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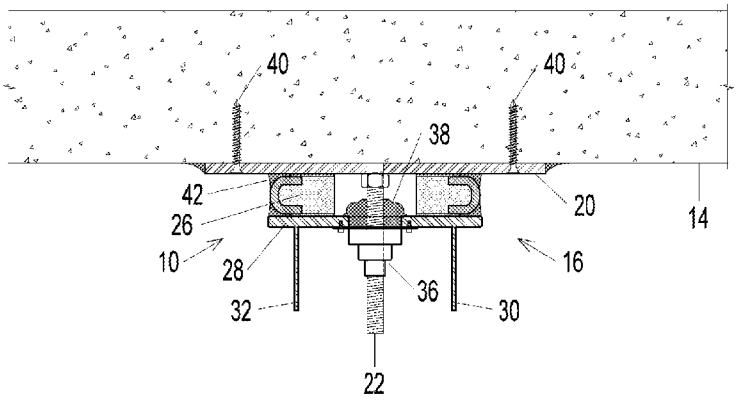

FIG. 1

(57) Abstract: An embodiment of the invention comprises a track assembly (10) for joining together a wall and ceiling for constructing a room in a high containment facility. The track assembly is comprised of a track member (16) for placement over a wall framing stud forming a wall section of the room. An engagement plate member (20) is attached to the ceiling along wall connecting to the ceiling at the point of the track assembly. An alignment bolt member (22) is connected to the engagement plate and depends downwardly therefrom. A flexible member (26) is placed between the top surface of the track member and the engagement member to resist excessive expansion and compression so that limited movement between the track member and engagement plate is permitted. The alignment bolt provides resistance to excessive lateral movement and reinforces the track assembly in preventing excessive deflective lateral movement of the wall.

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CONTROL JOINT TRACK ASSEMBLY FOR SEISMIC AND ENVIRONMENTAL STABILIZATION

RELATED APPLICATION

[0001] The present PCT patent application claims priority benefit of an earlier-filed provisional patent application identified as Serial No. 63/600,317, filed November 17, 2023. The identified earlier-filed application is hereby incorporated by reference into the present application.

FIELD OF THE INVENTION

[0002] The present invention relates to a high containment wall system constructed for Biosafety Level (BSL) biological labs. In particular, an embodiment of the high containment wall system relates to a system and structure for maintaining structural soundness and airtight conditions when subjected to deflections from seismic events under which the structure may be exposed. More specifically, an embodiment relates to a control joint assembly at the interface of the wall and ceiling in the high containment wall system.

BACKGROUND OF THE INVENTION

[0003] The biosafety industry strives to develop standards and facilities that provide mechanisms and practices to lower the risk of unintentional infection from pathogens or biological materials in the laboratory or environmental release of those materials from the laboratory. The Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) have established levels of biosafety (BSL-1 to BSL-4) to guide laboratory researchers in the safe handling of biological agents. Generally, the term "high containment" refers to the higher levels of biosafety wherein enhanced protective measures are employed.

[0004] While all structural and operational aspects of a laboratory facility are considered in the overall approach in ensuring high containment protocol, the walls and ceilings of a facility are one of the most dynamic areas of laboratory design. Walls and ceilings provide the main barrier in preventing the escape of biological agents from a lab facility. An alternative in high containment barrier construction provides for a system of panels comprised of a homogeneous composite resin core. The homogeneous composite resin core high containment barrier system provides for economies on the manufacturing and installation process. An advantage of the homogeneous core is that the panels may be

manufactured within tight tolerances without disrupting the structural integrity of the panel. This permits a heightened degree of uniformity of joined panels when erecting the barrier system and creates a flat, even wall surface at areas where panels are joined together. The panels can be used with traditional steel studs and furring channels.

