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(54) **ROUTER JIG AND METHOD OF USE**

(57) The present disclosure relates to a jig 1 for cutting an edge on a workpiece, the jig 1 comprising a main body 2 having guide channel 4 for guiding a cutting tool, in use, the guide channel comprising a straight section 4a having a longitudinal axis L,
the jig 1 further comprising one or more positioning devices 18 arranged to be at least partially accommodated within the guide channel 4, in use, wherein the one or more positioning devices 18 define a plurality of abutting surfaces 34,
wherein, in use, each abutting surface 34 lies on a plane intersecting the guide channel 4 such that, when the abutting surface 34 abuts an edge of a workpiece to be cut, said edge overlaps with the guide channel 4,
and wherein, in use, each abutting surface 34 lies on a different respective plane that is parallel to the longitudinal axis L of the straight section 4a of the guide channel 4. The disclosure further relates to a method for cutting an edge of a workpiece.

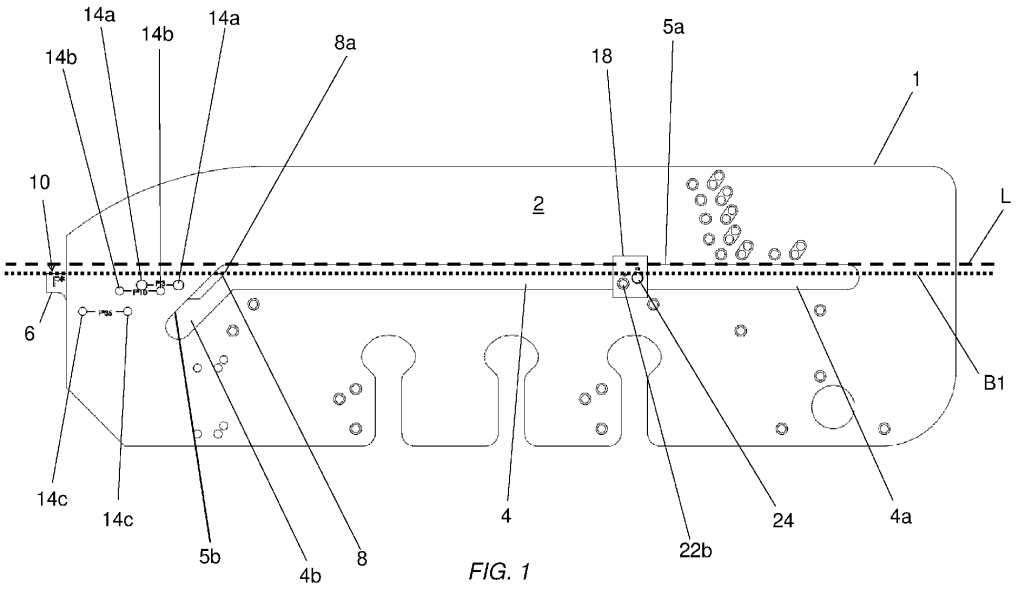

FIG. 1

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Description

[0001] The invention relates to the general field of router jigs and more particularly, but not exclusively, to router jigs for forming corresponding male and female cuts in cooperating worktop pieces ('workpieces') to allow the workpieces to be joined with a Mason's Mitre joint.

[0002] When installing worktops/countertops/work surfaces (e.g. in kitchens and bathrooms) it is common practice to incorporate a joint (a 'Mason's Mitre') when connecting two lengths of worktop material in a perpendicular arrangement (e.g. to navigate internal corners or when installing a breakfast bar/peninsula). The Mason's Mitre is constructed by cutting a recess ('female') in one workpiece, and a corresponding protrusion ('male') in the other.

[0003] A Router, Router Cutter, Guide Bush, and Routing Jig/Template is typically used to achieve the necessary cuts in both lengths of material.

[0004] The Mason's Mitre is required in order to remove the rounded 'Postformed Edge' of worktop material, particularly common in laminated chipboard, to achieve a practical, visually appealing finish. Traditionally, the depth of the Female recess (the 'Inset') is approximately 35mm, in order to be larger than the Postformed Edge. Due to changes in worktop styles and manufacturing techniques (namely a reduction in the size of the Postformed Edge), it is now desirable to have different Inset depths available, such that less time is required to remove less material when forming the Masons Mitre.

[0005] The length of the Female recess ('Backset') is relative to the width of the Male workpiece.

[0006] The Female recess is always cut parallel to the Postformed Edge of the Female workpiece.

[0007] If adjoining walls are positioned at 90 degrees, the Male protrusion is cut at 90 degrees to the Female recess ('Square').

[0008] If adjoining walls are not positioned at 90 degrees, the Male protrusion is cut at a corresponding angle to the Female recess ('Out-of-Square').

[0009] In order to appropriately align a jig with a workpiece to be cut, the jig must be correctly positioned in two-dimensional space to provide the correct backset and inset sizes. However, positioning the jig appropriately to account for different inset sizes is a complicated task and is prone to error, which may result in poorly aligned joints and/or significant material wastage if the user needs to start again, since an incorrectly cut workpiece will often not be reusable.

