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(54) **SLIDE OPENING DOOR ASSEMBLY**

(57) An anti-tamper and/or anti-ligature pocket slide opening door assembly comprising a door leaf having opening and closing side edge and door frame assembly which door assembly comprises a pocket at one side thereof, and a closing sidepiece at the other side thereof and comprises at least one sliding assembly for slideable translation of the door leaf therebetween, wherein said sliding assembly is configured for manual operation, wherein said assembly further comprises one or more dampers or buffers configured to absorb impact of door leaf on door assembly at moment of, or on sliding to closed position or open position, characterised in that said one or more dampers or buffers comprise a resiliently deformable elongate door leaf closing side edge and a resiliently deformable frame assembly closing sidepiece, and kit and methods for assembly and manufacture.

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Description

[0001] The present invention relates to a slide opening door assembly, a kit therefor comprising a frame assembly and a door leaf and removably mountable components, a method for manufacturing a slide opening door assembly, and the use of said assembly in an environment where there is risk of misuse including ligature and/or tampering, more particularly the use thereof in mental health or secure structures or institutions which house vulnerable or violent individuals, most particularly the invention relates to such anti-tamper and/or anti-ligature slide opening door assembly.

[0002] In buildings which house vulnerable or violent individuals there is often a need to secure against accidents, intentional self-harming, damage to property or the like. One particular example of this is buildings which house individuals with mental health problems who are, in many cases, more liable to accidents and in some cases may be prone to harming themselves intentionally.

[0003] A risk exists that an individual might damage their surroundings and thereby create an insecure or unsafe environment or create an environment which presents an opportunity to self-harm or for such individual to otherwise deliberately injure themself.

[0004] Vulnerable or violent individuals often possess tremendous strength. It is therefore a requirement that their environment is robust and constructed to withstand impact, herein referred as tampering. Walls, doors and the like are constructed to a high specification using reinforced or strengthened materials compared to those used in corresponding domestic environments and omitting any point which an individual might use to secure a ligature and attempt to take their own life by hanging, asphyxiation and the like.

[0005] Many efforts have been made to overcome the ligature risk presented in particular at door leaf top edge and hinges of hinge opening doors. A pocket slide opening door assembly prevents access to door leaf top edge with door leaf in open position, and lacks hinges. However, a sliding point of engagement of door leaf in door frame assembly renders slide opening doors vulnerable to impact, lacking a fixed point in relation to their frame assembly. For this reason, only very recently have sliding door assemblies been considered for use in housing vulnerable or violent individuals. WO 2017/068362 discloses for example a slide opening door assembly for use in secure areas, comprising overlap of door leaf and frame at door leaf top and side edges, providing high impact resistance and restricting access to the sliding assembly. The door assembly is configured for exclusive operation, by security personnel, care personnel and the like, of an automated sliding assembly, thereby controlling passage of such individual through the assembly, and restricting access, and tampering, by said individual at the sliding assembly thereof with door leaf in open position.

[0006] There is however at present no safe alternative to hinge opening doors connecting a suite of rooms, such as a bedroom and en-suite, for operation at will, by violent or vulnerable individuals occupying such a suite of rooms. Although such individuals may be deemed to be of sufficiently low risk to their environment and themselves, to occupy, and pass at will between, such rooms, any such door assembly must nevertheless be free of ligature risk and tamper risk.

[0007] There remains a need to overcome, obviate or mitigate one or more disadvantages of the prior door assemblies, whether identified herein or elsewhere, or to provide for an alternative to or improvement of existing door assemblies.

Brief description

[0008] We have now identified that a requirement of a door assembly for use internally within a suite of rooms suitable for housing a vulnerable or violent individual, is that the assembly be manually operable by said individual. For example an en-suite door connecting rooms in a suite of rooms, such as bedroom and bathroom or en-suite, should facilitate moving between said rooms at will by an individual considered at sufficiently low risk and/or not under continuous observation, to occupy said suite.

[0009] Such door assembly may discourage ligature and tampering, both by anti-ligature and anti-tamper features, and by visual appearance. By this is meant that the door assembly whilst being highly secure does not give a visual appearance of a high security door assembly, for example giving an appearance of an ordinary domestic sliding door in an ordinary domestic setting.

[0010] There is provided herein an anti-tamper and/or anti ligature pocket slide opening door assembly addressing this need, comprising a door leaf and door frame assembly which door assembly comprises a pocket at the side thereof, and comprises a sliding assembly configured for manual operation.

[0011] We have moreover identified that a particular concern with a slide opening door assembly configured for manual operation, is the risk of tampering, in the form of damage to the assembly or self-harm to an individual, as a result of abusive or violent manual operation of the sliding assembly by said individual. More particularly such slide opening door presents a risk of damage to the door assembly or to an individual, as a result of violent manual sliding of door leaf to open or closed position. Damage might for example be by force of impact of door leaf on pocket or on a closing sidepiece to said door assembly. At particular risk of damage are the sliding mechanism of such door assembly, and an individual positioned in the path of the closing door leaf of such door assembly. Damage may be intentional or otherwise. For example an individual wishing to intentionally self-harm might position a hand, leg, head or trunk in the path of the closing door leaf.

[0012] In the case of a highly secure slide opening door assembly, comprising oversized and/or strengthened door leaf and frame assembly, such violent manual open-

ing or closing action of said sliding door leaf, may have serious consequences for door assembly or individual.

[0013] In contrast, an automated slide opening door or an appropriately operated manually operated slide opening door, is opened and closed with controlled or regulated speed, ensuring minimal or no impact, and minimal or no risk, on opening and closing.

[0014] Accordingly there is provided herein an anti-tamper and/or anti-ligature pocket slide opening door assembly comprising a door leaf and door frame assembly which door assembly comprises a pocket at the side thereof, and comprises a sliding assembly configured for manual operation, wherein said assembly further comprises one or more dampers or buffers configured to absorb impact of door leaf on door assembly at moment of, or on sliding to closed position or open position,
wherein said one or more dampers or buffers comprise a resiliently deformable elongate door leaf closing side edge and a resiliently deformable frame assembly closing sidepiece.

[0015] Said damper(s) or buffer(s) may optionally additionally comprise a resiliently deformable elongate door leaf pocket side edge or part thereof and/or a resiliently deformable pocket end piece or part thereof.

[0016] In embodiments herein a damper or buffer comprises a resiliently deformable elongate buffer disposed along an entire door leaf edge, that is to say at least that part of the door leaf closing side edge that is exposed or visible, i.e. comprised within a door assembly clear opening (CO), or disposed along frame assembly sidepiece, that is to say at least that part of the closing sidepiece that is exposed or visible, i.e. comprised within the CO, or disposed along a pocket end piece, for example disposed along the entire pocket end piece or part thereof, more particularly provided in the form of a resiliently deformable elongate door leaf pocket side edge or door leaf closing side edge (or part thereof) and/or frame assembly closing sidepiece or pocket end piece, also termed opening end piece (or part thereof), or a combination thereof, as hereinbefore defined. Such elongate buffer or combinations of elongate buffers conveniently absorbs tampering impact resulting from violent closing action or opening action of said sliding door leaf.

[0017] Said resiliently deformable elongate buffer is suitably disposed at door leaf closing edge and/or frame assembly closing side piece. Door assembly comprising said closing elongate buffer(s) suitably reduces risk of injury to an individual if caught in said clear opening during closing of said door leaf. For example an individual attempting to self-harm might attempt to place him or herself in the way whilst closing said door leaf. In embodiments, either resiliently deformable buffer, or both said resiliently deformable buffers in combination, are configured to deform about an object placed therebetween. Such resilient deformation prevents damage to door assembly and to any such object. In embodiments herein, said buffers are resiliently deformable so as to permit withdrawal of an object positioned therebetween, with said door leaf in closed position, without opening of said door leaf. Resilient deformation herein renders said assembly closing side edge anti-ligature, whereby a ligature placed therebetween is released if weighted.

[0018] A resiliently deformable elongate buffer is suitably comprised of resiliently deformable materials, more particularly of compressible material which compresses under impact and regains its configuration on removal of impact force. The greater the closing force, the greater the compression and thus buffering. At maximum closing force, the buffers are configured to remain only partially deformed. Said compressible material may avoid rebound of closed door leaf, which might result from damping with an elastic material. The buffer(s) is suitably comprised of material which is soft and/or cushioning and also sufficiently resilient to resist damage by manually pulling apart or by penetrating with a soft or blunt implement.

[0019] The elongate configuration of said buffer, more particularly said closing buffers, is/are suited for the present anti-tamper and anti-ligature application, and is/are less susceptible to damage or tamper and to ligature than might be one or a plurality of stopper shaped buffers interspersed along an edge or side piece herein, more particularly the exposed door leaf closing side edge or frame assembly closing side piece herein.

[0020] In embodiments, a door assembly herein comprises in combination a pocket mounted pocket end piece and/or door leaf pocket side edge buffer and door leaf closing side edge and closing sidepiece resiliently deformable elongate buffers.

[0021] In embodiments the door assembly is configured in manner to provide overlap of door leaf and frame at the door leaf top edge, optionally at door leaf closing side edge, and at door leaf pocket side edge and thereby prevents tampering and/or reduces tamper risk. Preferably the door assembly is configured in manner to provide overhead overlap of door leaf and frame at the door leaf top edge, and pocket overlap at door leaf pocket side edge.

[0022] Preferably said closing sidepiece and closing side edge buffers comprise a convex or part-rounded or curved surface protruding from said sidepiece and side edge, for example are half-moon shaped. Such surface renders said buffers resilient to tamper attempt as no purchase can be gained for the purpose of manually pulling apart.

[0023] Said overlaps minimise side impact vulnerability to tampering of said assembly, in particular vulnerability to tampering at a sliding point of engagement of said door leaf in said frame assembly. Said overlaps moreover minimise ligature risk, in particular risk of insertion of a ligature between frame assembly and door leaf. Overlap provides a tortuous path between frame assembly and door leaf. Such tortuous path compounds any attempt to entrain or thread a ligature therebetween.

[0024] A sliding assembly herein is selected from a sliding assembly or its parts disposed in relation to a

headpiece to said door frame assembly and to said overhead overlap, for example coextensively with said overhead overlap, and comprising slidingly engageable door leaf top edge, and a sliding assembly or its parts disposed in relation to a bottom piece disposable across the door frame assembly and comprising slideably engageable door leaf bottom edge, for example by dynamic sliding means such as rolling sliding means.

[0025] Overlap may be overlap of two oppositely facing faces of said door leaf with two oppositely facing faces of said frame assembly, such as two outwardly facing faces of said door leaf and two inwardly facing faces of said frame assembly, or in case of overhead or bottom overlap, may be overlap of two inwardly facing faces of said door leaf, which may be internally disposed within said door leaf or disposed in manner to project from said door leaf, with two outwardly facing faces of said frame assembly or a combination of two or more thereof. This is in contrast to the sense of overlap provided in the case of a hinged opening door assembly, for which it would not be possible to provide overlap at two door leaf faces, since such would prevent functioning, i.e. opening, of said hinged opening door leaf.

[0026] In embodiments the door assembly herein is an anti-ligature anti-tamper sliding pocket door assembly which comprises, or is configured to comprise, with door leaf mounted in door frame assembly, a concealed sliding mechanism(s), i.e. translating part or sliding element of said sliding assembly(ies), concealed door leaf top edge and concealed door leaf pocket side edge.

[0027] In embodiments the sliding point of engagement for such sliding door assembly is concealed in anti-ligature and anti-tamper manner in all positions.

[0028] More preferably, in embodiments, there is herein provided a pocket slide opening door assembly comprising: a door frame assembly which comprises a pocket and a door leaf wherein the door assembly comprises at least one sliding assembly for slideable translation of the door leaf in relation to the door frame assembly between a closed position and an open position, wherein the door leaf comprises a door leaf top edge, a door leaf pocket side edge and a door leaf closing side edge;

wherein the door frame assembly provides an overhead overlap (O^O) with the door leaf at said door leaf top edge, with the door leaf in open position, closed position and therebetween, for example provided by means of at least one overhead overlap element to a headpiece of the door frame assembly;

and provides a pocket overlap (O^P) with the door leaf at pocket side edge with the door leaf in open position, closed position and therebetween, for example provided by the pocket;

wherein at least parts of the at least one said sliding assembly are configured to be disposed in relation to the door frame assembly headpiece and the overhead overlap, in manner which prevents access thereto for tamper purpose or for ligature purpose or both,

wherein the at least one sliding assembly is configured for manually operated slideable translation of the door leaf in relation to the door frame assembly between a closed position and an open position

and wherein said door leaf comprises a resiliently deformable elongate door leaf closing side edge and said frame assembly comprises a resiliently deformable closing sidepiece.

[0029] Suitably said door assembly further provides a bottom overlap (O^B) with a door leaf bottom edge, with door leaf in open position, closed position and therebetween. Bottom overlap is for example provided by a bottom piece to the frame assembly. A bottom piece for example comprises a recessed or raised profile or combination thereof, having overlap height $O^B h$, for example a routered channel or flange provides a sliding floor track of a bottom sliding assembly bridging the clear opening. The bottom piece or track may be profiled to either or both side thereof to prevent trip hazard.

[0030] Overhead overlap and bottom overlap are independently at one or both faces of said door leaf, preferably at both faces. Overhead and/or bottom overlap herein may be provided by said sliding assembly or part thereof.

[0031] The herein pocket slide opening door assembly comprising overlaps, resiliently deformable buffers and concealed sliding point of engagement as defined, is robust to side impact, is robust to damage to door assembly and injury to individuals resulting from slideable translation of door leaf to closed position, and is robust to tampering or ligature attempt, moreover is configured for convenient assembly and door leaf removal.

[0032] In embodiments, in a door assembly herein, said door leaf is configured for slideable translation in a plane including said door leaf closing side edge, resiliently deformable elongate buffer, and said resiliently deformable closing sidepiece.

[0033] In embodiments herein in an assembly comprising said door leaf in closed position, deformation of either or both said buffers, for example about an object therebetween, is configured to provide, with said door leaf in closed position, a clear line of sight between said buffers.

[0034] In embodiments herein, said resiliently deformable elongate door leaf closing side edge buffer is coextensive with said closing side edge of said door leaf, and said resiliently deformable elongate closing sidepiece buffer is coextensive with said closing sidepiece, preferably coextensive with door leaf closing side edge across the width thereof, and coextensive with said closing sidepiece, across the width thereof.

[0035] Resiliently deformable materials are known in the art, and are selected for example from high duty natural and synthetic rubbers, such as EPDM neoprene, resiliently compressible elastic materials such as foams and the like, and combinations thereof including combinations of same materials in different configurations or properties.

[0036] In embodiments, a resiliently deformable buffer is hollow and may comprise a sheath and core structure.

This may facilitate independently controlling degree and ease of deformation and of resilience of respective buffers. A sheath may comprise anti-tamper natural or synthetic rubber or elastomeric polymer with optional core comprising natural or synthetic foam, or granule or bead, or otherwise discrete packing. Advantageously core material provides grab resistance to said sheath. Advantageously sheath material provides tear resistance to said core.

[0037] In embodiments a buffer comprises a rounded, such as half-moon cross section, C cross section or D cross section profile. A buffer is suitably mounted to a backing plate, for example door leaf closing sidepiece backing plate, or to a pair of backing corner or plates, for example door leaf closing side edge corner pieces. Backing plates provide for mounting of said buffer and may confer shape on a buffer material and thereby confer resilience and deformation properties.

[0038] Door leaf closing buffers may be of independent profile cross section. Buffer depth $B^{L}d$ and $B^{S}d$ may be independently selected in the range 15mm to 45mm, such as 15mm to 25mm or 20mm to 40mm. and/or width $B^{L}w$ and $B^{S}w$ may be of same or similar width as door leaf closing side edge and closing sidepiece respectively.

[0039] In embodiments herein overhead overlap of door leaf top edge with door leaf in closed position comprises or is provided by the sliding assembly or one or more of its parts, more particularly a part configured to be disposed in the door assembly clear opening. In embodiments herein door leaf top edge or that portion thereof overlapped by said frame assembly with door leaf in closed position, for example configured to occupy the clear opening in closed and part closed position, at least in part comprises or is provided by a top edge of one or more parts of a sliding element associated therewith and preferably coextensive therewith.