[0005] New and existing buildings are constantly threatened by building movement, building materials being susceptible to variable climate changes, laboratory's positive and negative pressure requirements and natural forces such as seismic and hurricane activities. As a primary barrier in high containment and research laboratories, it is critical that architectural interior finishes perform to required expectation. It is also equally paramount that the assembly methods and the products utilized to construct, bond and seal the panel joints be constructed to deliver the highest level of integrity for the safety of its occupants and its surrounding environments. A primary barrier must function at the highest level so it can maintain a gas tight, air tight, water and moisture tight environment. These surfaces and panel joints must also withstand harsh decontamination and sanitizing protocols throughout the life cycle of the laboratory. It is therefore important to construct the primary barrier (room envelop) with high performance products and installation methods that require minimum components, with no exposed fasteners delivering a smooth, seamless finish resulting in an impenetrable barrier finish.

[0006] Also, in considering movements and deflections in wall and ceiling structures that may be caused by seismic events (such as earthquakes) and hurricanes, it is imperative that joints between the walls and ceiling panels be stable to maintain their integrity to prevent a disruption or deterioration of the gas tight, air tight, water and moisture tight environment that can happen during such events.

BRIEF SUMMARY OF THE INVENTION

[0007] An embodiment of the invention comprises a track assembly for joining together a wall and ceiling for constructing a room as part of a high containment facility. The track assembly is comprised of a track member for placement over a wall framing stud forming a wall section of the room. An engagement plate member is attached to the ceiling along the area that the wall will connect to the ceiling at the point of the track assembly. An alignment bolt member is connected to the engagement plate and depends downwardly therefrom. The track member has an opening on a top surface thereof to receive the

alignment bolt member. A flexible member is placed between the top surface of the track member and the engagement member. The flexible member has flexural rigidity to resist excessive expansion and compression so that limited movement between the track member and engagement plate is permitted. The alignment bolt is received within a grommet positioned below the top surface of the track member and sealant is provided around and within the grommet to maintain the grommet in position below the top surface of the track member. The alignment bolt provides resistance to excessive lateral movement and reinforces the track assembly in preventing excessive deflective lateral movement of the wall. The alignment bolt is held within the grommet. The grommet and sealant have a degree of flexibility to allow the track member to move up and down in relation to the engagement member.

[0008] After installation of the track assembly at the wall and ceiling joint, sealant is added at points of contact around the engagement member and track member to seal off any openings that might permit air, gas or moisture leakage around or through the track assembly. The track assembly enables the wall to withstand up and down movement of the wall and lateral drift of the wall that may be caused by seismic or other environmental conditions such that the necessary airtight, gastight and moisture tight conditions of the high containment lab can be maintained and to preserve the structural integrity of the wall caused by disruptive forces.

[0009] In another embodiment of the invention, the track assembly can be pre-fabricated with the flexible member already positioned in place between the engagement plate and the track member such that the individual elements of the track assembly need not be serially positioned and installed in place as the wall is erected. In this configuration, the engagement plate of the fully assembled track assembly can first be attached to the ceiling and then the wall studs be inserted into the track member that is already positioned in place. This avoids difficulties in installment that can arise from having to first attach the engagement plate to the ceiling, then attaching the flexible member to the attachment member, and then aligning the track member with the engagement plate.

[0010] In explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or

illustrated in the drawings. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

[0011] As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention. Though some features of the invention may be claimed in dependency, each feature has merit when used independently.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0012] The present invention is described herein with reference to the following drawing figures, with greater emphasis being placed on clarity rather than scale.

[0013] FIG. 1 is a cross sectional view of a section of the track assembly as attached to a ceiling.

[0014] FIG. 2 is a cross sectional view of a section of the track assembly as attached to a ceiling and with the wall framing and wall panels attached.

[0015] FIG. 3 is a cross sectional view in side elevation of a section of the track assembly as attached to a ceiling with the wall framing studs connected to the track assembly.

[0016] FIG. 4 shows a section of the wall framing studs connected to the track assembly.

[0017] Fig. 5 shows a cross sectional view of the track assembly with shipping bracket.

DETAILED DESCRIPTION OF THE INVENTION

[0018] An embodiment of the present invention comprises a track assembly for joining together a wall and a connective surface, such as a ceiling, for constructing a room

as part of a high containment facility. The track assembly 10 as installed at the joint between wall 12 and ceiling 14 is shown generally in FIG. 2. Track assembly 10 comprises a track member 16 adapted to receive wall framing stud 18. Engagement plate member 20 provides for attachment of track assembly 10 to ceiling 14. Alignment bolt 22 depends downwardly from engagement plate 20 and extends through opening 24 in track member 16. Flexible member 26 is sandwiched between the top of track member 16 and engagement plate 20.