[0010] Therefore, there remains a need for a jig that can be easily set up to allow the user to correctly position the jig relative to a workpiece for forming cuts in the edge of a workpiece suitable for a Mason's Mitre joint, which account for different inset and backset sizes.

[0011] According to a first aspect of the present invention, there is provided a jig for cutting an edge on a workpiece, the jig comprising a main body having guide channel for guiding a cutting tool, in use, the guide channel comprising a first straight section and a second straight section arranged at an angle relative to the first straight section,

the jig further comprising one or more alignment devices defining a plurality of datum points arranged to overlap the guide channel, in use, for aligning the jig with a reference mark on a workpiece to be cut,

wherein each of the datum points defined by the one or more alignment devices lies on a different plane perpendicular to a longitudinal axis of the first straight section and lies on a common plane that is parallel to and spaced from a guiding edge of the second straight section.

[0012] With the arrangement of the present invention, the alignment device can be used to correctly position the jig by aligning a reference mark formed on the workpiece to be cut with a selected one of the plurality of datum points. The reference mark represents a point on the workpiece with which the jig must be aligned to suitably position the jig relative to the workpiece to ensure the cut is made in the correct place and/or orientation. The reference mark may represent, for example, a width of a cooperating workpiece (e.g. a male workpiece) to be joined to the workpiece to be cut (e.g. a female workpiece). Accordingly, the reference mark represents a width of the cut that is to be formed in the workpiece. It will be appreciated that the present invention may equally be used for aligning the jig with alternative reference marks for forming alternative cuts in a workpiece.

[0013] Each datum point overlaps the guide channel. Regardless of the exact nature of the reference mark, by overlapping the datum points with the guide channel, the selected datum point can be closely, and therefore accurately, aligned with the reference mark on the workpiece. This allows for accurate alignment and positioning of the jig.

[0014] Each datum point corresponds to one of a plurality of inset sizes.. For a given reference mark, the position of the jig relative to the reference mark will differ depending on the inset size i.e. the depth of the cut to be formed in the edge of the workpiece. Accordingly, a single datum point provided in a fixed position cannot be used for cuts having different inset sizes.

[0015] According to the present invention, each of the datum points defined by the one or more alignment devices lies on a different plane perpendicular to a longitudinal axis of the first straight section. That is, each datum point is offset in a direction parallel to a longitudinal axis of the first straight section, relative to the other datum points. This allows the jig to be positioned correctly in a direction parallel to the longitudinal axis of the first straight section, by selecting an appropriate one of the datum points according to the desired inset size.

[0016] At the same time, each datum point lies on a common plane that is parallel to and spaced from a

guiding edge of the second straight section. In this regard, the guiding edge of the second straight section is to be understood as being an edge of the guide channel that is used to guide a cutting tool (e.g. a router) during a cutting operation. By providing each datum point on a common plane that is parallel with the guiding edge of the second straight section, each datum point can be appropriately positioned in two dimensions according to a desired inset size. That is, the datum point is can be correctly positioned in a direction parallel to the longitudinal axis of the first straight section, and in a direction perpendicular to the longitudinal axis of the first straight section. A single datum point can therefore be used to correctly position the jig in two-dimensional space, for a desired inset size.

[0017] In the present invention, the angle of the second straight section relative to the first straight section (or more specifically, an angle of the guiding edge of the second straight section relative to the longitudinal axis of the first straight section) is not particularly limited. The angle is preferably greater than 90 degrees and less than 180 degrees, more preferably in the range 110 degrees and to 160 degrees, and most preferably in the range 120 degrees and to 150 degrees. In particularly preferred embodiments, the angle is approximately 135 degrees.

[0018] Preferably, the one or more alignment devices define a first datum point and a second datum point,

the first datum point is located on a first perpendicular alignment plane that is perpendicular to the longitudinal axis of the first straight section, and on a first parallel alignment plane that is parallel to the longitudinal axis of the first straight section;

the second datum point is located on a second perpendicular alignment plane that is perpendicular to the longitudinal axis of the first straight section, and on a second parallel alignment plane that is parallel to the longitudinal axis of the first straight section,

wherein a distance between the first perpendicular alignment plane and the second perpendicular alignment plane in a direction parallel to the longitudinal axis of the first straight section is equal to a distance between the first parallel alignment plane and the second parallel alignment plane in a direction perpendicular to the longitudinal axis of the first straight section.

[0019] With this arrangement, an offset between the first datum point and the second datum point in a direction parallel to the longitudinal axis of the first straight section is equal to an offset between the first datum point and the second datum point in a direction perpendicular to the longitudinal axis of the first straight section. This arrangement provides for correct positioning of each datum point in two dimensions where an angle between the guiding edge of second straight section and the longitudinal axis of the first straight section is 135 degrees, which is preferred.