[0040] For example, a sliding assembly comprises an elongate profile member providing one or more elongate overhead and/or bottom sliding tracks and configured to receive thereabout or therebetween an elongate sliding element comprising one or more static or rolling sliding surfaces, and substantially coextensive with and/or continuous with the door leaf top edge and/or bottom edge. Preferably said sliding element comprises continuous elongate top edge and/or bottom edge of said door leaf and eliminates a potential ligature point which might be presented at said door leaf top edge and/or bottom edge between two spaced apart sliding elements.

[0041] Door leaf herein has door leaf height Lh, including integral door leaf top edge and overhead sliding element and/or door leaf bottom edge sliding element where present.

[0042] The door leaf as herein defined may have height L.h of 196cm or 200cm or in excess thereof, such as up to 204cm, 208cm, or up to 300cm.

[0043] Door leaf herein further has door leaf width Lw, including resiliently deformable closing side edge or buffer. Lw may be in a range from 780cm to 810cm such as 790cm.

[0044] The hereinbefore defined pocket, closing sidepiece including sidepiece buffer, bottom piece and overhead overlap element, define a clear opening CO therebetween having clear opening width CO.w and clear opening height CO.h. Clear opening CO herein is defined with respect to the frame assembly, including overlaps as hereinbefore defined, regardless of position or presence of door leaf, that is to say in closed position or part closed position or, in case of a door assembly configured such that door leaf protrudes from the pocket, in fully open position. CO.h herein is less than the height of the door leaf L.h. CO.w herein is less than the width of the door leaf L.w.

[0045] In embodiments herein, the door assembly may include a closing side overlap. Preferably however the door assembly herein is not configured to provide a closing side overlap.

[0046] We have found that, in the present invention,. buffers herein are resiliently deformable so as to permit withdrawal of an object positioned therebetween with said door leaf in closed position, without opening of said door leaf. In a further advantage, overlap of door leaf and frame assembly at door leaf closing side edge is not required. More particularly we have found that buffers herein, in combination are configured to deform to release any object or ligature inserted therebetween, more particularly to release any weighted object or ligature.

[0047] In preferred embodiments accordingly, the herein pocket slide opening door assembly comprises only the following overlap: overhead overlap at door leaf top edge, overlap at door leaf pocket side edge, overlap at door leaf bottom edge, as hereinbefore defined, i.e. said assembly omits a closing side overlap.

[0048] In said embodiments Lw is the same as or less than COw, Preferably $Lw = COw - B^{S}d + O^{P}d$, where Lw is door leaf width, COw is clear opening width, $B^{S}d$ is closing sidepiece buffer depth and $O^{P}d$ is pocket overlap depth. It will be apparent that in these embodiments the door leaf buffer and closing sidepiece buffer are in end to end abutment, with the door leaf in closed position.

[0049] Advantageously overhead overlap element(s) and/or bottom piece herein is/are removably mountable to said frame assembly. Advantageously closing side piece buffer and/or door leaf closing side edge buffer is/are removeably mountable to respective frame assembly and/or door leaf. Accordingly frame assembly herein with removed overhead overlap element(s) and /or bottom piece overlap element and sidepiece buffer has height COh - (O^{O}.h and/or O^{B}.h), where O^{O}.h is overhead overlap height and O^{B}.h is bottom overlap height, as hereinbelow defined, and has width COw- $B^{S}w$, where $B^{S}w$ is closing sidepiece buffer width. This facilitates door leaf loading and removal.

[0050] Preferably COh + O^{O}.h or O^{B}.h is greater than or equal to Lh.

[0051] Preferably COw + $B^{S}w$ is greater than or equal to Lw, and/or COw + $B^{S}w$ + $B^{L}w$ is greater than or equal

to Lw, where $B^{L}w$ is door leaf closing side edge buffer width.

[0052] Accordingly door leaf may be loaded into frame assembly prior to mounting overhead overlap element(s) and/or bottom piece overlap, and prior to mounting sidepiece buffer and optionally additionally door leaf buffer. Consequently door leaf may be removed from frame assembly herein after demounting overhead overlap element(s) and/or bottom piece overlap, and after demounting sidepiece buffer and optionally additionally door leaf buffer.

[0053] In embodiments herein door frame assembly overhead overlap of door leaf top edge, with door leaf in closed position, comprises or is provided by the sliding assembly, wherein said sliding assembly comprises one or more elongate track elements. In embodiments said sliding assembly or said one or more track elements are removable, more particularly a part or parts thereof corresponding to the clear opening.

[0054] In embodiments herein said sliding assembly(ies) comprises a pocket portion and a clear opening portion, corresponding to the clear opening CO, wherein a CO portion is provided separately and is configured for securing in position in relation to the door frame assembly after loading the door leaf in the door frame assembly, preferably by anti-tamper and anti-ligature fixing means.

[0055] In embodiments said overhead overlap is provided to both faces of said door leaf, or internal to said door leaf.

[0056] In embodiments said bottom overlap is provided to both faces of said door leaf, or internal to said door leaf.

[0057] Removeable fixing means for mounting of CO portion of sliding assembly as hereinbefore defined permits door leaf removal. Preferably removeable mounting is by recessed attachment fixing as herein defined which fixing is thereby anti-ligature. Preferably removeable mounting is non-removeable for anti-tamper purpose, and is accessed by secure sliding assembly removal means such as by key or anti-tamper tool means as known in the art or described herein.

[0058] In embodiments herein, a cooperating part of said sliding assembly disposable in said CO is removably mounted to said frame assembly as hereinbefore defined in manner that removal of said overhead overlap element comprises removal of said sliding assembly or its one or more parts. Thereby door leaf removal is facilitated as hereinbefore defined. Said door leaf may be recessed in said pocket during overhead overlap/sliding assembly part removal and subsequently slid into and removed from said CO..

[0059] Preferably an overhead overlap element comprises a part of said sliding assembly which is configured to be disposed in relation to that part of the frame assembly corresponding to the clear opening, i.e. not including that part which is to be disposed in the pocket.

[0060] More particularly an overhead overlap element as hereinbefore defined comprises a sliding track element for a sliding assembly herein, for coupling or mounting to the door frame assembly at a headpiece thereof, and sliding engagement with one or more sliding elements provided by said door leaf at the top edge thereof or for coupling or mounting to the door leaf herein, and sliding engagement with one or more sliding elements provided by said door assembly at the headpiece thereof.

[0061] In embodiments overhead overlap is provided by an overlap portion which is same as or different to sliding track portion, for example overlap portion may be disposed outwardly of or may comprise one or more sliding track portions configured to receive thereabout or therebetween or to be received by one or more sliding elements. Preferably said one or more overhead sliding elements are static sliding elements and said door frame assembly comprises a door frame assembly bottom piece disposable across the door frame assembly and slideably engageable with the door leaf bottom edge by dynamic sliding means such as rolling sliding means provided in relation thereto.

[0062] In embodiments herein, the overlap portion comprises a sliding element track comprising a flange or beam configured to be received in a mating closed sided channel of one or more sliding tracks, for example a flange having regular or irregular cross section selected from rectangular, trapezoid, radiused or part radiused (at one face, such as an upwardly disposable face), oblong, ovoid and circular and combinations thereof, including combinations of same shapes having different radii or relative dimensions.

[0063] Preferably said sliding track and sliding element comprise a static sliding surface at respective overlapping faces of said overhead overlap element and door leaf, for example a low friction coating thereof.

[0064] The door assembly herein comprising door override and door leaf removal by removable overhead sliding assembly track or overhead overlap element, as hereinbefore defined, suitably provides for release of said door leaf from bottom overlap by any of a number of means including but not limited to those disclosed herein. Suitably release and removal is by tilting door leaf out of plane of assembly and raising bottom edge out of bottom piece overlap.

[0065] In a further aspect there is provided a kit for a door assembly as hereinbefore defined comprising a door frame assembly and a door leaf as hereinbefore defined together with removeably mountable components including separate overhead overlap element(s), closing sidepiece buffer and optionally separate door leaf closing side edge buffer as hereinbefore defined.

[0066] In a further aspect there is provided a door frame assembly or component thereof or a door leaf as hereinbefore or hereinbelow defined, preferably for use in a door assembly as hereinbefore defined. Preferably a door leaf herein comprises: integral elongate sliding member or integral elongate rolling member including rolling mechanism at top edge and bottom edge, closing side edge buffer and optional pocket side edge buffer. More preferably a door leaf herein comprises integral

elongate top sliding member and integral elongate bottom rolling member, said members mounted to door leaf at the respective top and bottom faces thereof. Said door leaf is preferably comprised of wood and said sliding members comprised of composite, more particularly of plastic extrusion. Said rolling mechanism is suitably comprised of steel, mounted in said composite member, more particularly comprised of a roller cassette as hereinbefore defined.

[0067] In a further aspect there is provided a method for the manufacture of a pocket slide opening door assembly, or door leaf, door frame assembly or component thereof as hereinbefore defined.

[0068] In a further aspect there is provided a method for installing a door assembly as hereinbefore defined in a support structure having an opening to receive said door assembly. In preferred embodiments, said method comprises providing the door frame assembly having pocket, headpiece, sidepiece and bottom piece as herein defined, providing a door leaf as herein defined for slideably engaging in said door frame assembly, installing the door frame assembly in a support opening such as a wall and locating the door leaf in the enlarged opening defined by pocket, headpiece, sidepiece and bottom piece simultaneously slideably engaging with bottom piece, and reversing into pocket, thereby slideably engaging the door leaf within the sliding assembly track within the pocket. Door frame assembly overlap at door leaf top edge, closing sidepiece buffer and optionally additionally door leaf closing side edge buffer as hereinbefore defined are provided separate to the frame assembly at at least one face thereof, preferably a clear opening face as herein referred. The method comprises further optionally locating door leaf closing side edge buffer and securing, locating closing side piece buffer and securing, and finally providing said overhead overlap element at at least one door leaf face, locating at the headpiece and securing. Securing is subsequent to installing and loading the door leaf.

Detailed Description

[0069] A 'pocket door' assembly herein is defined as an assembly comprising a door leaf and a hollow wall, pocket, recess, bay or compartment in a support such as the wall at the side of a doorway, or in the present context at the side of a door frame assembly. The door leaf may be slid into and, in whole or part, concealed within the pocket in open position. A pocket may be provided by the door frame assembly or a support therefor or both. In embodiments, the hereindefined door frame assembly comprises a pocket which receives the door leaf in part in open position, whereby a part thereof, including a handle configured for manual door leaf operation, and sliding to closed position, protrudes from said pocket.

[0070] A 'door leaf as herein referred is as known in the art, and variously defined as a single independently moving panel of a door. A single door leaf features a single panel that fills an entire CO. A door leaf as herein referred comprises two faces, being an inside face and an outside face, or being two inside faces, for example in case of an en-suite. An inside is vulnerable to ligature attempt, tampering, or the like. An outside face may be disposed in manner that it is equally or less vulnerable to ligature attempt, tampering, or otherwise. A 'clear opening' as herein referred is the opening defined by a frame assembly herein, configured between a headpiece, side piece, pocket and bottom piece, including overlaps as herein defined.

[0071] A 'clear opening face' herein is that face or faces of the herein door assembly defined by said frame assembly including overlaps as herein defined. In embodiments, overlaps are provided at an outside face of the door leaf herein, whereby said door leaf is robust to tampering by sideways impact to the door leaf. In embodiments therefore a clear opening face of a frame assembly herein is an outside face thereof.

[0072] A 'door assembly' as herein referred is a domestic slide opening door assembly, more preferably an interior domestic slide opening door assembly.

[0073] In embodiments the door assembly herein is an anti-ligature pocket slide opening door assembly which comprises, with door leaf mounted in door frame assembly, a concealed door leaf top edge, concealed door leaf bottom edge and concealed door leaf pocket side edge.

[0074] In embodiments concealing of door leaf pocket side edge, bottom edge and top edge is by means of overlap with the frame assembly in anti-ligature and anti-tamper manner, whereby the door assembly is robust to tampering by sideways impact to the door leaf. "Concealing ... by means of overlap" is in the sense that said edge is not accessible for ligature or tamper. Moreover "concealing ... by means of overlap" serves to interrupt any direct path or clear line of sight across an edge of said door leaf from one face of said door leaf to the other face thereof. Thereby the door leaf edge, in particular the top edge, is robust to ligature attempt.

[0075] In embodiments the sliding point of engagement for such sliding door assembly is concealed in anti-ligature and anti-tamper manner in all positions In embodiments, at least a part of the sliding assembly is concealed in anti-ligature and anti-tamper manner in a sliding door assembly herein comprising door leaf mounted in door frame assembly, with the door leaf in all positions.

[0076] By making use of an opening and closing mechanism other than a pivotal mechanism, i.e. other than a hinge mechanism, more particularly by making use of a sliding mechanism, a sliding door assembly is provided which presents a top edge of the door leaf received within and enclosed by the frame assembly in closed position and in open position and in any position therebetween. In particular the door assembly prevents or discourages ligature by eliminating traditional hinged opening ligature points, notably the hinge and the exposed door leaf top edge at an open hinged-opening door leaf.

[0077] It will be apparent to the skilled person that by

"a top edge of the door leaf received within and enclosed by the frame assembly", reference herein is to said top edge being substantially coplanar with and within the confines of the frame assembly "in closed position and in open position and in any position therebetween". This is in contrast to the exposed door leaf top edge at an open hinged opening door leaf.

[0078] Moreover it will be apparent that the herein "top edge of the door leaf received within and enclosed by the frame assembly" maintains its disposition in relation to the frame assembly "in closed position and in open position and in any position therebetween". That is to say that the interface of top edge of door leaf and frame assembly is the same in all positions, and is effectively a "closed" interface, even in the case that the door leaf is open or partially open. This is in contrast to the exposed door leaf top edge at an open hinged opening door leaf.

[0079] Moreover it will be apparent that the herein "top edge of the door leaf received within and enclosed by the frame assembly" is not exposed, i.e. does not present a ligature point, with the door leaf in open or partially open position. Thereby the door assembly herein eliminates traditional hinged opening ligature points, notably the exposed door leaf top edge at an open hinged opening door leaf. More particularly, all of the hereinabove understanding of the referenced term is apparent in the common perception of disposition and function of pocket slide opening doors. It will be apparent moreover that in the case of other slide opening doors, such as folding slide opening doors, which lack a pocket and use a form of pivotal mechanism in some respects resembling a hinge opening door, the top edge of the door leaf is not received within and enclosed by the frame assembly "in closed position and in open position and in any position therebetween".

[0080] A 'ligature' is anything used for tying or binding something tightly, for example a cord or wire. A ligature is therefore anything which might be used to form a noose for the purpose of strangulation, or to tie off a limb or appendage with the risk of causing harm, by intention or accident.

[0081] A 'ligature point' is defined as any point which is load bearing, for example able to support over 40kg, that can be used to support a cord, rope or other material for the purpose of strangulation or causing harm.

[0082] In the present context, a ligature point is taken to refer to a 'ligature point' as known in the art of hinged opening doors and equally applicable in the present context, including and selected from any of assembly elements including door leaf top edge, gaps and apertures around door leaf top and side edges such as door leaf to frame assembly tolerances, fixing heads such as screw heads and the like; door leaf or frame assembly profiles including architraves, panelling and the like; door or frame furniture including door handles, locks and the like, and additionally herein selected from any of sliding door leaf to sliding door frame assembly tolerances and also including sliding assembly profile, gaps and apertures providing access to sliding assembly, and the like.

[0083] 'Anti-ligature' is defined as meaning opposed to or against ligature. Hence an anti-ligature door assembly is such assembly which is opposed to or against ligature or which lacks ligature points.

[0084] Reference herein to 'tamper' or 'tampering' is taken to mean to interfere with or interfering with, preferably to mean misuse of, misusing or attempt or attempting to prevent functioning of, for example including damage or damaging by dismantling or obstructing or by direct or indirect impact and the like, and in particular to barricade or attempt to barricade said door assembly. Reference is typically in relation to a door assembly or part thereof as herein defined, in any manner to interfere with said door assembly or part thereof as herein defined.