[0019] An embodiment of the track assembly provides for track member 16 to be comprised of aluminum having a width of 5 inches and a thickness of 0.25 inches. Legs 30 and 32 extend downwardly from the bottom edge of upper plate 28 and are spaced 0.5 inches inwardly from each side edge of upper plate 28. Legs 30 and 32 have a thickness of 1/16 inch and extend downwardly 2 inches from upper plate 28 to form an interior channel for receiving wall framing studs. Track member 16 is constructed to facilitate project length and be provided in a number of sections spanning the entire length of the wall that joins the ceiling as seen in the partial section of wall in FIG. 4. The dimensions of the track member permit insertion of wall framing studs 18 between legs 30 and 32 as seen in FIG 2.

[0020] Engagement plate 20 is comprised of stainless steel and has a width of 8 inches and a thickness of 0.25 inches. It has a length corresponding to that of track member 16 to span the length of the wall joining the ceiling. A series of alignment bolts 22 are secured to the underneath side of engagement plate 20. Alignment bolts 22 are positioned centrally of engagement plate 20 and depend downwardly to be received in openings 24 in track member 16. In joining alignment bolt 22 to engagement plate 20, a threaded opening 34 is provided. Alignment bolt 22 is threaded and has a 3/8 inch diameter. Alignment bolt 22 attaches to engagement plate 20 in threaded engagement in opening 34. The threads permit the introduction of sealant in and around the threads to secure the connection and to ensure a seal that is resistant to air, gas and moisture leakage at the point of connection. Alignment bolts 22 are spaced along engagement plate 20 at 24 inch intervals and track member 16 has correspondingly spaced openings 24 to receive the alignment bolts.

[0021] A flexible grommet 36, such as a firewall grommet, is positioned through

the opening 24 in track member 16 and receives alignment bolt 22. Grommet 36 has circumferential flanges to enable it to be secured to track member 16 by screws or bolts. Sealant 38 is placed internally of grommet 36 to fill around alignment bolt 22 as well as around the portion of alignment bolt 22 above the opening 24 to hold alignment bolt 22 in sealed relationship with grommet 36. The flexible nature of grommet 36 permits relative up and down movement of track member 16 relative to engagement plate 20 to accommodate movement during a seismic event. Similarly, grommet 36 holds alignment bolt 22 in a flexible engagement to permit relative side to side movement of track member 16 to accommodate drift and lateral movement of the joined wall caused by a seismic event.

[0022] In preparing to attach engagement plate 20 to ceiling 14, screw holes are drilled into engagement plate to receive self-tapping masonry screws 40 that will attach the plate to the ceiling. In preparing for the attachment of engagement plate 20 to ceiling 14, the mating surfaces of engagement plate 20 and ceiling 14 are coated with a layer of epoxy to ensure that gaps between the mating surfaces are closed so that air, gas and moisture leakage through the points of engagement is prevented. The edges of engagement of plate 20 with ceiling 14 are sealed using an appropriate sealant such as Arcoplast Bio-Seal® (A-1010) white finishing compound.

[0023] Flexible member 26 should have flexural rigidity to confer a degree of resistance to forces of compression and expansion in order to accommodate up and down movement of the wall during a seismic event such as an earthquake. A suitable material that may be used for flexible member 26 is provided by the DSM System manufactured by Sika Emseal, which comprises a precompressed sealant and impregnated-foam hybrid silicone bellows. The material can be cut as needed to fit between engagement plate 20 and track member 20 and to provide a space for alignment bolt 22 to pass through as shown in FIG. 2. Sealant 42, such as Sikasil® WS-295 silicone sealant, is placed around the outer edges of flexible member 26 to prevent air, gas and moisture leakage.