[0020] It will be appreciated that where different a different angle is provided between the guiding edge of second straight section and the longitudinal axis of the first straight section, the offset between the first and second datum points in the parallel and perpendicular directions may be different. However, for any given angle, the correct relative offsets between the first and second datum points in the parallel and perpendicular directions can be ensured by providing the first and second datum points on a common plane that is parallel to and spaced from a guiding edge of the second straight section.

[0021] The jig may comprise an alignment device that is arranged to be located on the main body in a plurality of positions, and wherein, in each position of the alignment device, the alignment device defines a respective one of the plurality of datum points. Accordingly, a single alignment device can be used to selectively define a plurality of datum points, depending on the position in which the alignment device is located on the main body.

[0022] The alignment device may be attachable to the main body in a plurality of distinct, predefined positions such that, in each position of the alignment device, the alignment device defines a respective one of the plurality of datum points. The alignment device may be removably attachable to the main body.

[0023] The main body of the jig may comprise a track on which the alignment device is movably mounted, so as to allow the alignment device to be moved along the track to define a selected one of the plurality of datum points. For example, in a first position along the track, the alignment device defines a first datum point, and the alignment device can be moved along the track to a second position in which the alignment device defines a second datum point. In such embodiments, the alignment device may be continuously or infinitely adjustable along the track to allow the user to select an appropriate datum point for any desired inset size, within a predefined range. The track may be provided with a scale to allow the user to select the correct position for the desired inset size.

[0024] The alignment device may comprise at least one pair of apertures and the main body of the jig may comprise at least one corresponding pair of apertures, wherein the alignment device is arranged to be attached to the main body of the jig by insertion of a pair of attachment members (such as pins) through a pair of apertures of the main body of the jig and a corresponding pair of apertures of the alignment device, so as to position the alignment device in one of the plurality of predefined positions. This arrangement with a pair of attachment members (such as pins) received through corresponding pairs of apertures of the main body and alignment device, respectively, ensures that the alignment device is attached to the main body of the jig in a fixed position, preventing movement (in particular, pivoting) of the alignment device when attached to the main body of the jig.

[0025] The jig further may comprise an attachment system for attaching the alignment device to the main

body of the jig, wherein the attachment system comprises a first arrangement for attaching the alignment device to the main body of the jig in a first position, the first arrangement being unique to the first position, and a second arrangement for attaching the alignment device to the main body of the jig in a second position, wherein the second arrangement is unique to the second position. This prevents the alignment device from being unintentionally attached in the wrong position.

[0026] The first arrangement may comprise a first pair of apertures provided on the alignment device and a corresponding first pair of apertures provided on the main body of the jig having a spacing that is equal to a spacing of the first pair of apertures of the alignment device;
the second arrangement comprises a second pair of apertures provided on the alignment device and a corresponding second pair of apertures provided on the main body of the jig having a spacing that is equal to a spacing of the second pair of apertures of the alignment device, and the spacing of the first pair of apertures is not equal to a spacing of the second pair of apertures.

[0027] With the above arrangement, when a pair of attachment members (e.g. pins) is received within a pair of apertures provided on the main body of the jig, said pair of attachment members can only be received within the corresponding pair of apertures on the alignment device. Correct positioning of the alignment member for a desired inset size is thereby ensured.

[0028] Alternatively, the first and second arrangements may comprise different sized or shaped apertures arranged to receive attachment members of different sizes or shapes. Accordingly, only attachment members of the correct size and/or shape can be inserted through the apertures.

[0029] The jig may comprise a plurality of alignment devices that are attachable to the main body, wherein each alignment device of the plurality of alignment devices is arranged to define a respective one of the plurality of datum points when attached to the main body. The user can thereby select an appropriate one of the alignment devices according to a desired inset size, such that the alignment device defines an appropriate datum point for that inset size.

[0030] The jig may comprise an alignment device defining a plurality of distinct datum points when attached to the main body in a single position. Accordingly, the single alignment device simultaneously defines a plurality of datum alignment points, and the user can align the appropriate datum point with a reference mark on the workpiece, according to the desired inset size.

[0031] Preferably, the jig further comprises one or more positioning devices, wherein the one or more positioning devices define a first abutting surface and a second abutting surface, each abutting surface being arranged, in use, to lie on a plane intersecting the guide channel such that, when the abutting surface abuts an edge of a workpiece to be cut, said edge overlaps with the guide channel, wherein the first abutting surface is located on a first parallel positioning plane that is parallel to the longitudinal axis of the first straight section and the second abutting surface is located on a second parallel positioning plane that is parallel to the longitudinal axis of the first straight section.

[0032] In this regard, the phrase "the one or more positioning devices define a first abutting surface and a second abutting surface" is to be construed as meaning that a single positioning device may define two (or more) abutting surfaces, or a plurality of positioning devices may collectively define two (or more) abutting surfaces. That is, a first positioning device may define a first abutting surface and a second positioning device may define a second abutting surface, such that the first and second positioning devices collectively define the first and second abutting surfaces. It is preferred that a single positioning device defines the first and second abutting surfaces, since this allows for the provision of a single component in place of multiple components.