[0085] 'Anti-tamper' features include and are selected from any of any of the above features defined for the purpose of anti-ligature, and additionally features for withstanding impact at any part of a slide opening door assembly and the like and preventing damage to the door assembly or part thereof or preventing malfunctioning of the door assembly or part thereof, including dismantling the door assembly in a barricade situation, in either case in particular to prevent generation of a ligature point or other self-harming point. Anti-tamper features include including and are selected from impact resistance features such as reinforcing by means for example of oversized frame elements, door leaf to frame overlap and the like.

[0086] Preferably the door assembly is constructed of anti-tamper material, more preferably high strength material such as metal for example steel, engineering composite materials, plastics or polymers, or solid wood and combinations thereof and/or comprises components configured in manner to confer high strength, such as oversized components. For example composites include multiple phase polymers. Composites and plastics or polymers and wood may be presented as core and skin structures such as solid core construction or generic density core with lipping. Preferably the door frame assembly comprises hollow components, most preferably components are constructed in shaped sheet steel together with resiliently deformable materials providing closing sidepiece buffer and pocket buffer or portions as herein defined, and optionally together with synthetic or composite polymer or materials providing sliding track(s). more particularly, said overhead overlap element, and optionally said bottom piece comprise synthetic or composite polymer or materials, providing overhead and/or bottom sliding tracks. Preferably the door leaf comprises solid wood, metal or lightweight engineering composite materials as known in the art and combinations thereof together with resiliently deformable materials providing closing side edge and optionally pocket side edge buffer or portions as herein defined.

[0087] Pocket door assemblies are typically provided pre-assembled with the door leaf installed in the pocket. The hereindefined pocket door assembly is provided in two components being a door leaf and a door frame as-

sembly as hereinbefore defined including a pocket configured to receive the door leaf, or in three components being a door leaf, a door frame assembly as hereinbefore defined and a pocket configured to receive the door leaf. Additional fixings and elements including separate overhead overlap element(s), closing sidepiece buffer and optionally door leaf closing side edge buffer are provided as additional assembly components. The door assembly is a high strength assembly as hereinbefore defined which, by providing in two parts or three parts as hereinbefore defined facilitates convenient assembly without compromising strength conferred by weight and /or size of components.

Detailed Description

[0088] A sliding assembly herein comprises one or more elongate track elements and one or more sliding elements and means for engagement with the door frame assembly and with the door leaf for sliding engagement of doorframe assembly and door leaf. A sliding assembly may be operated or activated manually as known in the art, preferably by means of anti-tamper anti-ligature handle or similar closing furniture to said door leaf.

[0089] A track element or elements may be disposed in continuous or intermittent fashion along a headpiece of the frame assembly or along the door leaf at or towards the door leaf top edge, and a further track element(s) along the bottom piece to the frame assembly. Sliding element(s) may comprise one or more rolling or static sliding surfaces. A track may be located overhead of the door leaf top edge or thereabout and concealed by separate or integral overhead overlap element as herein defined.

[0090] Preferably the sliding assembly comprises an overhead or bottom elongate track configured to receive or engage an overhead or bottom sliding mechanism, more particularly comprises an elongate profile member providing therein one or more overhead elongate tracks, and configured to receive or engage one or a plurality of sliding elements.

[0091] Sliding elements may comprise one or more skids or elongate sliding elements, rollers or wheels. A skid or elongate sliding element suitably comprises a low friction surface. Preferably a sliding assembly comprises a single skid or single elongate sliding element. A roller or wheel is suitably configured to rotate about an axle and is secured to or within said door leaf in manner to provide low friction rolling translation of said door leaf along a sliding track. Preferably a sliding assembly comprises one or a plurality of rollers or wheels, more preferably comprises 2, 3, 4 or 5 wheels or a multiple thereof such as from 6 to 15 wheels.

[0092] A roller or wheel may comprise a continuous external rolling surface configured to rotate about, or by means of rotation of, an axle. Said roller or wheel may be secured by its axle or by an axle housing. Said axle may be configured to rotate or may be static, relative to the door leaf.

[0093] Preferably a roller or wheel comprises a static axle having thereabout a disc shaped or spherical solid annulus or solid "tyre" providing a continuous rolling surface. Said annulus is suitably supported by and configured to rotate about said static axle. Rotation is suitably facilitated by means of interfacing low friction surfaces of said annulus and said axle, or by means of a bearing therebetween. Preferably said annulus and axle are spaced apart and comprise therebetween a plurality of ball bearings, or roller bearings or cylinder bearings, disposed about said axle. Said bearings are aligned to mutually and independently roll in coaxial fashion about said axle, by action of translation of said annulus along a surface, in this case, along an elongate track. Thereby said translation of said annulus provides low friction or zero friction translation of said door leaf along said track. Annulus and axle may be independently selected from metal, synthetic or composite polymer and material, preferably from steel and aluminium. Bearings may be of metal such as steel or aluminium. Suitably the bearing surfaces of a composite annulus and/or axle is/are lined with a metal, synthetic or composite polymer or material, more particularly a steel or aluminium lining. Roller bearing configurations are known in the art.

[0094] The continuous surface bearing wheel or roller comprises load rating compatible with an oversized and/or reinforced door leaf as herein. The axle, for example provided by a cylindrical shoulder bolt or the like, is housed within the door leaf within that portion thereof configured to overlap with a bottom track and/or recessed within the door leaf, for example housed within a bottom sliding assembly elongate roller cassette or elongate roller holder disposed as the bottom overlap portion of the door leaf. A cassette or holder provides one or more internal apertures configured to receive in part each of one or a plurality of rollers or wheels and transvers thereto, one or a plurality of apertures configured to receive the or each axle. Accordingly the cassette or holder provides door leaf bottom edge, and supports the wheel(s) or roller(s) housed therewithin and protruding therefrom in manner to provide clearance between the door leaf bottom edge and a sliding or rolling track. A bottom assembly cassette or holder housing is suitably comprised of high strength material such as steel, or synthetic or composite polymer.

[0095] The sliding element(s) are configured to be slidingly received within or engaged by the profile member. Preferably one of the or each said track(s) and sliding element(s) is provided in association with the door frame assembly and the other(s) thereof is provided in association with the door leaf as hereinbefore defined.

[0096] Preferably the sliding element(s) are received within the profile member in manner to engage with the track. Either of elongate track and sliding element includes separate or integral coupling means for engagement with the door frame assembly or door leaf or both. More preferably elongate track is mounted or mountable

to the door frame assembly. Preferably sliding element(s) comprise coupling mean(s) for engagement with the door leaf. More preferably overhead elongate sliding element comprises recessed aperture extending from a top face to a door leaf face thereof for alignment with aperture in door leaf internal top edge, to receive coupling means comprising a plurality of fixing screws, for example from 2 to 5 fixing screws, along the length thereof. In the case of a bottom elongate sliding member, a comparable arrangement attaches at door leaf bottom internal edge.

[0097] In embodiments a sliding assembly for a door assembly herein comprises an elongate profile member comprising one or more elongate track elements as herein defined and including separate or integral coupling means for engagement with said door frame assembly, said member configured to receive therein, therebetween or thereabout, one or more sliding elements having one or more static sliding surfaces and including separate or integral means for coupling to said door leaf top edge, wherein said elongate profile member is an overhead overlap element as herein defined and wherein said one or more sliding elements are continuous with and separately or integrally coupled with said door leaf thereby providing said door leaf top edge as hereinbefore defined whereby said elongate profile member provides said overlap at two oppositely facing surfaces thereof with said sliding element(s) continuously disposed with said door leaf at the top edge thereof as hereinbefore defined.

[0098] Elongate profile member providing one or more elongate tracks on one or more inner surfaces thereof and configured to receive therein or therebetween said one or more sliding elements comprises low friction surfaces and thereby may eliminate a potential ligature risk.

[0099] One or more sliding elements herein are suitably continuous with the door leaf herein and thereby the top edge of said sliding element(s) suitably provide the top edge or part thereof, of said door leaf.

[0100] In embodiments overhead sliding assembly herein is provided in one part by a portion of door leaf herein configured to overlap said overhead overlap element at both faces thereof, and comprises a single elongate sliding element. Said sliding element may be integral with said door leaf or may be separate therefrom and coupled therewith at an internal door leaf top edge, said sliding element thereby providing door leaf top edge herein. Said sliding element may be continuous with or profiled relative to each door leaf face, for example may be of square or rectangular cross-section, having sliding element depth same as or less than door leaf thickness, or may be of "top hat" or "bowler hat" cross section, having rim of same depth as door leaf thickness, and crown of less depth than door leaf thickness or the like.

[0101] A single sliding element provided in a sliding assembly herein is suitably in the form of a continuous elongate sliding element coextensive with the top edge of the door leaf or with overhead overlap or with that portion thereof remaining outside the pocket in closed and part closed position. Thereby said sliding element presents a continuous elongate top edge of said door leaf and eliminates a potential ligature point which might be presented between at said door leaf between two spaced apart sliding elements. Such sliding element may be comprised in a door assembly herein without overhead overlap at the inside face thereof.

[0102] Said sliding element, or said sliding elements in combination, may comprise said door leaf top edge, in the form of low friction sliding surfaces provided on the element or each of said elements.

[0103] In embodiments herein, said elongate profile member is an overhead overlap element and is removably mounted to said frame assembly, or part thereof is removably mounted to said frame assembly, as hereinbefore defined in manner that removal of said overhead overlap element facilitates subsequent door leaf removal as hereinbefore defined. For example said elongate profile member comprises two elongate faces, providing overhead overlap at both door leaf faces, configured to be integrally or separately continuous with said headpiece at either or both of two outwardly facing faces of said headpiece, and said elongate profile member comprises recessed apertures for attachment fixings for securing to the headpiece and/or sidepiece(s).

[0104] A profile member may provide both overlaps, or two profile members may each provide an overhead overlap. A profile member providing both overlaps is suitably of inverted squared or rounded U-shaped cross section, or a combination thereof, for example of squared U outer and inner-cross section or of squared U outer- and rounded U inner-cross section. Said inner U-cross section is suitably of dimension to receive the hereinabove elongate sliding element, preferably with sliding tolerance, for example as herein defined. Said outer U-cross section face is preferably configured to extend continuously with said door leaf faces or be disposed to extend outwardly therefrom. For example, said profile member may be disposed outwardly from said door leaf faces to an amount equal to the tolerance between door leaf and pocket, at both door leaf faces thereof.

[0105] In embodiments, overhead sliding assembly profile member and sliding element herein are not weight bearing. Accordingly each said member and element may be independently selected from extrudable material such as high viscosity or low viscosity extrudable polymer.

[0106] Said apertures provide recessed fixing access at said elongate face or faces, and/or therebetween thereby providing for removeable mounting of said elongate profile member and thereby overhead overlap element and subsequent door leaf removal.

[0107] A sliding assembly comprising slidingly engageable low friction static sliding surfaces herein provides slideable translation of a door leaf as herein defined in relation to a door frame assembly as herein defined.

[0108] A low friction static sliding surface suitably comprises material selected from low friction metal such as polished stainless steel or cast bronze and solid lubricant

such as low friction composites and low friction polymers, for example PTFE (polytetrafluoro ethylene), nylon, UHMWPE (ultra high molecular weight polyethylene) and combinations thereof, in particular combinations comprising load bearing low friction metal with embedded solid lubricant such as stainless steel with embedded PTFE liner portions or plugs.

[0109] In particular a sliding assembly herein comprises an elongate sliding track element comprising integral coupling means for continuous elongate engagement with the door frame assembly along the length of said member, together with one or more sliding elements, said element comprising continuous surfaces herein may comprise a low friction surface as defined, for example a combination of stainless steel and PTFE.

[0110] In embodiments the hereindefined slide opening door assembly may be configured in manner to conceal and/or prevent access to the sliding assembly thereby preventing ligature at the sliding assembly and/or prevent tampering with the sliding assembly. **Description of embodiments**

[0111] Ligature and/or tamper risk is further reduced herein by provision of one or more seals between said door leaf and frame assembly. A seal herein may be an elongate seal mountable to the door leaf opening side edge and configured to extend outwardly to contact the frame assembly. Such seal may be a magnetic seal configured to contact and secure against the frame assembly, or may be a two part seal configured to engage with a corresponding seal mounted on said frame assembly. Such seals permit free travel of said door leaf and are configured to activate on closing of said door leaf. Alternatively such seal may be an elongate seal continuous with said door leaf effectively extending the door leaf within the frame assembly, but being deformable whereby installation and removal of said door leaf is not constrained.

[0112] In embodiments one or more seals herein comprise one or more wiper seals mounted on either of door leaf and frame assembly and comprising an angled deformable wiper blade, configured and disposed to non-contact skim, brush or otherwise sit proud of or loosely contact the other of door leaf and frame assembly at an edge or face thereof. The blade is conveniently angled at approximately 45C or thereabouts. Uniquely in the present context, a wiper blade is disposed to direct towards the direction of any incoming foreign body, and is configured to deform towards the other of door leaf and frame assembly on encountering such foreign body, thereby causing the blade to contact said door leaf or frame assembly, or to contact with greater force, thereby repelling said foreign body. For example, in the case of a pocket side wall mounted blade, the force of an inserted object from the opening forces the blade against the door creating a barrier. Said blade is thus configured to be "activated" only on insertion of a foreign object, or on attempt to conceal an object within the pocket.

[0113] A wiper seal may be disposed to contact any edge or face of said door leaf, i.e. top, side or bottom edge, or each face thereof, or to contact any part of said frame assembly, i.e. pocket side wall, overhead sliding track or bottom sliding track. In embodiments a wiper seal is provided at the top edge and/or bottom edge to said door leaf and disposed in manner to non-contact skim, brush or loosely contact an overhead sliding track or a bottom piece to the frame assembly, more particularly a bottom sliding track, suitably at a raised portion thereof. Such wiper seal is angled outwardly towards the closing side edge of the frame assembly. Said wiper seal thereby prevents entrainment of dirt or of a potential ligature or tamper device at the door leaf bottom edge, for example in the bottom sliding mechanism.

[0114] In further embodiments a wiper seal is provided at pocket side piece to said frame assembly, i.e. within the pocket opening, and disposed in manner to loosely contact the door leaf. Such wiper seal is angled outwardly towards the closing side edge of the frame assembly and towards the door leaf. Said wiper seal thereby prevents entrainment of a potential ligature or tamper device at or in the pocket. Preferably such wiper seal comprises an angled deformable blade having concave profile proximal to the pocket opening, more preferably an asymmetric concave profile. Any tamper attempt such as by attempt to insert a rigid foreign body between seal and door leaf and into the pocket, results in deflection of said body away from the tip of said seal. Moreover, said deflection increases outward pressure on said seal, in direction of door leaf, pressing said seal against said door leaf, further restricting any access within said pocket. More preferably said blade is configured and disposed to be out of contact with said door leaf, and only contact said door leaf on insertion attempt, and application of pressure on said blade. Wiper blade, having soft tip, is suitably comprised of polymer material such as neoprene or EPDM.

[0115] In embodiments herein, a door assembly is further rendered resilient to tampering by sideways impact inflicted at said door leaf, by means of one or more spacers mounted in an overlap as hereinbefore defined, said spacers providing contacting said door leaf at one or more rolling or sliding surfaces. For example a plurality of rollers mounted in said overlap resist sideways impact to said door leaf without impeding sliding of said door leaf.

[0116] In an embodiment the opening pocket comprises a lining, facing and sealing the pocket framework, which may be a removable lining, facing and sealing the pocket framework. and may be constructed of polymer or metal which may be antibacterial polymer or metal such as an antibacterial vinyl or coated metal. The lining may be withdrawn for cleaning purpose and reinserted. Alternatively the lining may be cleaned *in situ.* Alternatively or additionally seals or brush strips may be provided at the pocket opening and/or at door leaf overhead closing side edge or bottom closing side edge as hereinbefore defined. Fouling of pocket or lining or sliding tracks may be accidental or deliberate. The removable lining, seals or brush strips facilitate the prevention of dirt accumula-

tion and infection risk.