[0024] Because of drying and curing times of sealant and epoxies, it can be difficult to install track assembly 10 by sequentially installing the various components in place. That is, the sealants and epoxies applied to the surfaces to be joined have short curing times and do not readily permit the engagement plate 20 to be first applied to the

ceiling, followed by placement of flexible member 26 on the top of track member 16, insertion of sealant in grommet 36, and so on, all of which takes substantial time. For that reason, the track assembly 10 is preferably prefabricated of all its component parts as explained herein so that it may be installed as a unit onto ceiling 14 prior to erecting of the wall framing studs 18.

[0025] To facilitate the prefabrication and shipping of the track assembly, and to secure the elements together to avoid premature expansion of flexible member 26 installed between the top of track member 16 and engagement plate 20, a bracket 44 can be provided to draw the elements together as shown in FIG. 5. Bracket 44 is U-shaped and has a dimension to enable it to be placed within the channel formed by legs 30 and 32 depending downwardly from track member 16. The bottom of bracket 44 as an opening to receive the end of alignment bolt 22. A nut 46 is threaded onto the end of alignment bolt and tightened to draw together track member 16, flexible member 26 and engagement plate 20. Bracket 44 can be removed once track assembly is attached to the ceiling at the area where the wall will be joined.

What is Claimed is:

1. A track assembly for joining together a wall and a connective surface, the track assembly comprising:

a track member adapted to receive a wall framing stud;

an engagement plate member for connection to a connective surface;

a deflection-resistant flexible member;

and an alignment bolt member,

the alignment bolt member depending downwardly from the engagement plate member and through a top of the track member, the flexible member being positioned between the engagement plate member and a top of the track member, whereby the track assembly provides a resistance to deflective movement of the wall framing studs to which it is connected.

2. The track assembly of claim 1 in which the connective surface is a ceiling.

3. The track assembly of claim 1 in which the flexible member is compressible to permit slight upward and downward displacement of a wall relative to the connective surface to which the wall framing stud is connected.

4. The track assembly of claim 1 in which the flexible member permits slight lateral displacement of the wall framing stud relative to a ceiling to which the wall framing stud is connected.

5. The track assembly of claim 1 in which a grommet member is positioned below the top of the track member and fastened to the track member, the grommet member receiving the alignment bolt member therethrough, the alignment bolt member being held in secure relationship within the grommet member, the grommet member being flexible to permit upward and downward displacement of a wall relative to the connective surface to which the wall framing stud is connected.

6. The track assembly of claim 5 in which sealant is placed within the grommet member and around the alignment bolt inside the grommet member to hold the alignment bolt in secure engagement with the grommet member.

7. The track assembly of claim 1 in which the alignment bolt member provides resistance to lateral displacement of the wall framing stud relative to a ceiling to which the wall framing stud is connected.

8. A method for constructing a wall and ceiling joint to withstand deflective forces, comprising providing a track assembly for placement between wall framing studs and a ceiling, the steps comprising: placing a track member at the top of a wall framing stud along which the wall is to be erected;

attaching an engagement plate member on the ceiling at an area along which the wall will engage the ceiling;

providing an alignment bolt member on the engagement plate member such that the alignment bolt member extends downwardly;

providing an opening in the top of the track member to receive the alignment bolt member;

placing a deflection-resistant flexible member between the engagement plate member and the top of the track member;

providing a grommet member positioned below the top of the track member to receive the alignment bolt member in a secure engagement,

whereby the deflection-resistant flexible member limits deflective movement at the wall and ceiling joint caused by external forces effecting a vertical and lateral displacement of the wall relative to the ceiling.

9. The method for constructing a wall and ceiling joint to withstand deflective forces according to claim 8 in which the grommet member is flexible to permit upward and downward displacement of a wall relative to the connective surface to which the wall framing stud is connected.

10. The method of claim 8 in which a series of alignment bolt members are positioned along the track assembly to provide stability against external forces effecting a lateral displacement of the wall relative to the ceiling.

11. The method for constructing a wall and ceiling joint to withstand deflective forces of claim 8, wherein a sealant is applied to at all areas between the engagement of the track assembly with the ceiling and wall framing stud to provide a resistance to air, gas and moisture leakage through the areas of engagement.