[0033] Preferably, the one or more alignment devices define a first datum point and a second datum point, and a distance between the first parallel positioning plane and the second parallel positioning plane (of the first and second abutting surfaces, respectively) in a direction perpendicular to the longitudinal axis of the first straight section is equal to a distance between the first datum point and the second datum point in a direction perpendicular to the longitudinal axis of the first straight section. That is, a distance between the first parallel positioning plane and the second parallel positioning plane in a direction perpendicular to the longitudinal axis of the first straight section is equal to a distance between the first perpendicular alignment plane and the second perpendicular alignment plane in the same direction.

[0034] Accordingly, an offset of the first and second datum points in the perpendicular direction (a direction perpendicular to the longitudinal axis of the first straight section) is equal to an offset of the first and second abutting surfaces in the same direction. Accordingly, the first datum point can be used in conjunction with the first abutting surface to position the jig for a first inset size, and the second datum point can be used in conjunction with the second abutting surface to position the jig for a second inset size.

[0035] Preferably, the first datum point is located on the first parallel positioning plane and the second datum point is located on the second parallel positioning plane. That is, the first parallel positioning plane of the at least one positioning device is the same as the first parallel alignment plane of the alignment device, on which the first datum point is located. In the same way, the second parallel positioning plane of the at least one positioning device is the same as the second parallel alignment plane of the alignment device, on which the second datum point is located. With this arrangement, the first abutting surface lies on the same plane as the first datum point and the second abutting surface lies on the same plane as the second datum point. The first and second datum points

can thereby be used in conjunction with the first and second abutting surfaces, respectively, to easily and correctly position the jig in a direction perpendicular to the longitudinal axis of the first straight section of the guide channel.

[0036] Preferably, the one or more alignment devices define a first datum point and a second datum point, each datum point being located on a common plane that is parallel to and spaced from a guiding edge of the second straight section;

an angle between the guiding edge of the second straight section and the longitudinal axis of the first straight section is defined as α;
a distance between the first datum point and the second datum point of the one or more alignment devices in a direction parallel to the longitudinal axis of the first straight section is defined as X; and
a distance between the first parallel positioning plane and the second parallel positioning plane of the one or more positioning devices in a direction perpendicular to the longitudinal axis of the first straight section is defined as Y,
and the requirements of the following equation 1 are met:

$$\tan(180 - \alpha) = Y / X \quad (1).$$

[0037] This arrangement ensures a correct alignment of the jig in a direction parallel to the longitudinal axis of the first straight section of the guide channel, for any given inset size and any given angle between the guiding edge of the second straight section and the longitudinal axis of the first straight section.

[0038] Preferably, the at least one positioning device is at least partially accommodated within the guide channel. This provides convenient location of the positioning device and allows for an appropriate abutting surface to be defined, even for small inset sizes, where the abutting surface needs to be in relatively close proximity to the edge of the workpiece to be cut.

[0039] The at least one positioning device may be movable along the guide channel so as to adjust the position of the positioning device along the longitudinal axis of the first straight section. Accordingly, the positioning device can be moved along the length of the guide channel into any desired position. The positioning device can therefore be used with greater versatility for workpieces of different dimensions. That is to say, the position of the positioning member along the length of the guide channel is not predefined. The at least one positioning device may be slidably movable along the guide channel.

[0040] Preferably, the or each alignment device comprises a secondary reference edge arranged, in use, to abut an edge of a workpiece to be cut. A terminal point of the secondary reference edge may define one or more datum points of the alignment device. For example, the alignment device may be attachable to the main body of the jig in a first position, in which the terminal point of the secondary reference edge defines a first datum point, and in a second position, in which the terminal point of the secondary reference edge defines a second datum point. By providing a datum point as the terminal point of the secondary reference edge, it can be ensured that the datum point is located directly adjacent (abutting) the edge of the workpiece and can therefore be closely and accurately aligned with a reference mark on said edge of the workpiece. Accurate alignment of the jig is thereby ensured.

[0041] The secondary reference edge is preferably linear, to allow the secondary reference edge to lie flat against an edge of the workpiece to be cut. The secondary reference edge is preferably arranged to lie in a plane parallel to the longitudinal axis of the first straight section, and thus in the same parallel alignment plane as the datum point defined by the terminal point of the secondary reference edge. Accordingly, the secondary reference edge can be used to correctly position the jig in a direction perpendicular to the longitudinal axis of the first straight section, with or without the use of a positioning device as described above.

[0042] According to a second aspect of the present invention, there is provided a method of cutting an edge of a workpiece, the method comprising:

- providing a reference mark on a presentation edge of a workpiece to be cut, said reference mark being indicative of a desired position of a cut to be made;
- providing a jig comprising a main body having guide channel for guiding a cutting tool, in use, the guide channel comprising a first straight section and a second straight section arranged at an angle relative to the first straight section,

the jig further comprising one or more alignment devices defining a plurality of datum points arranged to overlap the guide channel, in use, for aligning the jig with a reference mark on a workpiece to be cut, wherein each of the datum points defined by the one or more alignment devices lies on a different plane perpendicular to a longitudinal axis of the first straight section and lies on a common plane that is parallel to and spaced from a guiding edge of the second straight section

- arranging the alignment device to define a datum point overlapping the guide channel, said datum point being selected according to a desired depth of the cut to be made;
- aligning the datum point with the reference mark on the workpiece to be cut so as to position the jig on the workpiece to be cut;
- rearranging the alignment device so as to be clear of the guide channel; and
- forming a cut on the workpiece using a cutting tool guided by the guide channel of the jig.