[0117] The overhead overlap is suitably defined as that part of the door leaf overlapped by the overhead overlap element to the headpiece. In the case that the door leaf top edge comprises a part of said sliding assembly in particular a sliding element, having a face thereof coextensive with a face of said door leaf, and coextensive with said door leaf top edge, as hereinbefore defined, the overhead overlap is that part of the door leaf and/or sliding element overlapped by the headpiece or an overhead overlap element to the headpiece, which in turn may constitute a face of a part of the sliding assembly such as an elongate profile member or overhead sliding track element as hereinbefore defined. References herein are correspondingly interchangeable.

[0118] The overhead overlap O^O and bottom overlap O^B are suitably characterised by overlap height O^O.h and O^B.h respectively, being the height of the door leaf and/or sliding element overlapped by the respective overlap element or elongate profile member or sliding element. O^O.h is the vertical distance between a lower edge of the overhead overlap element or elongate profile member or sliding track element and the top edge of the door leaf and/or sliding element. References herein are to be read in correspondingly interchangeable fashion.

[0119] The overhead overlap O^O provides an overhead overlap tolerance o.t. between parallel opposed faces of the overhead overlap element and the door leaf face, i.e. an overlap face of the overhead overlap element and the door leaf face overlapped thereby.

[0120] In embodiments overhead overlap height O°.h, bottom overlap height O^Bh, pocket overlap width O^Pw, and optionally closing side overlap width O^Sw being the height and width respectively of the door leaf overlapped by the overhead overlap element, bottom piece, pocket and optionally sidepiece buffer, or being the vertical distance between a lower edge of the overhead overlap element and the top edge of the door leaf, the upper edge of the bottom piece overlap to the bottom edge of the door leaf, or the horizontal distance between the pocket opening overlap to the pocket side edge of the door leaf in closed position, and optionally the side piece buffer overlap to the door leaf closing side edge, is independently selected in the range from 0.5cm or 1.2cm or 2cm up to 1.2cm or 2cm or 3cm, 5cm, 5.5cm or 8 cm, such as from 2.5 cm to 3cm or from 3cm to 5 cm such as for example 2.8 cm, 2.9 cm, 3.0 cm, 3.6 cm, 4.0cm, 4.4cm or the like.

[0121] In embodiments herein O^O.h is greater than or equal to 2 cm, more preferably is in a range from 2 cm or 5cm to 8cm.

[0122] In an embodiment at least one overhead overlap element is provided separately and is secured in position in relation to the door frame assembly after loading the door leaf in the door frame assembly. Preferably securing is by means of anti-tamper and anti-ligature fixing means.

[0123] Preferably an overhead overlap element is removably mounted to a face of said frame assembly permitting access for maintenance or door override. Preferably said closing sidepiece buffer is removably mounted within the clear opening of said frame assembly.

[0124] In embodiments the overhead overlap element is located at a lower substantially horizontal face of a headpiece as hereinbefore defined. Preferably the seating for fixing means is provided in the lower headpiece face. Such seating is thereby concealed within the headpiece and overhead overlap element.

[0125] In a further embodiment the pocket slide opening door assembly comprises a removeable sliding assembly track or track portion.

[0126] In embodiments a removeable sliding assembly track or track element herein is that portion of a sliding assembly track configured for mounting above or below the clear opening of the herein frame assembly. Such removeable sliding track element may comprise recessed apertures for concealed mounting to said headpiece, or bottom piece, for example by anti-tamper and anti-ligature fixing mountings or may comprise mounting means provided in the headpiece or bottom piece comprise mating components mountable and lockable by a push fit, sliding fit and/or drop fit mechanism, for example as hereinbelow defined, or concealed in anti-ligature and anti-tamper manner by said overhead or bottom overlap as hereinbefore defined.

[0127] Alternatively such track element comprises recessed attachment fixings for securing into the headpiece or side piece to the frame assembly as hereinbefore defined.

[0128] In embodiments said track element is separately or integrally coupled with an overhead overlap element as hereinbefore defined or constitutes an overhead overlap element as hereinbefore defined, and comprises recessed attachment fixings for securing into the headpiece or side piece to the frame assembly as hereinbefore defined.

[0129] Preferably the removable sliding assembly track portion is of length greater than or equal to the width of the door leaf Lw. Preferably a fixed sliding assembly track portion of length greater than or equal to the width of the door leaf Lw is provided overhead or in the bottom of the pocket and optionally partly protruding therefrom. Thereby the assembly is configured for opening door leaf into the pocket, or partly protruding therefrom, supported by said fixed sliding assembly track portion, removal of the removable sliding assembly track portion, and sliding the door leaf to closed position, by means of the remaining sliding assembly, whereby the door leaf is released from the sliding assembly having removed track portion. As herein defined, the door assembly is further configured for removal of resiliently deformable buffer to the sidepiece, thereby facilitating removal of said door leaf from said assembly.

[0130] Preferably the removable sliding assembly track portion is configured to overlie or underlie the closing sidepiece resiliently deformable buffer herein. In an

advantage the closing sidepiece resiliently deformable buffer is configured for mounting to the closing sidepiece by drop fit or sliding mechanism as herein defined, for example by a plurality of mushroom head projections projecting rearwardly from a backing plate to said buffer and disposed along the length thereof and configured to be received in a plurality of open top, closed bottom (or in case of removable bottom track portion, closed top, open bottomed) vertically aligned slots in the closing sidepiece. Accordingly said buffer is configured to be locked in position by said overlying or underlying removable sliding track portion.

[0131] Preferably said closing sidepiece buffer backing plate is configured for mounting said buffer in anti-tamper and anti-ligature manner, for example by sliding mounting of elongate head portions of elongate buffer T-sections, O-sections or the like, disposed to protrude rearwardly from said buffer at each edge thereof, within mating elongate apertures at each edge of said elongate backing plate. In an advantage the buffer is comprised of a planar resiliently deformable elongate strip, mounted in one aperture to project perpendicular to said backing plate and bent back to engage and mount in the second aperture, thereby creating a buffer sheath. Conveniently said backing plate is mounted to said closing sidepiece after engaging said buffer, by drop-fit or sliding-fit means as hereinbefore defined. The buffer sheath may be packed with resiliently deformable material according to the desired resilience. Advantageously this permits conferring resilience properties on said buffer which are not capable of being conferred by a material having a sufficiently cohesive and robust structure to withstand tampering, for example to withstand manually pulling apart or tearing or penetrating the surface thereof with a blunt or soft instrument. For example sheath may be a natural or synthetic rubber and packing may be a foam, granules or beads or other discrete material.

[0132] Said door leaf closing side edge buffer may be separate or integral with said door leaf, for example may be moulded thereto or from, or may be configured for mounting to said door leaf side edge by means of a door leaf closing side edge buffer backing plate. Preferably a door leaf closing side edge buffer backing plate is configured for mounting said buffer in anti-tamper and anti-ligature manner, for example in corresponding manner to that for closing sidepiece buffer backing plate as hereinbefore defined. In this case however, it may be convenient to mount to two corner backing plates. Conveniently said corner backing plates may be mounted to said door leaf closing side edge prior to mounting said buffer thereto.

[0133] In embodiments track element coupled with or constituting said overlap element, is mountable to said headpiece, by fixings to headpiece or sidepiece as hereinbefore defined, and is substantially coextensive with the headpiece face to which it is mountable, thereby eliminating any headpiece profile irregularities above said clear opening. Alternatively said track element is coextensive with a portion a face of said headpiece to which it is mountable, and a further profile element which is coextensive with the remaining portion of said headpiece face is mountable to said track element or to said headpiece, and is removeably mountable with said track element or otherwise. Said further profile element may constitute a removable overlap element as hereinbefore defined.

[0134] The door assembly herein suitably comprises one or more dampers configured to decelerate the sliding door leaf approaching closed position or open position or to absorb impact of sliding door on door assembly at moment of reaching closing position or open position.

[0135] In embodiments the door assembly herein may comprise a bidirectional damper or two opposing dampers outwardly facing, for example located intermediate a pair of sliding elements. Such damper(s) assists in preventing damage being sustained to the track as a result of abuse and in preventing injury.

[0136] Preferably a closing damper herein provides deceleration in a damping distance or amplitude at closing side edge in a range from 15 cm or 20cm up to 30cm, preferably up to 25 cm for example in the range from 15 to 20 cm. Such distance or amplitude is sufficient to reduce the risk of serious injury in case of an individual being struck by a closing door leaf, and in particular in case of said individual's head being struck by said closing door leaf.

[0137] In embodiments herein a closing damper is selected from a pocket mounted damper having damping amplitude comparable to the clear opening, for limiting door leaf speed and closing force in said clear opening or for limiting door leaf speed approaching the closing side edge, for example selected from an inertia reel damper, such as is well known in products such as seat belts, self-belaying devices and the like, a rigid or flexible tether, a rack and pinion damper, an overhead buffer and stop combination spaced apart to permit permitting long buffering amplitude as hereinbefore defined, a side edge mounted or side piece or end piece mounted elongate buffer as hereinbefore defined, and the like.

[0138] A pocket mounted damper is suitably disposed in said pocket, one end thereof mounted at or towards the pocket opening end piece and the other end thereof configured for attaching to said door leaf at or proximal to the opening side edge thereof, an within the pocket overlap portion or overhead overlap portion of said door leaf.

[0139] A pocket mounted inertia reel locking damper suitably comprises an inertia reel, said reel tethering an elongate webbing or tape at one end thereof, said webbing or tape attaching at other end thereof to said door leaf at or near the opening side edge thereof. Such inertia reel permits the webbing or tape to be drawn out at an acceptable speed, and thus the door leaf to move at an acceptable speed, but locks under excessive load. An inertia reel may comprise the option to adapt sensitivity according to weight of door leaf, and risk of tampering.

A pocket mounted rigid tether may be telescopic or hinged, and comprises a plurality of elongate members, hinged or telescopically linked in manner to elongate and contract.

[0140] A rack and pinion or spaced apart buffer and stop damper permit long damping amplitude as hereinbefore defined, and are suitably disposed along the door leaf top edge and within the overhead overlap portion thereof.

[0141] In embodiments, a door assembly herein comprises in combination a pocket mounted inertia reel damper and a closing side edge resiliently deformable elongate buffer.

[0142] The door assembly as hereinbefore defined may comprise a door frame assembly bottom piece disposable across the door frame assembly and slideably engageable with the door leaf lower edge as known in the art. In a further embodiment the door assembly comprises a slideably engageable door frame bottom piece wherein the bottom piece or door leaf provides a sliding assembly engageable with door leaf and bottom piece. A sliding assembly preferably comprises a sliding element as hereinbefore defined. The assembly of this embodiment is particularly advantageous in providing robust and smooth sliding of an anti-tamper door assembly as hereinbefore defined, more particularly an oversized door assembly provided in high strength materials to withstand impact.

[0143] The door assembly is typically for use as an internal door such as a bathroom door or en suite and as such it might be expected that any locking or security requirement would be simply to lock the door leaf in closed position for privacy, whereby a conventional locking bolt as known in the art shooting into the closing sidepiece would suffice. In the present context of violent or vulnerably individuals however there may be a need to lock the door leaf in open or closed position. Moreover a locking bolt arrangement may present a ligature risk. Accordingly the door assembly may comprise a bolt recessed within the door leaf and means for advancing the bolt to extend vertically out of the door leaf from the bottom edge or top edge of the door leaf and means for retracting back into recessed position, together with a corresponding aligned aperture in the overhead track or floor track adapted to receive the bolt in advanced position. Preferably means for advancing the bolt is key operated, and is recessed within the door leaf. An access aperture suitably extends to a side edge or face of the door leaf for access via a key having shank or stem of suitable length, such as in the range 1.5 to 3cm length. One or a plurality of apertures may be disposed along the track allowing multiple lock positions. Apertures may be any shape and configuration which serves to retain the bolt, and thereby the door leaf, in locked position.

Detailed Description

[0144] The assembly is now illustrated in non-limiting manner with reference to the figures, all of which are cross-section views unless otherwise indicated, wherein

Figures 1a and 1b illustrate the door assembly comprising a door frame assembly and door leaf herein;
Figures 1c and 1d illustrate the sliding engagement of door leaf in assembly;
Figures 1e, 1f and Figures 2a to 2c illustrate the door assembly including bottom piece having rolling gear;
Figures 2c and 2d illustrate wiper seals in the assembly herein;
Figure 3a illustrates the door assembly having damper and buffer arrangements and Figure 3b illustrates buffer profiles;
Figures 4 to 11 illustrate the door assembly having variants of overhead sliding assembly.

[0145] Figure 1a illustrates door assembly in kit form, pre-assembled, with frame assembly installed in a support such as a wall. Slide-opening door assembly comprises a door frame assembly (1) comprising pocket (P) disposed at one end of headpiece (1a), and adjacent to clear opening (CO) disposed at the other end of headpiece (1a). Door frame assembly (1) further comprises bottom piece (1b), pocket opening (1c) and closing side piece (1d). Pocket mounted sliding assembly portion (3a) is illustrated disposed along the headpiece (5), having sliding track (4a). Overhead sliding assembly elongate profile member portion (3b) for mounting in the clear opening (CO) is illustrated as separate component having overhead sliding track portion (4b). Cooperating fixing means for mounting detachably removeable overhead sliding assembly portion (3b) to headpiece are not shown. Bottom piece (1b) includes bottom sliding assembly elongate profile member (3c). Closing side piece buffer (B^S) is shown as separate component, mounted to backing plate having two fixings for drop-fit mounting to closing sidepiece (1d).

[0146] The door assembly also comprises door leaf (L) having a door leaf top edge (2a) provided by overhead elongate sliding element (5a) and bottom edge (2b) provided by bottom elongate sliding element (5b), pocket side edge (2c) and closing side edge (2d) having mounted thereto, door leaf closing side edge buffer (B^L), via backing plate (not shown).

[0147] In Figure 1b is shown assembled assembly. Overlap is now present as overhead overlap shown as door leaf portion between door leaf top edge (2a) and bottom edge of overhead overlap (3b), bottom overlap as door leaf portion between top edge of bottom sliding assembly elongate profile member (3c) and door leaf bottom edge (2b) and pocket overlap as door leaf portion between pocket opening (1c) and door leaf pocket side edge (2c). There is no overlap at door leaf closing side edge.

[0148] Door leaf (L) is configured to be mounted in the door frame assembly (1) in sliding engagement (engagement coupling not shown) with sliding assembly portions

(3a, 3b) and sliding assembly (3c). The door leaf (L) is slideable between a closed position in which the door leaf (L) occupies the doorway clear opening C.O (Fig 1b), and an open position in which the door leaf occupies pocket (P) (not shown).

[0149] Figure 1a illustrates the pocket door assembly as a kit in multiple parts. The door assembly described herein may conveniently be provided non assembled. However there remains a need to provide in manner to be able to assemble in situ as herein described. Preferably the overhead overlap element which is integral with overhead sliding assembly elongate profile member (3b) is provided separately to the headpiece (5) and is conveniently secured to the headpiece (5) after installing the door leaf (L) and closing side piece buffer (B^S) *in situ.*

[0150] Figure 1c shows detail of door leaf (L) top edge (2a) provided by elongate sliding element (5a), and slidingly engaged with overhead sliding assembly elongate profile member (3b). Sliding element (5a) is of inverted squared-U cross section as described herein, and engages with sliding element (5a) of "top hat" cross section as described herein. Overhead overlap is visible (O^O)

[0151] Figure 1d shows detail of door leaf slidingly engaged at top and bottom door leaf edges (2a, 2b). Parts are as indicated in Figure 1c. In addition bottom sliding assembly elongate sliding element (5b) is slidingly engaged in integral bottom piece and bottom sliding assembly elongate profile member (1b,3c) by means of elongate sliding track (4c). Bottom overlap is visible (O^B). Overhead and bottom sliding assembly elongate profile members (3a, 3b, 3c) comprised in clear opening CO and extending into the pocket (not shown) are illustrated. Bottom piece (1b) is shown profiled to prevent trip hazard in the CO. Overhead sliding track is continuous across interface (1:3a-3b) between overhead sliding assembly elongate profile members (3a, 3b). Shoulder bolts (6) are illustrated, providing axle for bottom sliding assembly rolling sliding elements (not shown), comprised in bottom sliding assembly elongate sliding element.