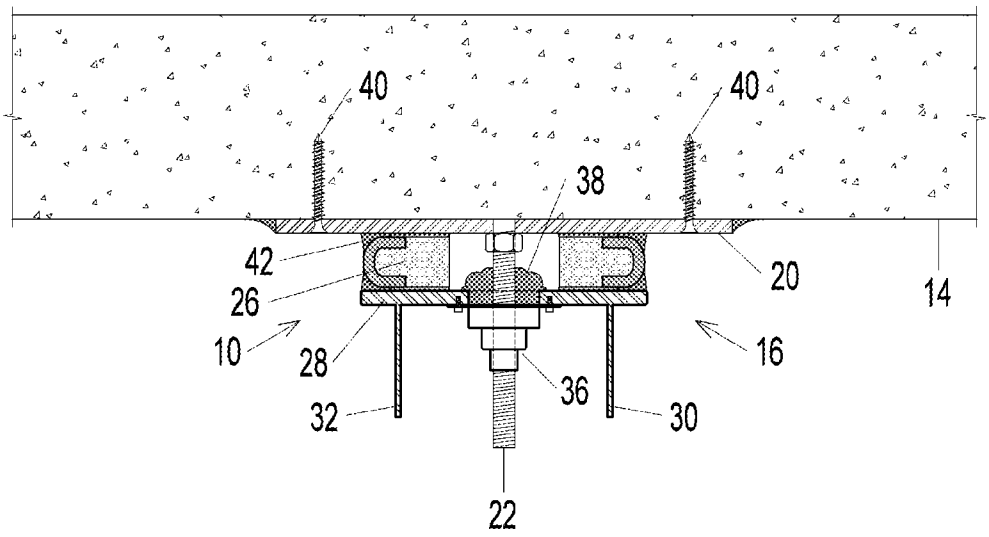

FIG. 1

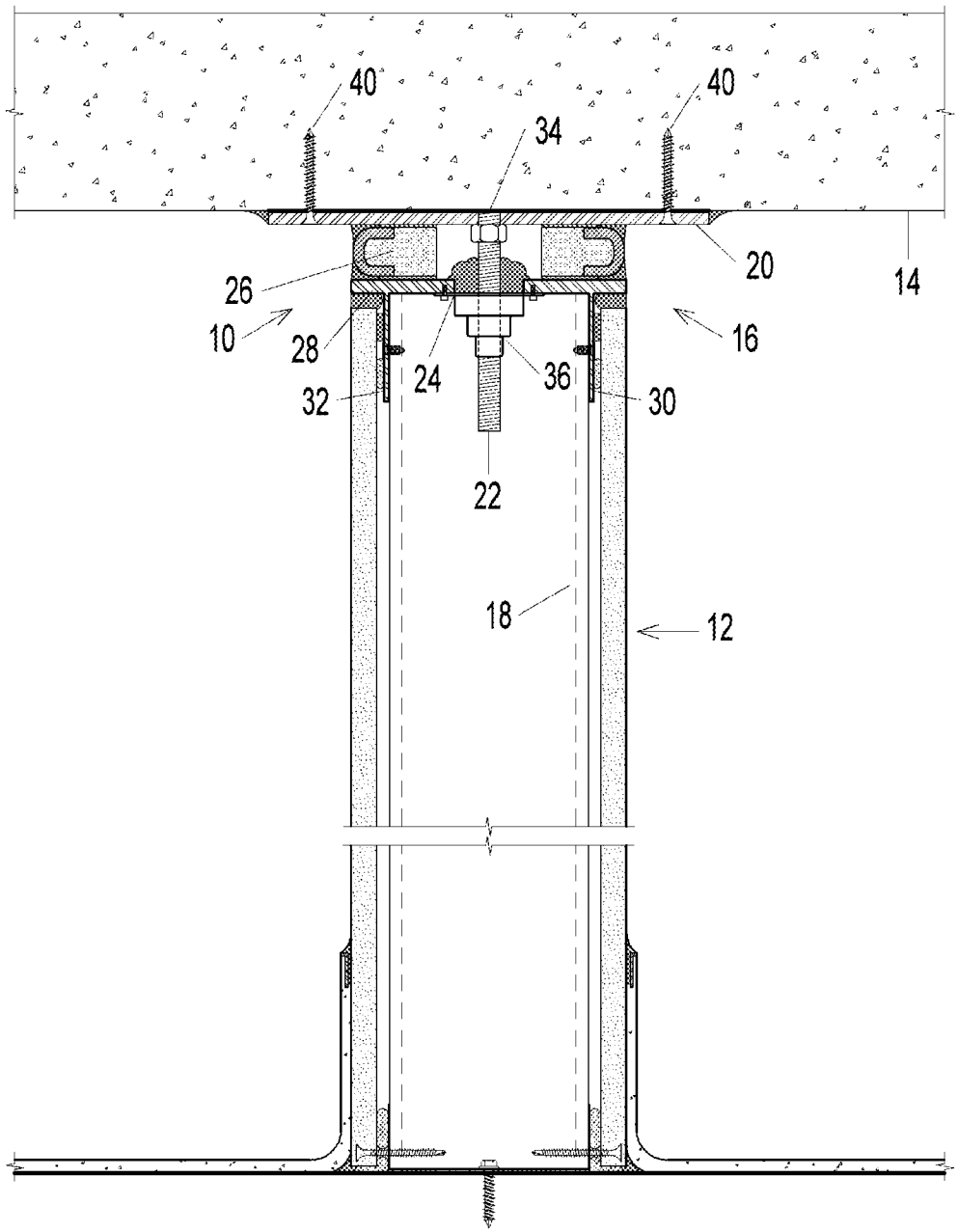

FIG. 2

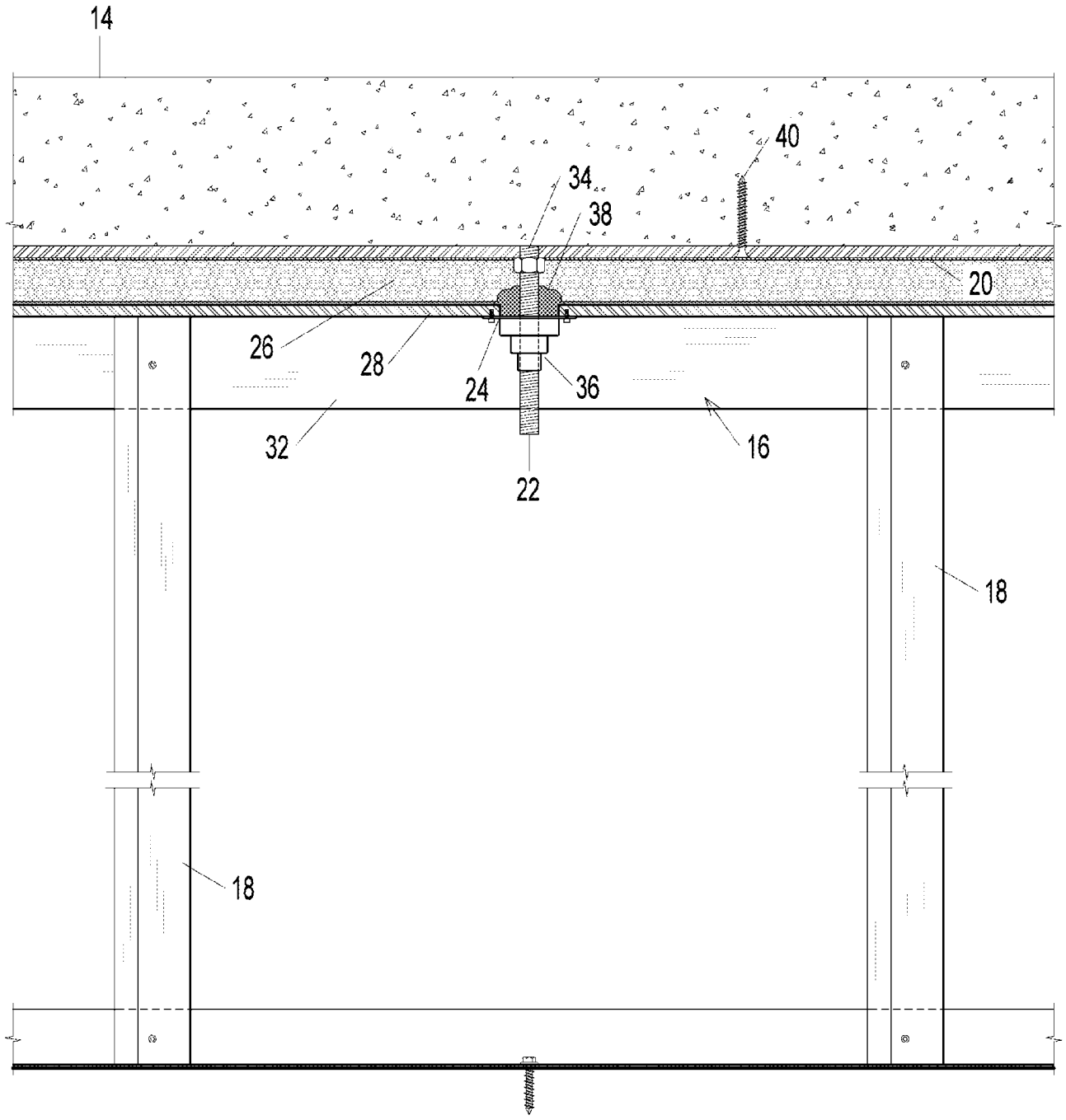

FIG. 3

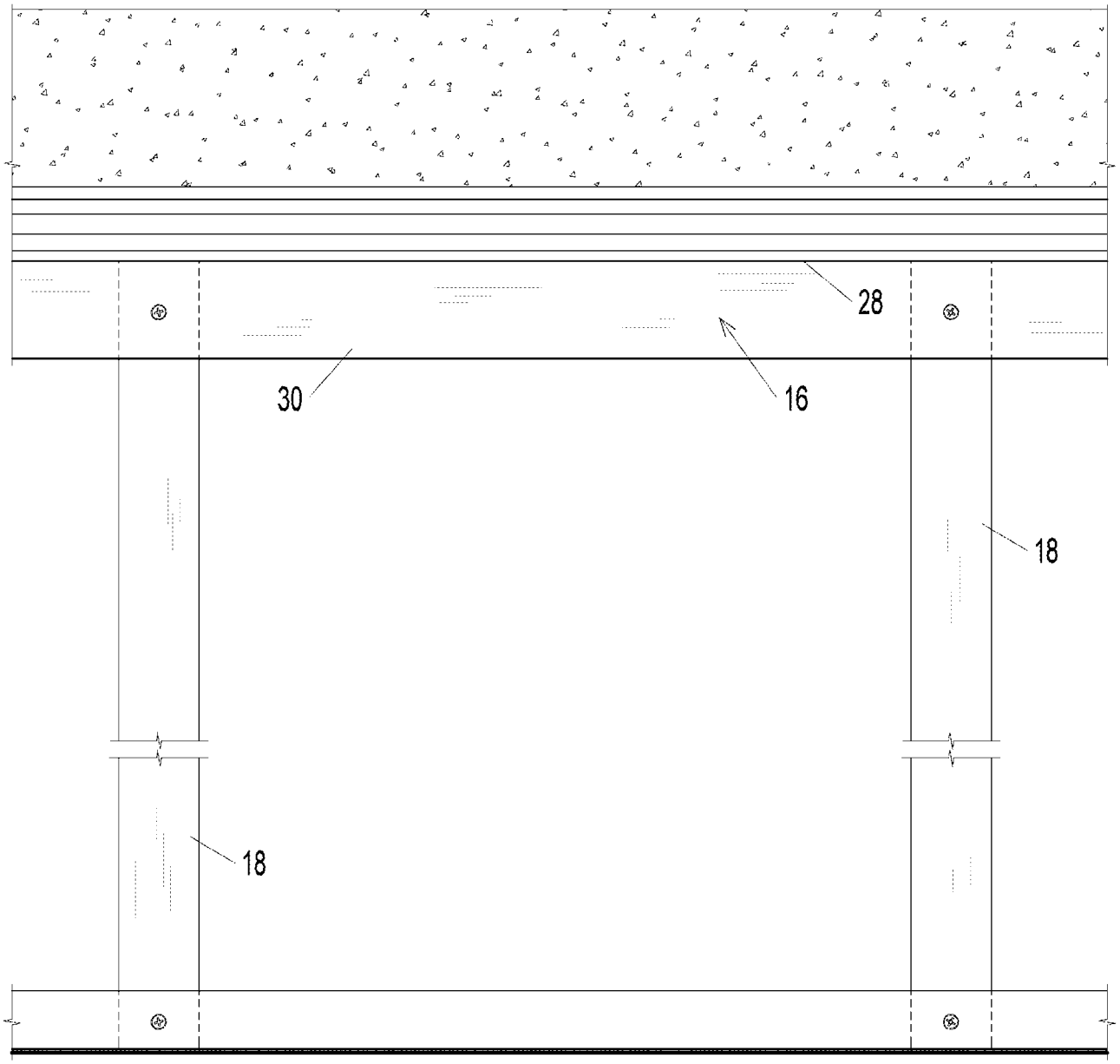

FIG. 4

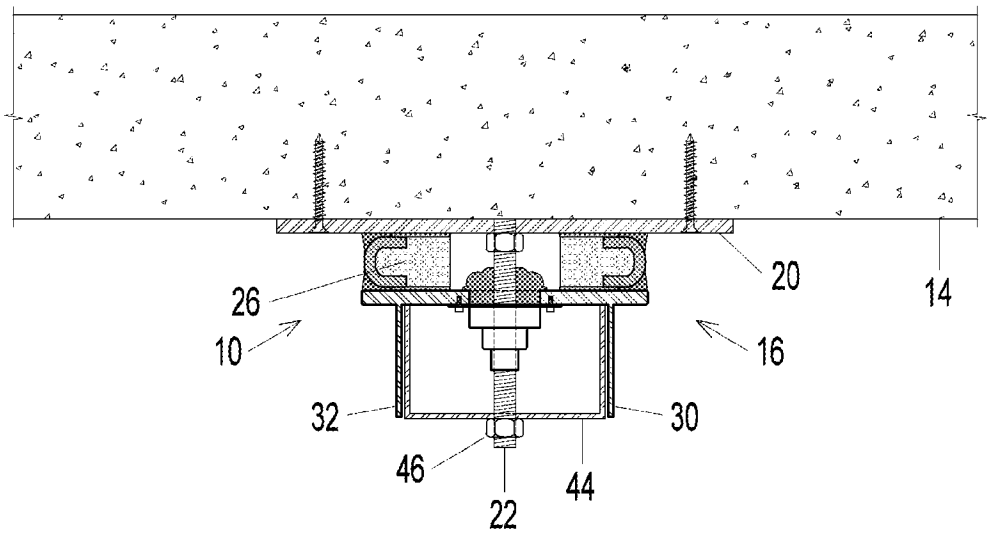

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/056387

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***E04B 2/82*** (2025.01); ***E04B 1/98*** (2025.01); ***E04B 2/80*** (2025.01)

CPC: ***E04B 2/82; E04B 1/98; E04B 2/80***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	JP 2010-71021 A (TAKENAKA KOMUTEN CO LTD) 02 April 2010 (02.04.2010)	
X	see machine translation	1-4, 7
Y	see machine translation	5, 8-11
	US 4,086,734 A (HAYASHI) 02 May 1978 (02.05.1978)	
Y	entire document	5, 8-11
	US 2011/0247281 A1 (PILZ et al.) 13 October 2011 (13.10.2011)	
Y	entire document	11
	US 2019/0218774 A1 (DANESI et al.) 18 July 2019 (18.07.2019)	
A	entire document	1-11
	US 11,686,091 B2 (PRING) 27 June 2023 (27.06.2023)	
A	entire document	1-11

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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