrates a top track of the present invention and FIG. 12.0 which illustrates a bottom track of the present invention. As illustrated in FIG. 11.0, a top track (1100) affixed to a bottom of a ceiling further comprises a corrugated slot for affixing fastening means such as screws enables the top track to be affixed to the bottom of the ceiling; and a plurality of ears for holding the at least one vertical post. As illustrated in FIG. 12.0, the bottom track (1200) affixed to a flooring layer as an end post for positioning the mounting frames of the cleanroom partition wall panel further comprises a corrugated slot for affixing fastening means such as screws enables the top track to be affixed to the flooring layer as an end post. Further, a top track joining of the present invention utilizing fastening means is illustrated in FIGs. 14.0a and 14.0b while a bottom track joining of the present invention utilizing fastening means is illustrated in FIGs. 15.0a and 15.0b. As illustrated in FIGs. 14.0a and 14.0b, screws are utilized to fasten the top track to the ceiling and L-bracket is utilized to affix the vertical post and the top track together. As illustrated in FIGs. 15.0 and 15.0b, screws are utilized to fasten the bottom track to the flooring layer and L-bracket is utilized to affix the vertical post and the bottom track together.

Reference is now made to FIG. 16.0 which is a flowchart illustrating a general methodology of the present invention for constructing a cleanroom partition wall panel. The method comprising steps of first affixing a top track to a bottom of a ceiling (1602); and affixing a bottom track to a flooring layer as support to wall panels (1604). Subsequently, a corner post is affixed to the top track and the bottom track at corner joints of the top and bottom tracks (1606). Thereafter, at least one vertical post is affix to the top and bottom tracks (1608) while at least one horizontal mullion is affix to at least one vertical post as horizontal support to the partition wall panel (1610). A plurality of wall panels are positioned and is spaced apart juxtaposed at opposite side to each other to form a partition wall panel with wall panel having a coplanar surface (1610). A self-locking capping means is provided to the at least one vertical post for holding the plurality of wall panels in position (1616). Spacing means of L-type spacer is affixed at both ends of the at least one horizontal mullion for fixing and

supporting a position of the horizontal mullion (1618); and a plurality of brackets is affixed to the self-locking capping means (1620).

The present invention provides a self-locking vertical capping means with snap-fit mechanism to position and hold a plurality of wall panels without utilization of any fastening means. It enables capping to be capped and removed at both sides and enables the wall panels to be installed and dismantled at either side at anytime.

Unless the context requires otherwise or specifically stated to the contrary, integers, steps or elements of the invention recited herein as singular integers, steps or elements clearly encompass both singular and plural forms of the recited integers, steps or elements.

Throughout this specification, unless the context requires otherwise, the word “comprise”, or variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated step or element or integer or group of steps or elements or integers, but not the exclusion of any other step or element or integer or group of steps, elements or integers. Thus, in the context of this specification, the term “comprising” is used in an inclusive sense and thus should be understood as meaning “including principally, but not necessarily solely”.

CLAIMS

1. A cleanroom partition wall panel system (200, 300, 400) comprising:

a top track (202) affixed to a bottom of a ceiling;

a plurality of wall panels (204a, 204b, 204c, 204d) spaced apart juxtaposed at opposite side to each other, each wall panel having a coplanar surface;

a bottom track (206) affixed to a flooring layer as an end post for positioning the wall panels of the cleanroom partition wall system;

at least one vertical post (506) affixed to the top and bottom tracks to engage with the plurality of wall panels (204a, 204b, 204c, 204d);

at least one horizontal mullion (212, 800, 404) being affixed to the at least one vertical post (506) as horizontal support and as a divider to the partition wall panel;

self-locking capping means provides capping to the at least one vertical post (506) for holding at least two of the plurality of wall panels in between;

spacing means (210, 406) affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion;

a plurality of brackets (208, 502) affixed to the vertical post (506) ; and

a plurality of corner posts (1300) with suspension grid openings for holding and supporting cleanroom partition wall panel at corners of the cleanroom partition;

characterized in that

the at least one vertical post (506) affixed to the top and bottom tracks to engage with the plurality of wall panels further comprises (600):

snap-fit locking means (602a, 602b, 602c, 602d) at each side of a top portion and a bottom portion of the vertical post (506) for interconnecting with the self-locking capping means (700);

a receiving recess (604) at each side of an inner portion of the vertical post (506); and

corrugated threaded slots (606a, 606b) recessed into a side surface of the inner portion of the vertical post (506); the corrugated threaded slots having continuous grooves for fastening means to be threaded between the corrugated threaded slots enabling fastening of the vertical post (506) with the top and bottom tracks by using the brackets (208).

2. The cleanroom partition wall panel system (200) according to Claim 1, wherein the self-locking capping means (300, 700) further comprises vertical capping (402, 504) with extending flanges (702) having at least a pair of inwardly protruding ribs with snap-fit locking means of positive panel lock-in type (704a, 704b) for locking of the at least one vertical post (506) for holding the plurality of wall panels (204a, 204b, 204c, 204d).

3. The cleanroom partition wall panel system (200) according to Claim 1, wherein the top track (1100) affixed to the bottom of the ceiling further comprises:

    a corrugated slot for affixing fastening means enabling the top track to be affixed to the bottom of the ceiling; and

    a plurality of ears for holding the at least one vertical post (506).

4. The cleanroom partition wall panel system (200) according to Claim 1, wherein the bottom track (1200) affixed to the flooring layer as the end post for positioning mounting frames of the cleanroom partition wall panel further comprises a corrugated slot for affixing fastening means enabling the bottom track to be affixed to the flooring layer.

5. The cleanroom partition wall panel system (200) according to Claim 1, wherein the at least one horizontal mullion (800) being affixed to the at least one vertical post (506) as horizontal support and as a divider to the partition wall panel further having suspension grid openings (802) for supporting and holding the wall panels in position.

6. The cleanroom partition wall panel system (200) according to Claim 1, wherein spacing means (210, 406) affixed at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion is a L-shaped spacer (900); the L-shaped spacer is affixed to each end sides of the horizontal mullion.

7. The cleanroom partition wall panel system (200) according to Claim 1, wherein the plurality of brackets affixed to the self-locking capping means further comprises panel type brackets (1000); the panel type brackets are affixed to the vertical capping for holding the wall panels in position.

8. The cleanroom partition wall panel system (200) according to Claim 7, wherein each of the panel brackets (1000) is affixed to wall panels thickness of less than 45mm.

9. A method (1600) for constructing a cleanroom partition wall panel comprising steps of:

affixing a top track to a bottom of a ceiling (1602);

affixing a bottom track to a flooring layer as support to wall panels (1604);

affixing corner post to the top track and the bottom track at corner joints of the top and bottom tracks (1606);

affixing at least one vertical post (506) to the top and bottom tracks (1608);

affixing at least one horizontal mullion to at least one vertical post (506) as horizontal support to the partition wall panel (1610);

affixing spacing means at both ends of the at least one horizontal mullion for fixing and supporting a position of the horizontal mullion (1612);

positioning a plurality of wall panels spaced apart juxtaposed at opposite side to each other to form a partition wall panel, each wall panel having a coplanar surface (1614); and

providing self-locking capping means to the at least one vertical post (506) for holding the plurality of wall panels in position (1616).