[0152] Figures 1e and 1f illustrate roller sliding element or runner (7a) mounted on shoulder bolt (6), about axle (8) with roller bearings (9) therebetween. Figure 1e shows the runner in cross section elevation, and Figure 1f shows the door leaf as a bottom view looking down at bottom elongate sliding element. Door leaf bottom edge (2b) is shown, comprising the bottom sliding element skid (7b) disposed about and between runners (7a), which are located in apertures in bottom sliding element (5b).

[0153] Figure 2A, 2B and 2C illustrate the door assembly having bottom piece (100) disposable across the door frame assembly and slideably engageable with the door leaf lower edge (2b) by means of lower static sliding element (not shown) or rolling mechanism (102) suitably received within the door leaf lower edge (2b). The door assembly comprising bottom rolling mechanism of Figure 2A and Figure 2B and 2D is particularly useful when providing in reinforced door assembly whereby the weight of the door leaf merits means for bottom support, in particular in combination with an overhead static sliding assembly such as illustrated in Figures 4 to 11. Figure 2C illustrates an arrangement with wiper seal 110 angled towards closing side edge. Wiper seal (110) is disposed within door leaf (L) towards bottom edge (2b) at closing side edge (2d) thereof to non-contact skim or lightly contact bottom piece (100) and so as to push aside obstacles as the door leaf L advances. Should an obstacle remain in the path of the advancing door leaf L and impede wiper seal (110), pressure exerted on wiper seal (110) increases pressure of wiper seal (110) contact to bottom piece (100), thereby preventing entrainment of such obstacle. Rolling mechanism (102, not shown), is disposed rearwardly of wiper seal (110), having regard to the direction of closing of door leaf (L), as illustrated in Figure 10 in the form of rolling mechanism (102), or alternatively in the form of static sliding element (not shown) such as a low friction surface of door leaf (L) bottom edge (2b) and/or low friction surface of bottom track recesses and/or flange.

[0154] Figure 2D illustrates a further wiper seal (110) embodiment mounted to pocket wall (120) comprising blade (130) angled to non-contact skim or brush door leaf face (L) slidingly translating within the pocket P. Blade comprises angled portion, which directs an object directed between door leaf (L) and pocket wall away from said door leaf to concave portion (140), causing the blade to deflect towards door leaf side wall thus blocking against any ingress of object therebetween.

[0155] Figure 3a illustrates damping means as described, including inertia reel closing damper 200, having tape 201 attached to the pocket side edge of door leaf L and providing damping distance Dd in excess of 15cm or 20cm. Door leaf closing side edge comprises resiliently deformable or compressible buffer B^L. Inertia reel damper 201 ensures that an individual cannot be struck with force by the closing door leaf, whilst damper B^L ensures a soft impact at any body part or object struck by door leaf. Buffer deformation (D^L and D^S) is shown at door leaf closing side edge buffer and closing sidepiece buffer.

[0156] Figure 3b illustrates buffer (B^L, B^S) profiles. Of half-moon cross section, mounted in backing plate or plates (not shown for B^S), mounted on door leaf closing side edge (2d) and closing side piece (1d). A similar buffer may be located on door leaf pocket side edge, in the pocket (not shown). Buffers deform and compress on impact, absorbing closing force and preventing injury to an object therebetween.

[0157] Figures 4 to 11 illustrate overhead overlap element comprising integral overhead sliding assembly track releasably mounted to the frame assembly. Parts have the same meaning as in foregoing figures. In this case an overhead overlap element (3b) or either or both of two overhead overlap elements (26) include a low friction static sliding surface (300) disposed as a covering or as a part of sliding track (301) at the overhead overlap element (26). Door leaf top edge (2a) comprises in similar manner a low friction static sliding surface (300) disposed

as a covering or as a part of sliding element (302) disposed at or forming the door leaf top edge (2a). An overlap may be provided to either or both faces, in any arrangement or combination of arrangements illustrated. Overhead overlap element comprising static sliding track (302) is releasably mounted to a clear opening face F^{CO}. In Figures 9 and 11 overlap element element (3b) is shown as a single part providing integral sliding profile member, as might be the case in any of Figures 4 to 11 by adaptation. Releasable mounting means are illustrated at the clear opening face F^{CO} comprising channel (35, dotted) internal to the overhead overlap element (26) for securing to clear opening face F^{CO}, for accommodating locking bolt (38) which is activated by key (not shown) via aperture and optional faceplate (37) to advance the bolt (38) upwardly into a locking aperture (not shown) in the headpiece (5) or to advance the bolt (38) horizontally or upwardly inclined, into a locking aperture (not shown) in a side piece (not shown) to one side of the overhead overlap element (26). In Figure 18 is illustrated both configurations of channel (35) and aperture and optional faceplate (38).

[0158] Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

[0159] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0160] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0161] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similarfeatures.

[0162] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. An anti-tamper and/or anti-ligature pocket slide opening door assembly comprising a door leaf having opening and closing side edge and door frame assembly which door assembly comprises a pocket at one side thereof, and a closing sidepiece at the other side thereof and comprises at least one sliding assembly for slideable translation of the door leaf therebetween, wherein said sliding assembly is configured for manual operation,
wherein said assembly further comprises one or more dampers or buffers configured to absorb impact of door leaf on door assembly at moment of, or on sliding to closed position or open position,
characterised in that said one or more dampers or buffers comprise a resiliently deformable elongate door leaf closing side edge and a resiliently deformable frame assembly closing sidepiece.

2. A pocket slide opening door assembly according to claim 1 comprising: a door frame assembly which comprises a pocket and a door leaf wherein the door assembly comprises at least one sliding assembly for slideable translation of the door leaf in relation to the door frame assembly between a closed position and an open position, wherein the door leaf comprises a door leaf top edge, a door leaf pocket side edge and a door leaf closing side edge;
wherein the door frame assembly provides an overhead overlap (O^O) with the door leaf at said door leaf top edge, with the door leaf in open position, closed position and therebetween, for example provided by means of at least one overhead overlap element to a headpiece of the door frame assembly;
and provides a pocket overlap (O^P) with the door leaf at pocket side edge with the door leaf in open position, closed position and therebetween, for example provided by the pocket;
wherein at least parts of the at least one said sliding assembly are configured to be disposed in relation to the door frame assembly headpiece and the overhead overlap, in manner which prevents access thereto for tamper purpose or for ligature purpose or both,
wherein the at least one sliding assembly is configured for manually operated slideable translation of the door leaf in relation to the door frame assembly between a closed position and an open position
and wherein said door leaf comprises a resiliently deformable elongate door leaf closing side edge and said frame assembly comprises a resiliently deformable closing sidepiece.

3. A pocket slide opening door assembly according to any of claims 1 and 2 further providing a bottom overlap (O^B) with a door leaf bottom edge, with door leaf in open position, closed position and therebetween, wherein said bottom overlap is provided by a bottom piece to the frame assembly comprising a recessed or raised profile providing a sliding track element of

a bottom sliding assembly bridging the clear opening.

4. A pocket slide opening door assembly as claimed in any of claims 1 to 3 wherein said resiliently deformable buffers are hollow and at least one thereof comprises a sheath and core structure, of an anti-tamper sheath material having resiliently deformable and configuration and a resiliently compressible core material.

5. A pocket slide opening door assembly as claimed in any of claims 1 to 4 wherein a buffer comprises a rounded surface profile, such as half-moon cross section, C cross section or D cross section and is mounted to a backing plate or a pair of backing corners or backing plates, mountable to face of closing side piece and to face or corners of door leaf closing side edge, wherein backing plate(s) provide for mounting of said buffer and may confer profile shape, resilience and deformation properties thereon.

6. A pocket slide opening door assembly as claimed in any of claims 1 to 5 wherein buffer depth $B^{L}d$ and $B^{S}d$ is independently selected in the range 15mm to 45mm, such as 15mm to 25mm or 20mm to 40mm. and/or width $B^{L}w$ and $B^{S}w$ are of same or similar width as door leaf closing side edge and closing sidepiece respectively.

7. A pocket slide opening door assembly as claimed in any of claims 1 to 6 wherein overhead overlap of door leaf top edge with door leaf in closed position comprises or is provided by an overhead sliding profile member to a sliding assembly, such as an inverted U cross-section profile configured to be disposed in the door assembly clear opening, and to engage door leaf top edge comprising or provided, at least in part, by a top edge of one or more parts of an overhead sliding element associated therewith and preferably coextensive therewith, and configured to slidingly engage with said overhead overlap element sliding assembly profile member, such as a "top hat" cross section sliding element having rim of same depth as door leaf thickness and crown of depth less than door leaf thickness,
wherein said profile member is configured to overlie said closing side piece resiliently deformable buffer, thereby locking said buffer in position mounted to said closing side piece by sliding engagement mounting means such as drop-fit means.

8. A pocket slide opening door assembly as claimed in any of claims 1 to 6 wherein buffers are configured to resiliently deform to release an object or ligature inserted therebetween or any weighted object or ligature.

9. A slide opening door assembly as claimed in any of claims 1 to 8 wherein door leaf bottom edge comprises a sliding assembly elongate sliding element comprising one or a plurality of roller(s), runner(s) or wheel(s) comprising a static axle having thereabout a disc shaped or spherical solid annulus or solid "tyre" providing a continuous rolling surface, said annulus supported by and configured to rotate about said static axle., facilitated by means of interfacing low friction surfaces of said annulus and said axle, or by means of a bearing therebetween.

10. A slide opening door assembly as claimed in claim 9 wherein said annulus and axle are spaced apart and comprise therebetween a plurality of ball bearings, or roller bearings or cylinder bearings, disposed about said axle, and aligned to mutually and independently roll in coaxial fashion about said axle, by action of translation of said annulus along a surface, such as, along an elongate track.

11. A slide opening door assembly as claimed in any of claims 1 to 10 configured for securing against entrainment of debris or objects within the pocket, by a wiper seal to be provided at a pocket side wall, inwardly of pocket opening, and disposed in manner to non-contact skim or loosely contact the door leaf, wherein said wiper seal comprises an deformable blade angled outwardly towards the closing side edge of the frame assembly and towards the door leaf, said blade having concave profile proximal to the pocket opening, more preferably an asymmetric concave profile, whereby tamper attempt such as by attempt to insert a rigid foreign body between seal and door leaf and into the pocket, results in deflection of said body away from the tip of said seal, and increases outward pressure on said seal, in direction of door leaf, pressing said seal against said door leaf, further restricting any access within said pocket.

12. A slide opening door assembly as claimed in any of claims 1 to 11 configured for use as an internal connecting door within a suite of rooms for housing a vulnerable or violent individual.

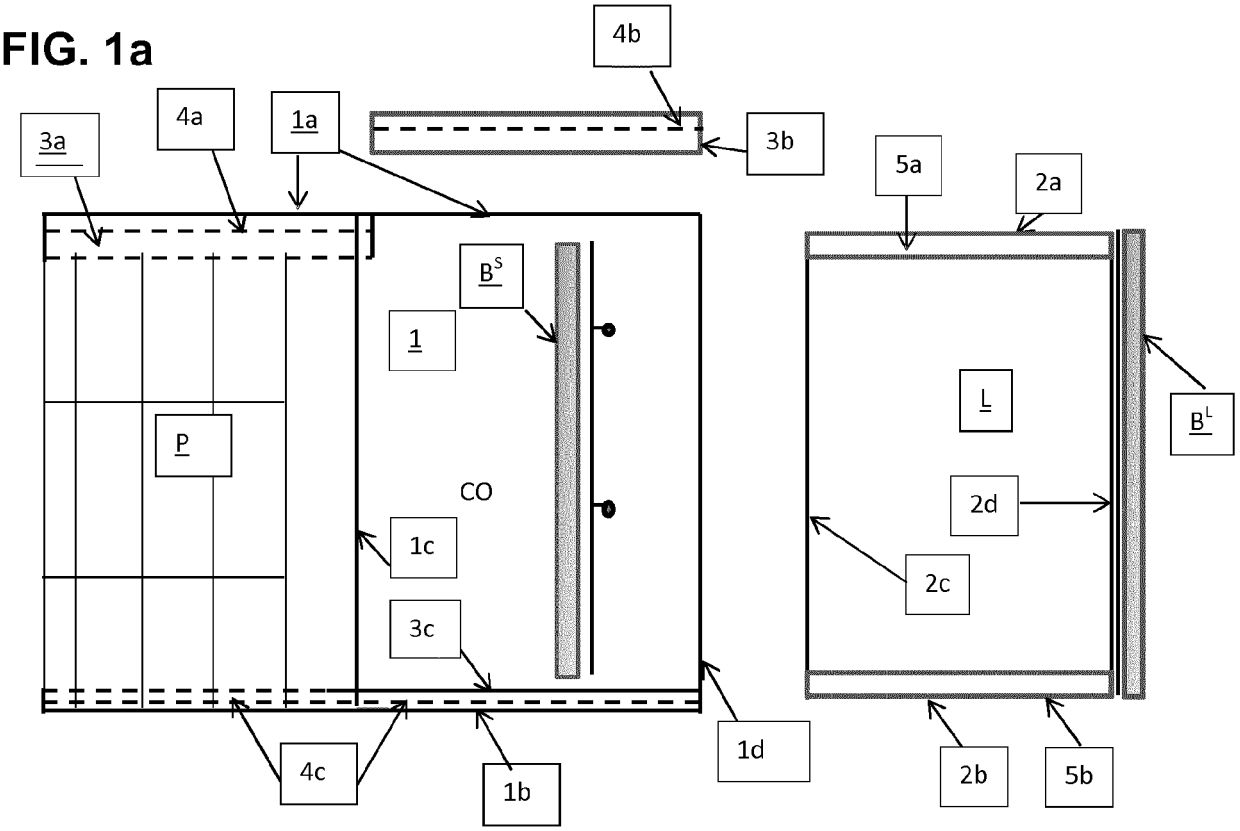
13. A kit for a slide opening door assembly as claimed in any of claims 1 to 12 comprising a doorframe assembly and a door leaf as defined in any said claims, together with removeably mountable components including one or more separate overhead overlap element(s), closing sidepiece buffer and optionally separate door leaf closing side edge buffer as hereinbefore defined.

14. A slide opening door assembly or kit as claimed in any of claims 1 to 13 configured for assembly during installation in a support structure having an opening to receive said door assembly, wherein said method

comprises providing the door frame assembly having pocket, headpiece, sidepiece and bottom piece as defined, providing a door leaf as defined for slideably engaging in said door frame assembly, installing the door frame assembly in a support opening such as a wall and locating the door leaf in the assembly opening (AO) defined by pocket, headpiece, sidepiece and bottom piece, thereby slideably engaging bottom sliding assembly, and reversing into pocket, thereby slideably engaging overhead sliding assembly within the pocket, wherein the method comprises further optionally locating door leaf closing side edge buffer and securing, locating closing side piece buffer and securing, and providing overhead overlap element sliding assembly in the assembly opening, locating at the headpiece and securing.

15. A method for manufacture of a slide opening door assembly or kit therefor or part thereof as claimed in any of claims 1 to 14.