[0043] The depth of the cut is to be understood as the dimension of the cut from the presentation edge in a direction perpendicular to the presentation edge. The presentation edge is an edge of the workpiece that is to be joined with another workpiece, for example using a Mason's Mitre joint. The presentation edge may be a postform edge, for example.

[0044] With the method of this aspect of present invention, the user can select a desired one of the plurality of datum points, according to the depth of the cut to be made in the workpiece. Since each one of the datum points is located on a common plane that is parallel to and spaced from a guiding edge of the second straight section, the datum point allows for accurate positioning of the jig in two dimensions (i.e. in a direction perpendicular to the longitudinal axis of the guide channel and in a direction parallel to the longitudinal axis of the guide channel).

[0045] The step of providing a reference mark on the presentation edge of the workpiece may comprise providing the reference mark in a position that corresponds to a width of a corresponding workpiece with which the workpiece is to be joined. For example, the workpiece to be cut may be a first workpiece (e.g. a female workpiece in which a female recess of a Mason's Mitre joint is to be formed) that is to be joined to a second workpiece (e.g. a male workpiece in which a male protrusion of a Mason's Mitre joint is to be formed). The reference mark on the first workpiece may be provided at a position that corresponds to the width of the second workpiece. For example, a distance of the reference mark from an end of the first workpiece may be equal to a width of the second workpiece. The position of the reference mark may be determined by measuring the width of the second workpiece and providing the reference mark at a distance from the end of the first workpiece that is equal to the measured width of the second workpiece. Alternatively, the second workpiece may be offered up to the first workpiece and the width measurement of the second workpiece can be directly transferred to the first workpiece.

[0046] Preferably, the jig is a jig in accordance with the first aspect of the present invention, as described above.

[0047] Preferably, the method comprises:

- for performing a cut comprising a first depth, arranging an alignment device to define a first datum point; and
- for performing a cut comprising a second depth, different to the first depth, arranging an alignment device to define a second datum point, different to the first datum point.

[0048] According to a third aspect of the present invention, there is provided a jig comprising a main body having guide channel for guiding a cutting tool, in use, the guide channel comprising a straight section having a longitudinal axis,

the jig further comprising one or more positioning devices arranged to be at least partially accommodated within the guide channel, in use, wherein the one or more positioning devices define a plurality of abutting surfaces,

wherein, in use, each abutting surface lies on a plane intersecting the guide channel such that, when the abutting surface abuts an edge of a workpiece to be cut, said edge overlaps with the guide channel,

and wherein, in use, each abutting surface lies on a different respective plane that is parallel to the longitudinal axis of the straight section of the guide channel.

[0049] With the arrangement of the present invention, the positioning device or devices define a plurality of abutting surfaces, each lying in a different plane, to allow the jig to be spaced from an edge of a workpiece to be cut for a plurality of different cut depths by selecting an appropriate one of the abutting surfaces.

[0050] Accommodating the positioning device or devices at least partially within the guide channel provides convenient location of the positioning device and allows for an appropriate abutting surface to be defined, even for small inset sizes, where the abutting surface needs to be in relatively close proximity to the edge of the workpiece to be cut.

[0051] Each abutting surface is arranged to extend below a lower surface of the main body of the jig, such that when the jig is placed on a workpiece with its lower surface contacting the workpiece, the abutting surface of the positioning device can be butted against a side edge of the workpiece so as to position the jig relative to the side edge of the workpiece.

[0052] In this regard, the phrase "the one or more positioning devices define a plurality of abutting surfaces" is to be construed as meaning that a single positioning device may define two (or more) abutting surfaces, or a plurality of positioning devices may collectively define two (or more) abutting surfaces. That is, a first positioning device may define a first abutting surface and a second positioning device may define a second abutting surface, such that the first and second positioning devices collectively define the first and second abutting surfaces. It is preferred that a single positioning device selectively defines a plurality of abutting surfaces, since this allows for the provision of a single component in place of multiple components. Various arrangements allowing a single positioning device to selectively define a plurality of abutting surfaces are possible, as will be understood from the description below.

[0053] The jig may comprise a positioning device arranged to be accommodated within the guide channel in a plurality of orientations, and wherein in each orientation, the positioning device defines a different one of the plurality of abutting surfaces.

[0054] Alternatively or additionally, the positioning member may comprise a body portion that is attachable to the main body of the jig in a plurality of predefined

positions, wherein in a first predefined position, the body portion defines a first abutting surface of the positioning device, and in a second predefined position, the body portion defines a second abutting surface of the positioning device. Accordingly, by selectively attaching the body portion to the main body in one of the plurality of predefined positions, a single positioning device can selectively define any one of a plurality of abutting surfaces.