FIG. 1a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B^S
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P
CO
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1c
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4c
1b
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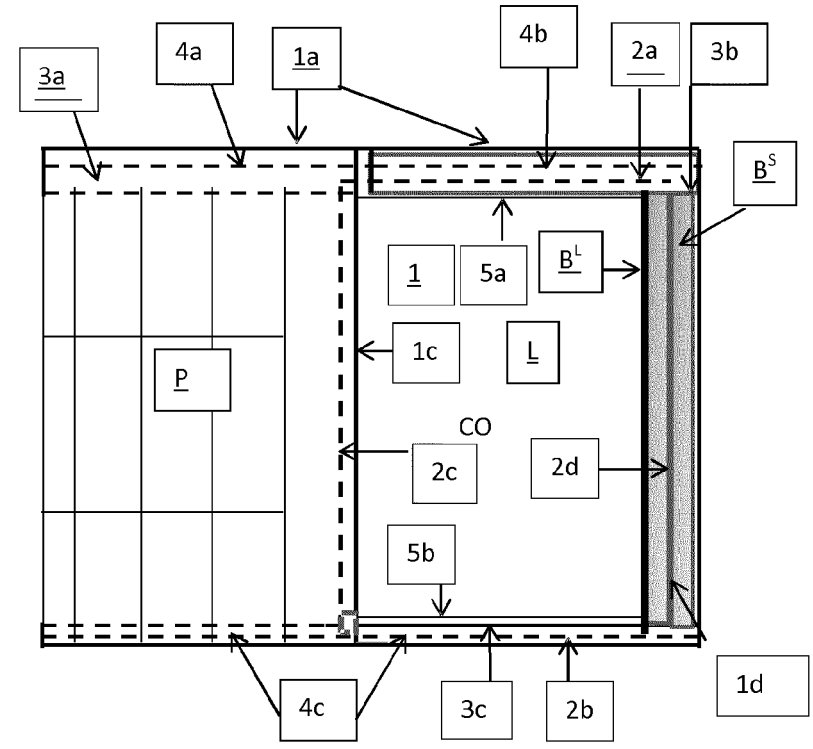
5b

FIG. 1b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3b
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5b
4c
3c
2b
1d

FIG. 1c

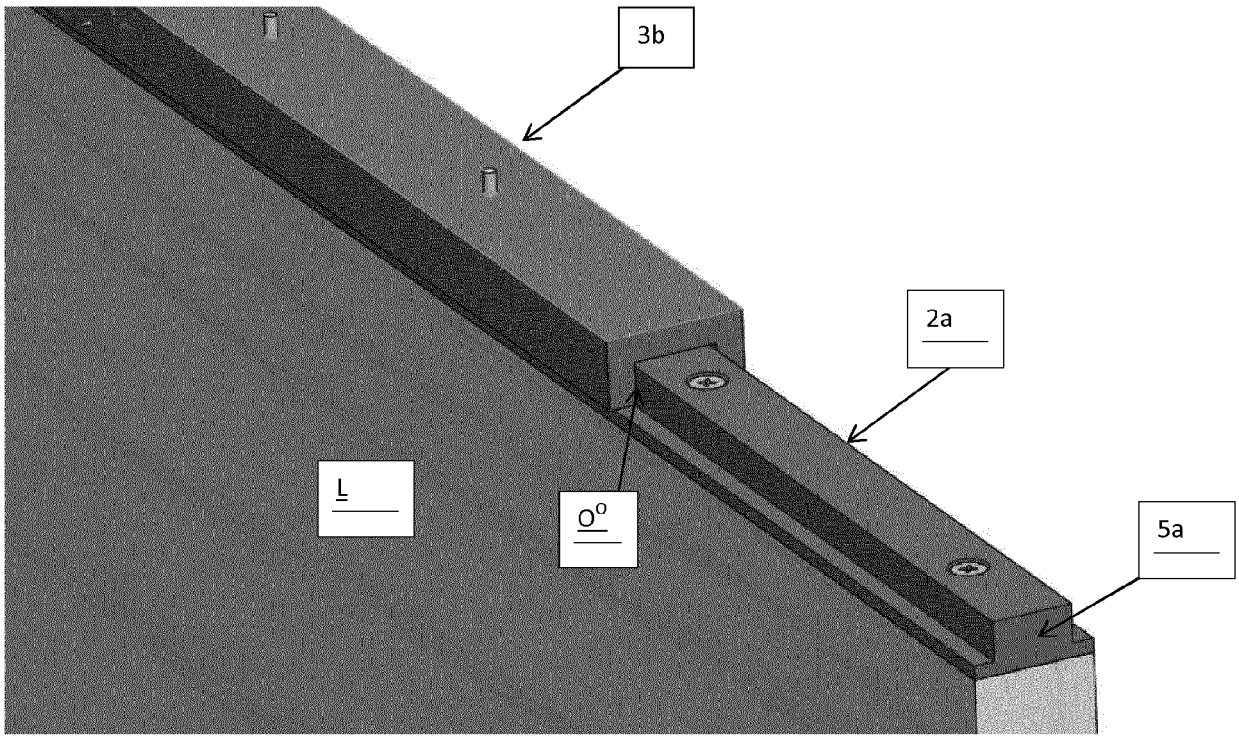


FIG. 1d

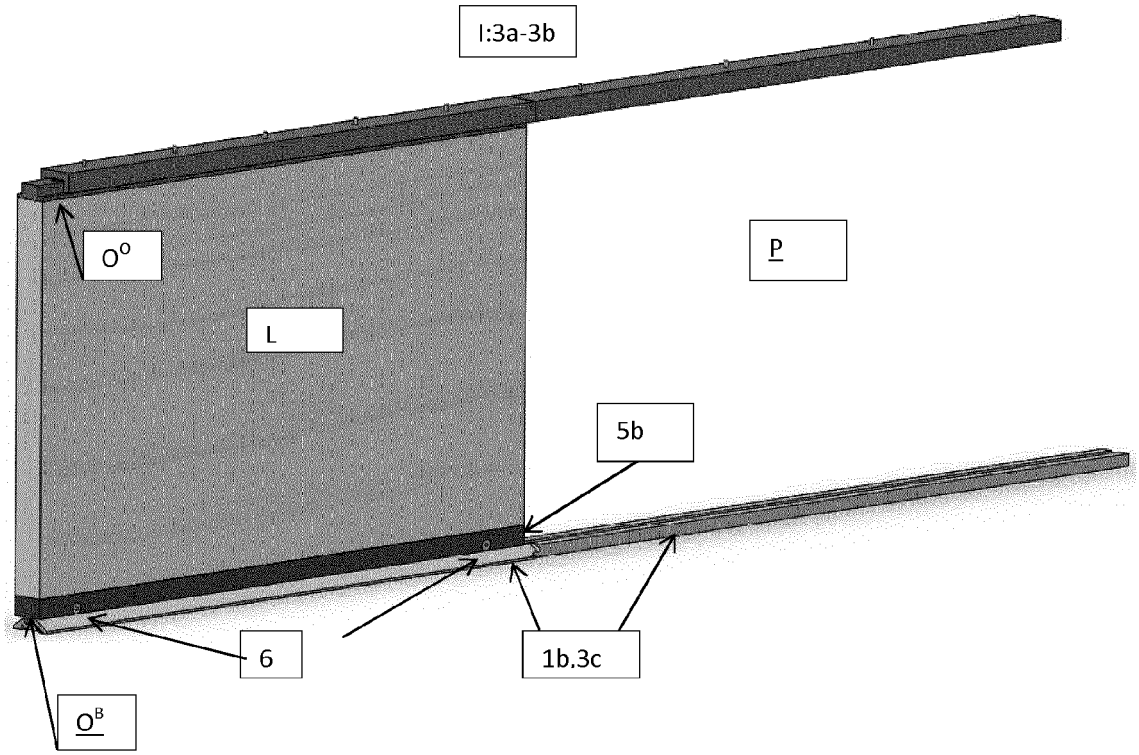


FIG. 1e

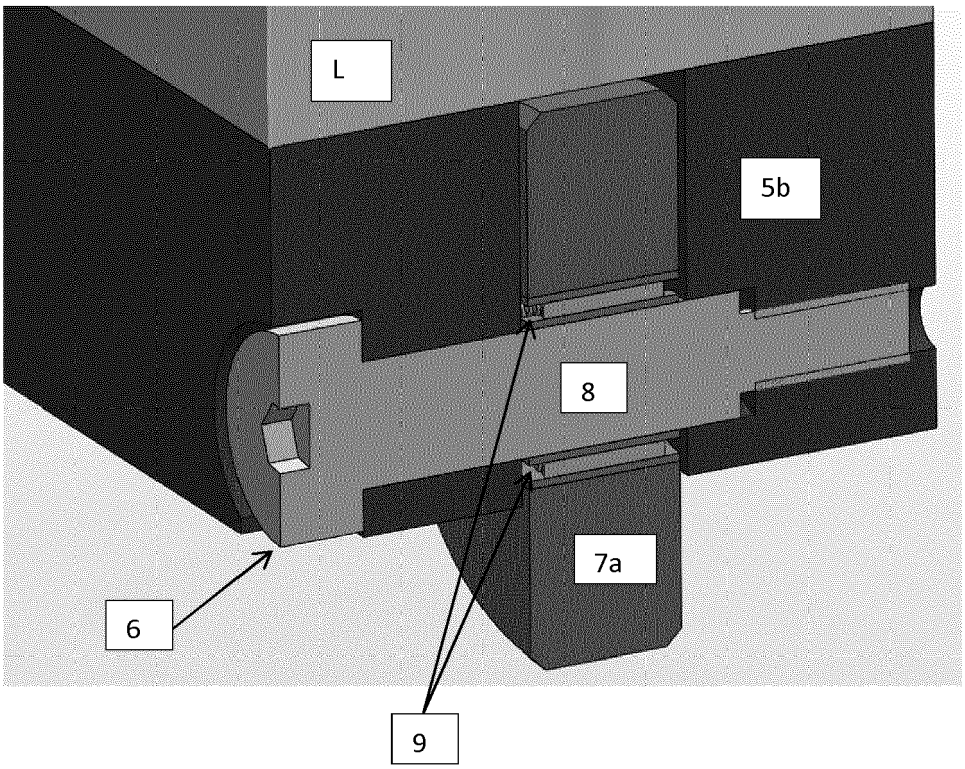


FIG. 1f

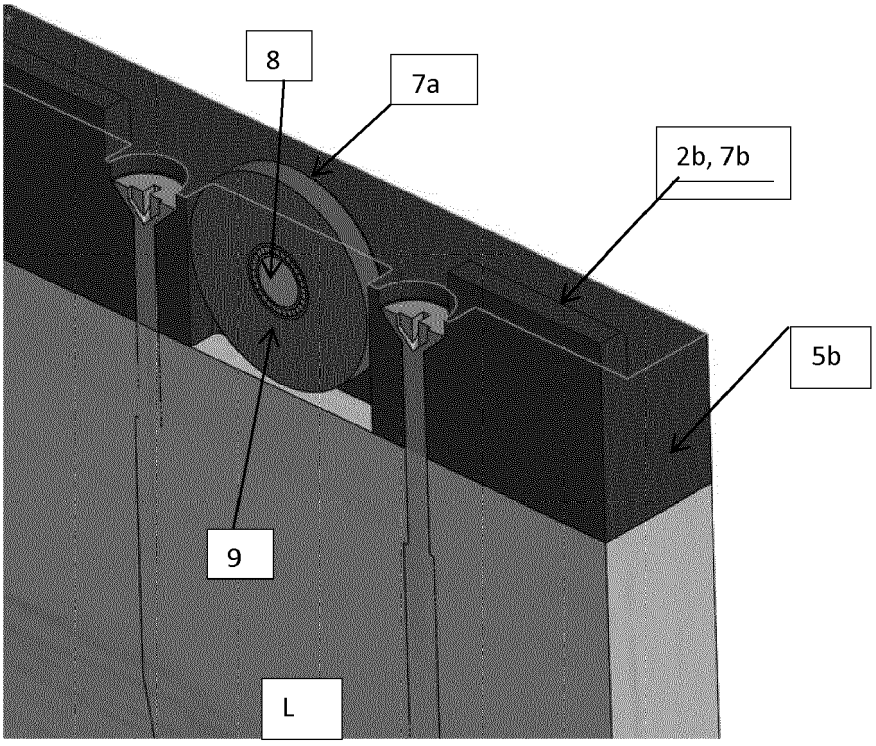


FIG. 2A

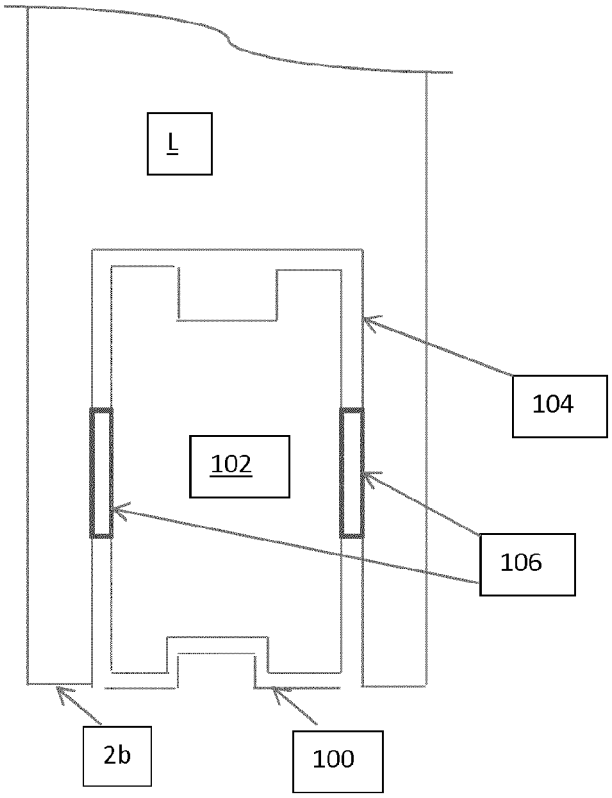


FIG. 2B

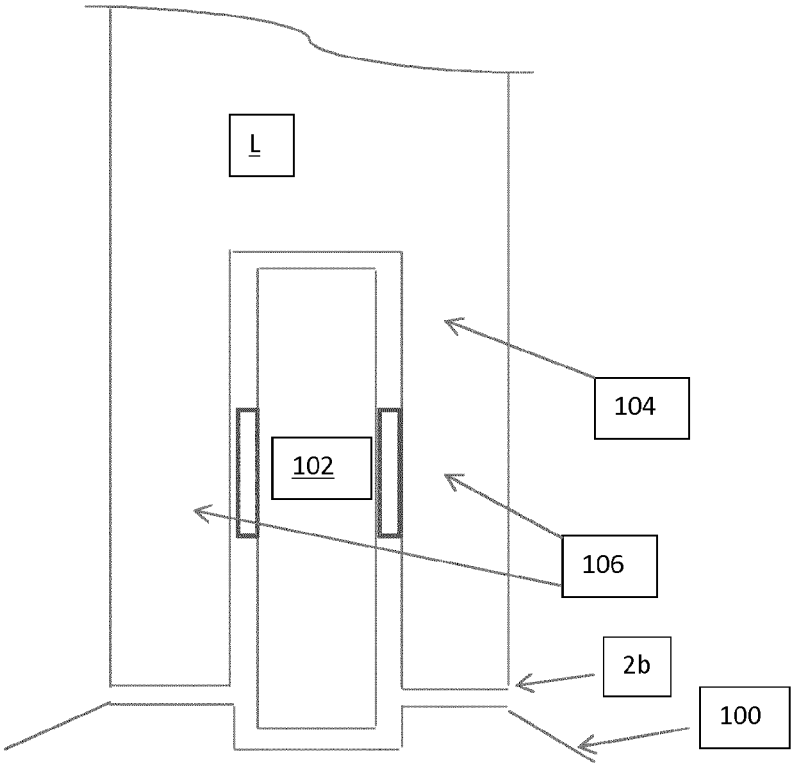


FIG. 2C

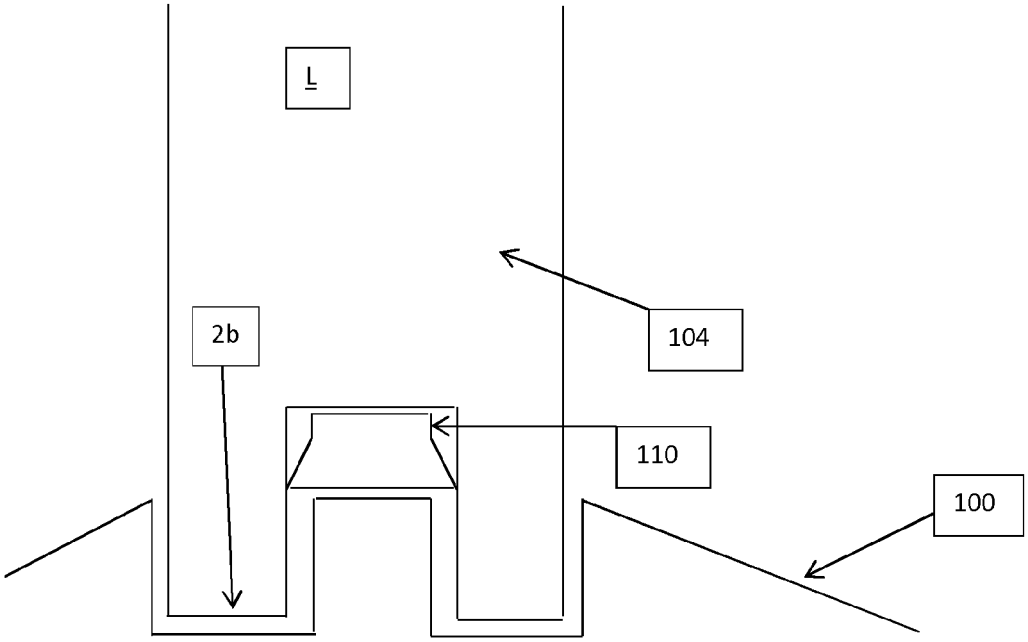


FIG. 2D

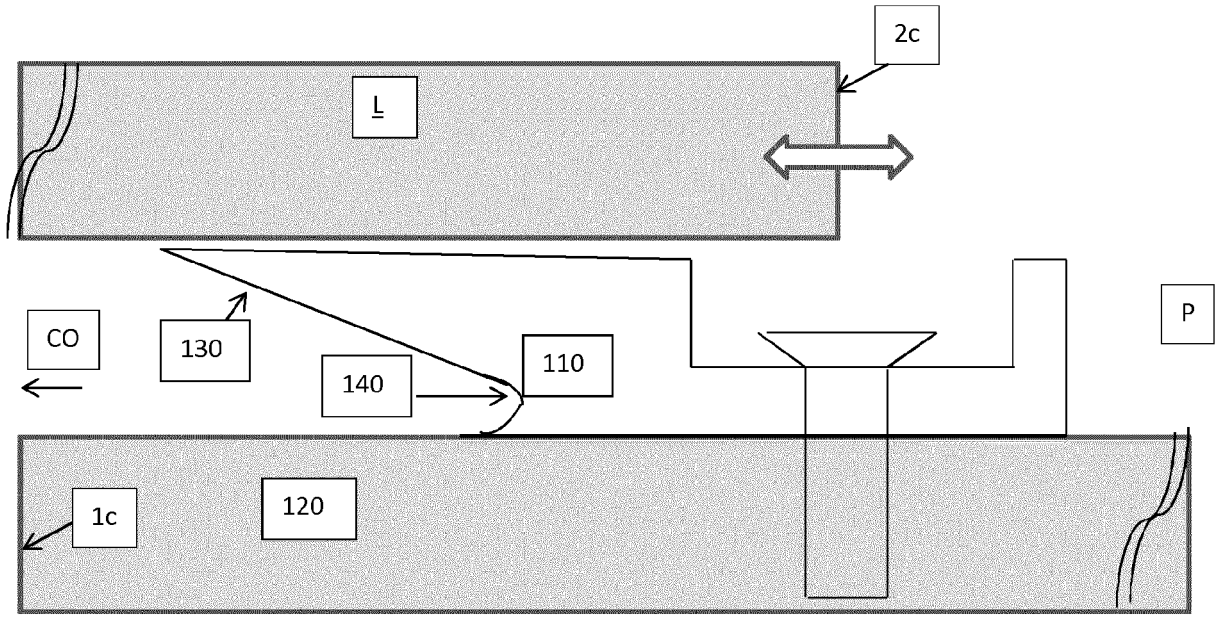


FIG. 3a

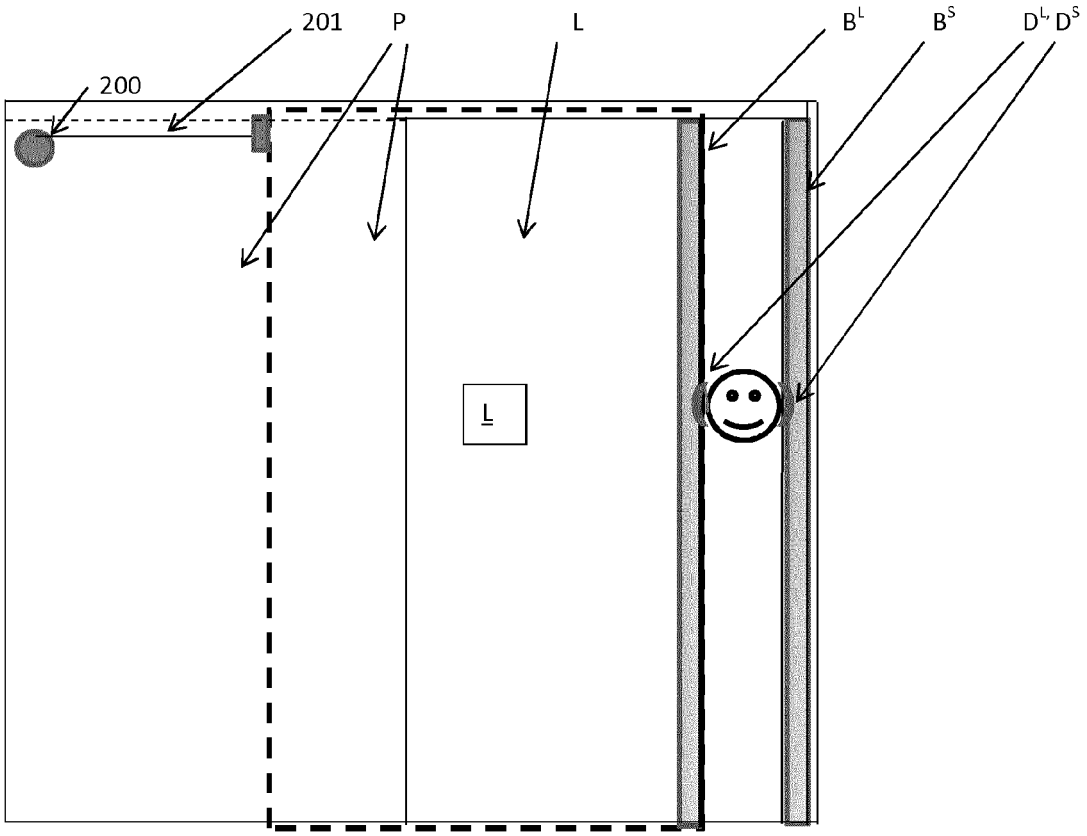


FIG. 3b

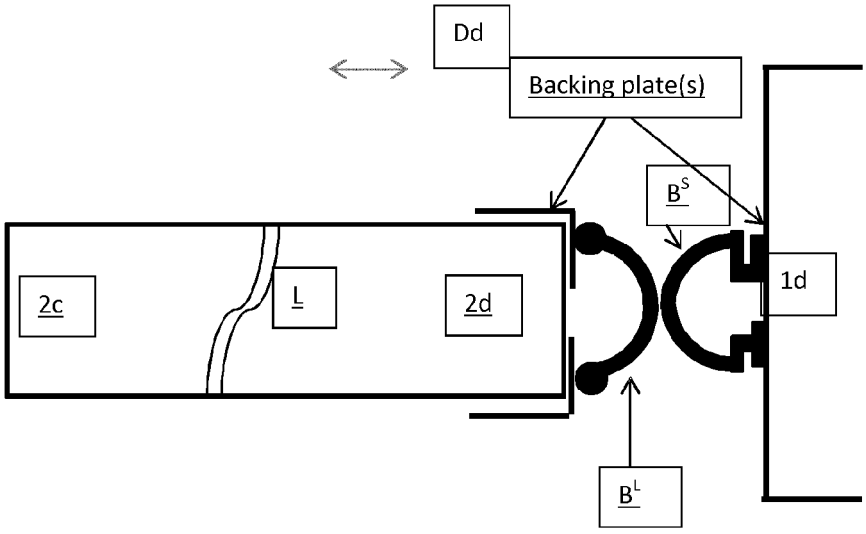


FIG. 4

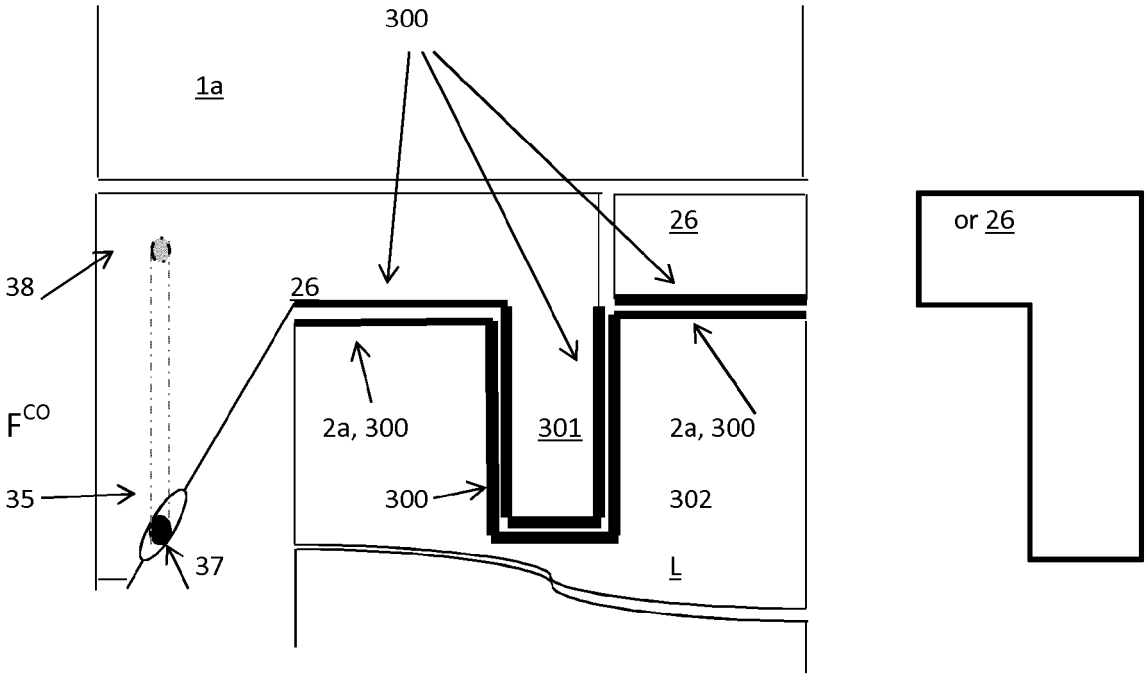
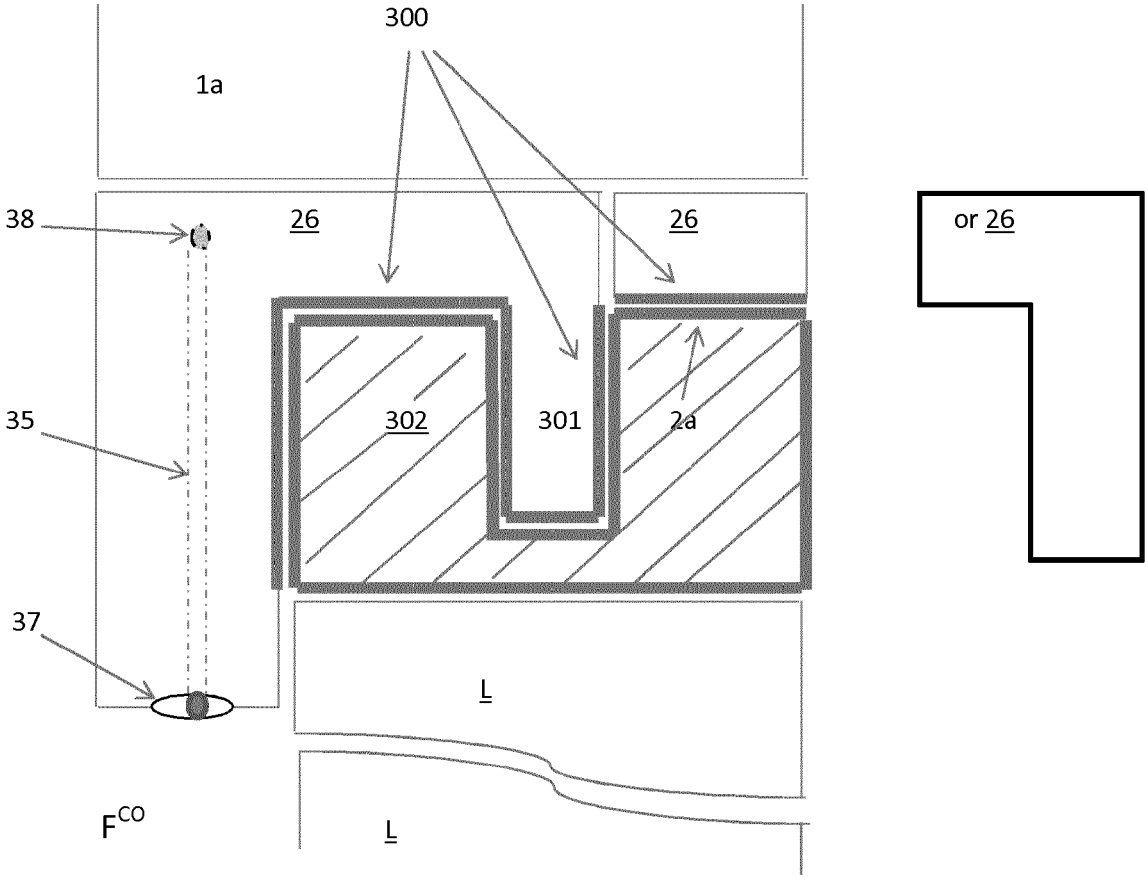

300
1a
26
38
26
F^{CO}
2a, 300
301
2a, 300
35
300
302
37
L
or 26

FIG. 5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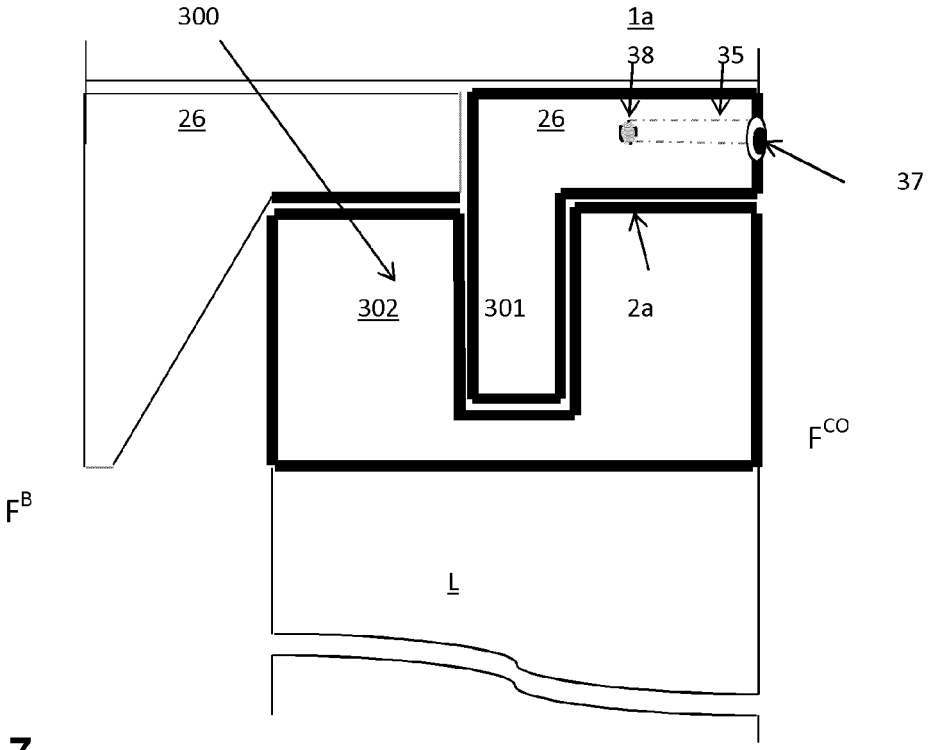
26
35
302
301
2a
37
L
F^{CO}
L
or 26