[0055] The main body of the jig may comprise an attachment aperture, and the body portion of the positioning device may comprise at least two attachment apertures, wherein the body portion is arranged to be attached to the main body of the jig by insertion of an attachment member through the attachment aperture of the main body and through one of the attachment apertures of the body portion, wherein insertion of the attachment member through a first attachment aperture of the body portion locates the body portion on the main body in the first predefined position, and insertion of the attachment member through a second attachment aperture of the body portion locates the body portion on the main body in the second predefined position. This provides a convenient arrangement for a single positioning device to selectively define a plurality of abutting surfaces.

[0056] The jig may comprise a positioning device that includes a body portion arranged to be accommodated within the guide channel, in use, the body portion being provided with one or more positioning apertures, wherein the positioning device further includes one or more positioning members arranged to be received within a respective one of the one or more positioning apertures to selectively define a respective abutting surface of the positioning device. Accordingly, the position device can selectively define any one of a plurality of abutting surfaces by simply inserting a positioning member into a positioning aperture of the body portion.

[0057] In one embodiment, the body portion may comprise a first positioning aperture and a second positioning aperture, each positioning aperture being arranged to receive a positioning member, wherein the first positioning aperture and the second positioning aperture are spaced in a direction perpendicular to the longitudinal axis of the straight section, such that a positioning member received in the first positioning aperture defines a first abutting surface and a positioning member received in the second positioning aperture defines a second abutting surface.

[0058] Alternatively or additionally, the positioning device may comprise a plurality of positioning members each arranged to be received in the same aperture of a common body portion, each positioning member being configured to define a different one of the plurality of abutting surfaces when attached to the body portion. For example, the positioning members may be shaped and dimensioned differently so as to define different ones of the plurality of abutting surfaces.

[0059] The positioning device may comprise at least one stepped portion for engaging with an edge of the guide channel. This allows for convenient location of the positioning device within the guide channel.

[0060] The at least one positioning device may be movable along the guide channel so as to adjust the position of the positioning device along the longitudinal axis of the straight section of the guide channel. Accordingly, the longitudinal position of the positioning member can be adjusted according to a particular workpiece and/or cutting operation.

[0061] The at least one positioning device may be slidably movable along the guide channel to allow the position of the positioning device along the longitudinal axis of the straight section to be continuously or infinitely adjustable.

[0062] The main body may comprise a track extending in a direction of the longitudinal axis of the straight section, the track being arranged to engage with a body portion of the positioning device so as to locate the body portion within the guide channel. This arrangement allows for a secure engagement of the body portion of the positioning device with the main body of the jig, whilst at the same time allowing for slidable movement of the positioning device along the longitudinal axis of the straight section of the guide channel.

[0063] The track may be provided on a guiding edge of the guide channel. The guiding edge of the guide channel is an edge which, in use, may be used to guide a cutting tool (such as a router) along the guide channel during a cutting operation.

[0064] The track may comprise a recess formed in the guiding edge of the guide channel, the recess being arranged to receive a part of the body portion of the positioning device. Alternatively, the track may comprise a protrusion formed on the guiding edge of the guide channel, the protrusion being arranged to be received within a recess formed in the body portion of the positioning device.

[0065] An opening may be formed at one end of the guide channel, the opening having a dimension in a direction perpendicular to the longitudinal axis of the straight section that is larger than a corresponding dimension of the body portion, so as to permit the body portion to be detached from the main body by sliding the body portion along the track and into the opening. This allows the positioning device to be easily removed from the guide channel to allow a cutting operation to be performed.

[0066] The positioning device may comprise a body portion arranged to engage with opposing edges of the guide channel, in particular opposing guiding edges, so as to locate the body portion within the guide channel between the opposing edges. The body portion is thereby braced against two opposing edges of the guide channel to provide for a secure engagement.

[0067] The positioning device may comprise a body portion having a recess arranged such that opposing surfaces e.g. an internal upper surface and an internal lower surface) of the recess engage respective upper

and lower surfaces of the main body of the jig, so as to locate the body portion on an edge portion of the guide channel.

[0068] The body portion may comprise an upper part defining an internal upper surface of the recess that is arranged to engage with the upper surface of the main body of the jig, in use, and a lower part defining an internal lower surface of the recess that is arranged to engage with the lower surface of the jig, in use, and wherein the first part is detachable from the second part so as to allow the body portion to be removed from the edge portion of the guide channel.

[0069] The edge portion of the guide channel may be a track that protrudes from a guiding edge of the guide channel. Alternatively, the edge portion of the guide channel may comprise the full thickness of the main body of the jig.

[0070] In some embodiments, the straight section of the guide channel is a first straight section, the guide channel further comprising a second straight section arranged at an angle relative to the first straight section. Accordingly, the guide channel is suitable for forming respective male and female parts of Mason's Mitre joint.

[0071] It will be appreciated that any of the features of the jig in accordance with the third aspect of the invention may be incorporated into the jig in accordance with the first aspect of the present invention. Likewise, any of the features of the jig in accordance with the first aspect of the invention may be incorporated into the jig in accordance with the third aspect of the present invention.

[0072] In accordance with a fourth aspect of the present invention, there is provided a method of cutting an edge of a workpiece, the method comprising:

- providing a jig in accordance with the third aspect of the present invention;
- placing the jig on a workpiece to be cut;
- arranging one of the one or more positioning devices so as to be at least partially accommodated within the guide channel and to define an abutting surface of the positioning device;
- engaging said abutting surface against an edge of the workpiece to be cut so as to position the jig relative to the workpiece to be cut;
- rearranging the positioning device so as to be clear of the edge of the workpiece to be cut; and
- forming a cut on the workpiece using a cutting tool guided by the guide channel of the jig.

[0073] The selected one of the abutting surfaces sets a position of the jig relative to the edge of the workpiece to be cut in a direction perpendicular to the longitudinal axis of the straight section. The positioning device may be used in conjunction with another identical positioning device or in conjunction with other positioning components of the jig so as to set the position of the jig relative to the edge of the workpiece along the entire length of the jig.

[0074] Rearranging the positioning device may comprise detaching or removing the positioning device from the main body of the jig, or may comprise moving the positioning device into a position in which it does not abut or interfere with the edge of the workpiece to be cut.

Non-limiting embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a plan view of a first side of a jig in accordance with the present invention, the jig comprising a female alignment device;

Figure 2 is a plan view of a second side of the jig of Figure 1 ;

Figures 3A to 3E are plan views of the jig of Figure 1, with the female alignment device attached in first, second and third positions;

Figure 4 is a plan view of the female alignment device;

Figure 5 is an exploded perspective view of the jig of Figure 1;

Figure 6 is a perspective view of a positioning device of the jig;

Figure 7 is a perspective view of a female workpiece to be cut;

Figure 8 is a perspective view of the jig of Figure 1 positioned on the female workpiece of Figure 7; and

Figures 9A to 19D are sectional views of various jigs in accordance with further embodiments of the present invention.

[0075] With reference to Figures 1 to 8, there is shown a jig 1 in accordance with the present invention. The jig 1 is suitable for cutting an edge on a workpiece, or more specifically for cutting cooperating male and female edges on two workpieces to be joined by a so-called 'Mason's Mitre' joint.

[0076] The jig 1 comprises a main body 2 having a guide channel 4 for guiding a cutting tool (specifically a router). The guide channel 4 comprises a first straight section 4a and a second straight section 4b arranged at an angle relative to the first straight section 4a. In the illustrated embodiment, the second straight section 4b is arranged at an angle of 135 degrees relative to the first straight section 4a, however it will be appreciated that alternative angles are possible.

[0077] The jig 1 further comprises an alignment device 6 that is suitable for aligning the jig 1 with the edge of a female workpiece to be cut, so as to form a female part of a Mason's Mitre joint. The alignment device 6 has an alignment member 8 in the form of a flat face of the alignment device 6, as shown most clearly in Figure 4. The alignment member 8 is arranged to overlap the guide channel 4 and defines a datum point 8a to allow the jig 1 to be aligned with reference point on a workpiece to be cut, as will be described in greater detail below. As can be seen from Figures 1 and 2, in particular, the term "overlap" means that the alignment member 8 is aligned with

the guide channel 4 when viewed in a direction perpendicular to a planar face of the main body 2 of the jig 1 (i.e. as shown in Figures 1 and 2). Accordingly, the datum point 8a also overlaps with the guide channel 4 so as to be aligned with the guide channel 4 when viewed in a direction perpendicular to a planar face of the main body 2 of the jig 1. This means that the datum point 8a is visible through the guide channel 4.

[0078] In the illustrated embodiment, the alignment member 8 is a flat face of the alignment device 6 that lies in a plane perpendicular to the longitudinal axis L of the first straight section. The datum point 8a is located at a terminal edge (an uppermost edge, as shown in the Figures) of the alignment member.

[0079] The alignment device 6 is removably attachable to the main body 2 of the jig 1 in a plurality of distinct, predefined positions, wherein in each predefined position of the alignment device 6, the alignment device 6 defines a different datum point 8a, 8b, 8c, each datum point 8a, 8b, 8c being located at a distinct, predefined position overlapping the guide channel 4. Accordingly, a single alignment device 6 defines a plurality of datum points 8a, 8b, 8c, depending on the position in which the alignment device 6 is attached to the main body 2 of the jig 1.

[0080] This is illustrated most clearly in Figures 3A to 3E. Figure 3A shows the alignment device 6 attached to the main body 2 in a first predefined position, Figure 3B shows the alignment device 6 attached to the main body 2 in a second predefined position, and Figure 3C shows the alignment device 6 attached to the main body 2 in a third predefined position. Figures 3D and 3E illustrate all of the first to third predefined positions of the alignment device 6, however it will be appreciated that this is shown for illustrative purposes only: in use, only one alignment device 6 will be attached to the main body 2 of the jig 1 in a selected predefined position at any given time.