FIG. 6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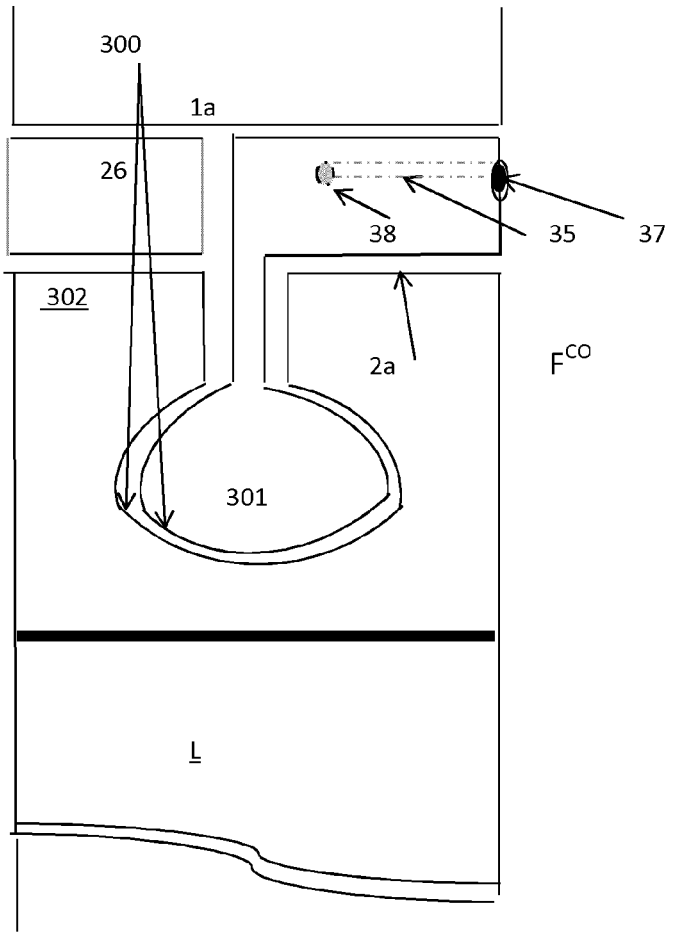
35
26
26
37
302
301
2a
F^CO
F^B
L

FIG. 7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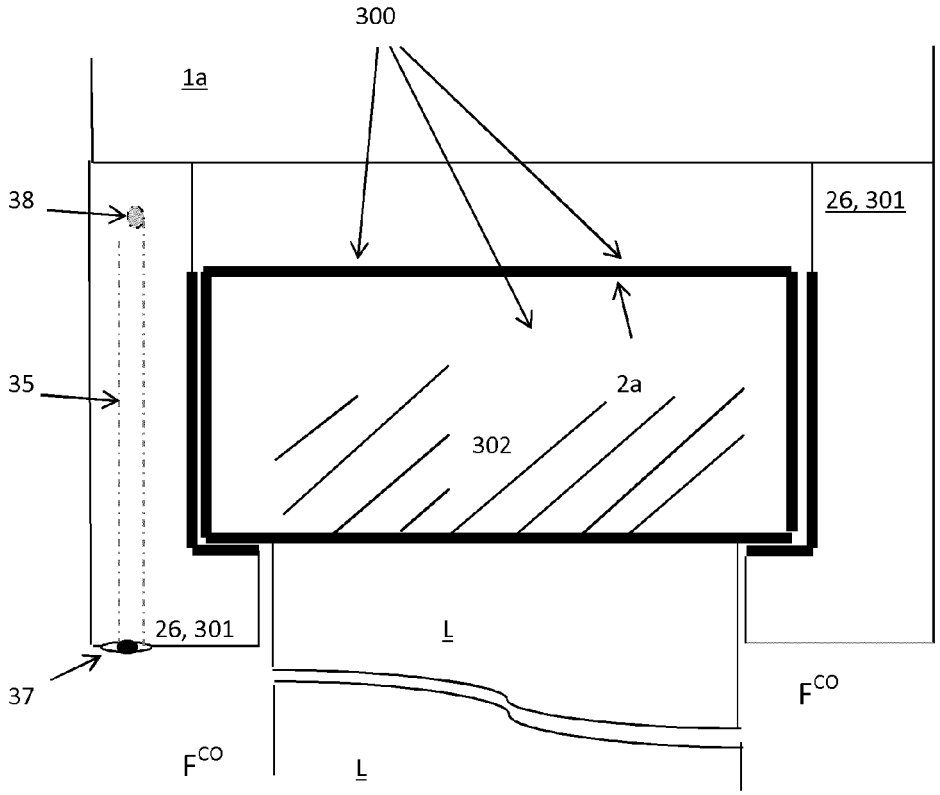
301
L

FIG. 8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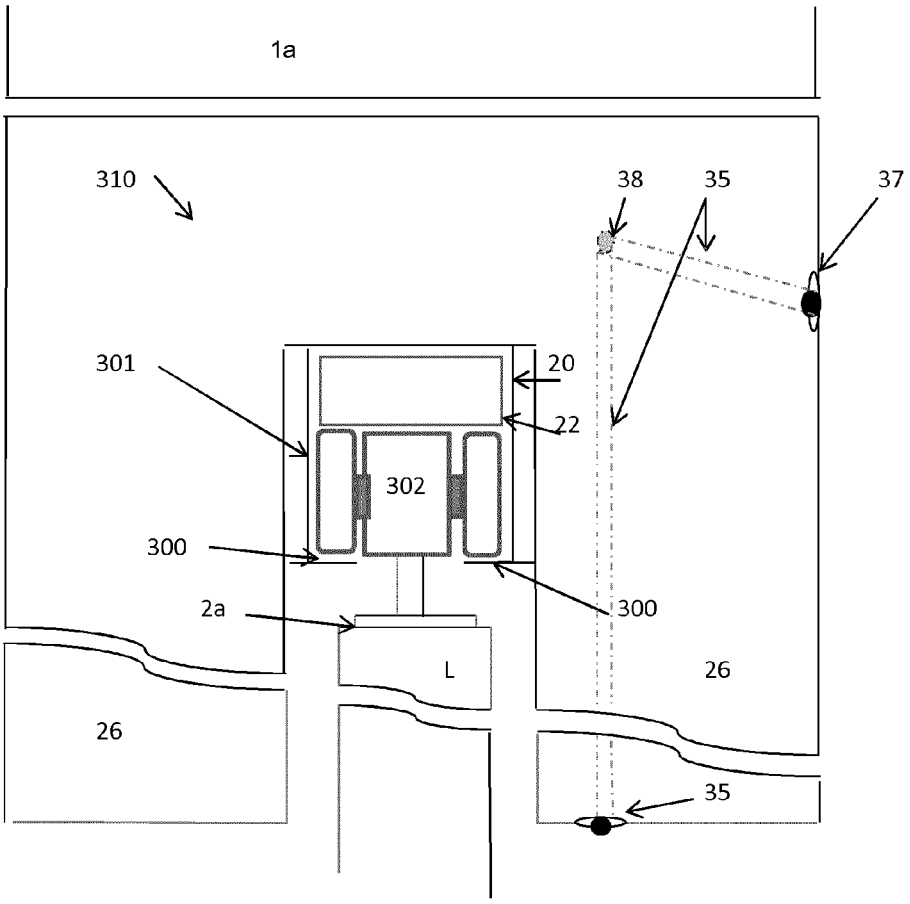
2a
302
26, 301
L
37
F^CO
F^CO
L

FIG. 9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301
20
22
302
300
2a
300
L
26
26
35

FIG. 10

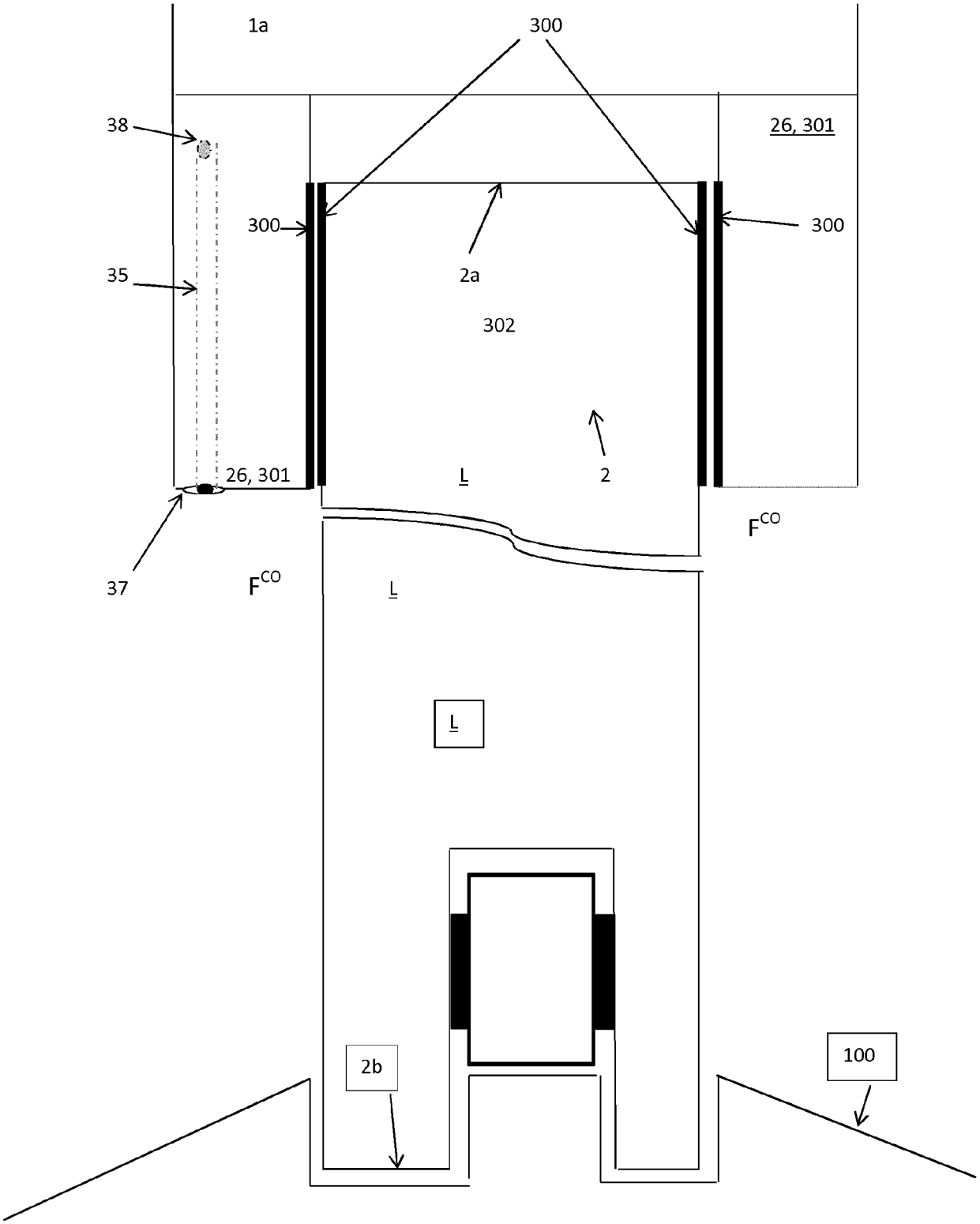
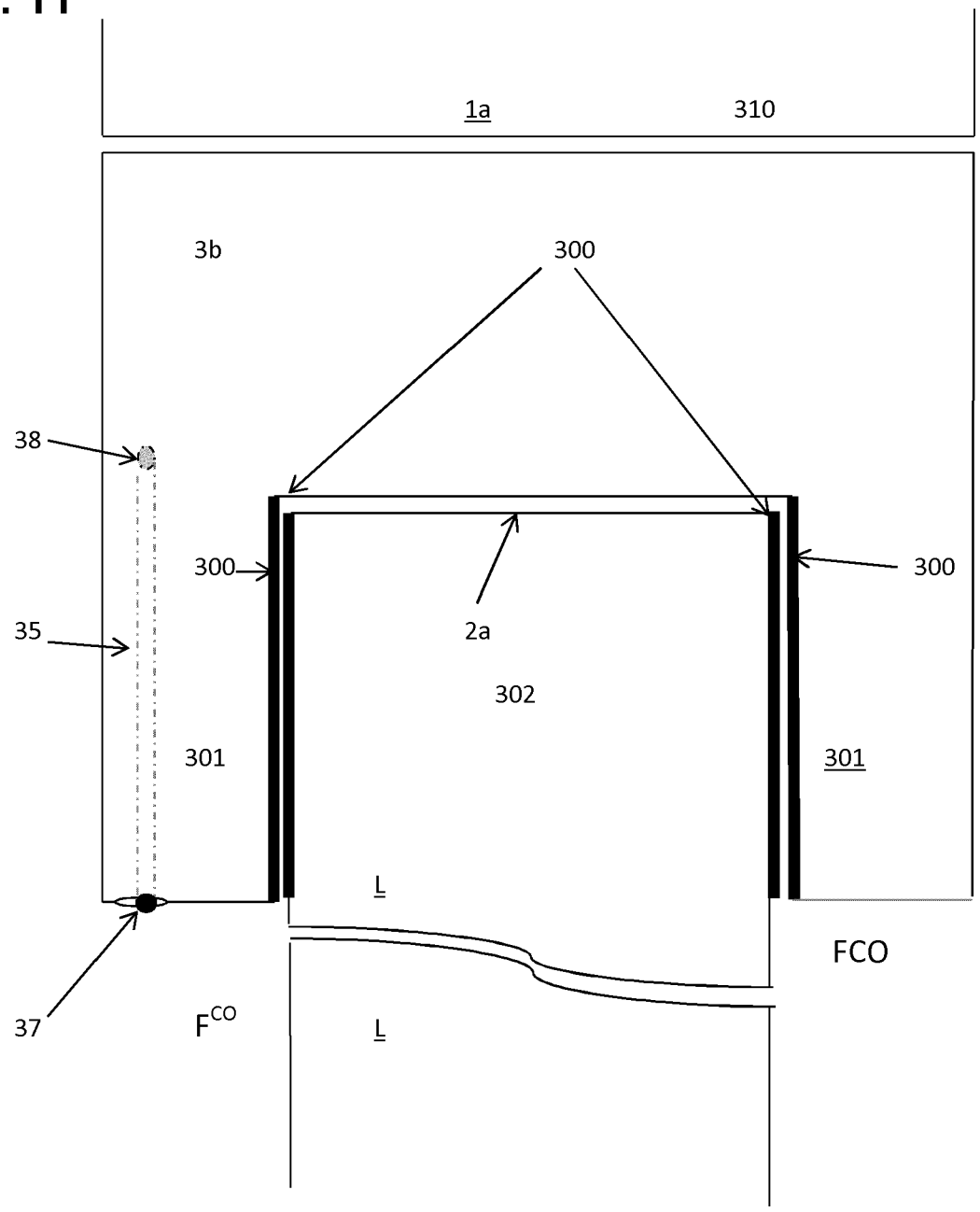


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 19 17 0702

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	GB 2 538 812 A (JOHN MONAGHAN LTD [GB]) 30 November 2016 (2016-11-30) * page 12, line 10 - page 26, line 26; figures 1-10a *	1-15	INV. E06B3/46
Y	EP 0 822 310 A2 (GEZE GMBH & CO [DE]) 4 February 1998 (1998-02-04) * column 11, lines 14-24; figure 16 *	1-15	
A	FR 2 572 766 A1 (JUILLET HUBERT [FR]) 9 May 1986 (1986-05-09) * pages 1-3; figure 2 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 October 2019	Hellberg, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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P : intermediate document

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 17 0702

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-10-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2538812 A	30-11-2016	NONE	
EP 0822310 A2	04-02-1998	AT 242403 T	15-06-2003
		DE 19733366 A1	12-02-1998
		DE 19733367 A1	18-06-1998
		EP 0822310 A2	04-02-1998
FR 2572766 A1	09-05-1986	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2017068362 A **[0005]**