[0081] In each of the first to third predefined positions of the alignment device 6, the position of the alignment member 8 relative to the guide channel 4, and thus the respective positions of the datum points 8a, 8b, 8c, are associated with a desired inset size of a female cut that is to be formed in a female workpiece. In the illustrated embodiment the first predefined position of the alignment device 6 shown in Figure 3A is intended for a 3mm inset, the second predefined position of the alignment device 6 shown in Figure 3B is intended for a 10mm inset, and the third predefined position of the alignment device 6 shown in Figure 3C is intended for a 35mm inset.

[0082] In order to appropriately position the jig 1 for a desired inset size, the datum point 8a, 8b, 8c must be appropriately positioned in two dimensions. That is, the datum point 8a, 8b, 8c must be positioned correctly in a direction parallel to a longitudinal axis L of the first straight section 4a of the guide channel 4 (a horizontal direction as shown in the Figures) and in a direction perpendicular to the longitudinal axis L of the first straight section 4a of the guide channel 4 (a vertical direction as shown in the Figures). The longitudinal axis L is not particularly limited and may be any axis extending longitudinally along the first straight section 4a of the guide channel 4 and may be, for example, defined by a guiding edge of the guide channel 4 or a central axis of the guide channel 4.

[0083] With reference to Figure 3A, in the first predefined position of the alignment device 6, the alignment member 8 (and thus first datum point 8a) is located on a first plane A1 that is perpendicular to the longitudinal axis L of the first straight section 4a of the guide channel 4 (the plane A1 being referred to hereafter as the first perpendicular alignment plane A1). With reference to Figure 3B, in the second predefined position of the alignment device 6, the alignment member 8 (and thus second datum point 8b) is located on a second plane A2 that is perpendicular to the longitudinal axis L of the first straight section 4a of the guide channel 4 (the plane A2 being referred to hereafter as the second perpendicular alignment plane A2). With reference to Figure 3C, in a third predefined position of the alignment device 6, the alignment member 8 (and thus third datum point 8c) is located on a third axis A3 that is perpendicular to the longitudinal axis L of the first straight section 4a of the guide channel 4 (the plane A3 being referred to hereafter as the third perpendicular alignment plane A3).

[0084] Accordingly, the first and second and third perpendicular alignment planes A1, A2, A3 are each perpendicular to the longitudinal axis L of the first straight section 4a of the guide channel 4 and are parallel to each other.

[0085] Similarly, with reference to Figure 3A, in the first predefined position of the alignment device 6, the alignment member 8 (and thus first datum point 8a) is located on a first plane B1 that is parallel to the longitudinal axis L of the guide channel 4 (the plane B1 referred to hereafter as the first parallel alignment plane B1). With reference to Figure 3B, in the second predefined position of the alignment device 6, the alignment member 8 (and thus the second datum point 8b) is located on a second plane B2 that is parallel to the longitudinal axis L of the first straight section 4a of the guide channel 4 (plane B2 being referred to hereafter as the second parallel alignment plane B2). With reference to Figure 3C, in a third predefined position of the alignment device 6, the alignment member 8 (and thus the third datum point 8c) is located on a third plane B3 that is parallel to the longitudinal axis L of the first straight section 4a of the guide channel 4 (the third plane being referred to hereafter as the third parallel alignment plane B3).

[0086] Accordingly, the first and second and third parallel alignment planes B1, B2, B3 are each parallel to the longitudinal axis L of the guide channel 4 and parallel to each other.

[0087] A distance between the first parallel alignment plane B1 and the second parallel alignment plane B2 is 7mm, which is equal to the difference between the inset sizes associated with datum points 8a and 8b (i.e. 3mm and 10mm). A distance between the second parallel

alignment plane B2 and the third parallel alignment plane B3 is 25mm, which is equal to the difference between the inset sizes associated with datum points 8b and 8c (i.e. 10mm and 35mm). A distance between the first parallel alignment plane B1 and the third parallel alignment plane B3 is 32mm, which is equal to the difference between the the inset sizes associated with datum points 8a and 8c (i.e. 3mm and 35mm). Accordingly, the distances between the respective parallel alignment planes in a direction perpendicular to the longitudinal axis are equal to the respective differences between the inset sizes associated with each datum point 8a, 8b, 8c. Accordingly, the jig 1 can be positioned correctly in a direction perpendicular to the longitudinal axis L of the guide channel 4 according to the desired inset size by aligning the jig 1 using an appropriate one of the datum points 8a, 8b, 8c.

[0088] In contrast, the distance between each pair of the first to third perpendicular alignment planes A1, A2, A3 in a direction parallel to the longitudinal axis L is dependent not only on the difference in the desired inset size, but also on the angle α between the first straight section 4a and the second straight section 4b of the guide channel 4, or more specifically the angle between a guiding edge 5a of the second straight section 4b and the longitudinal axis L of the first straight section 4a (for example, a longitudinal axis defined by a guiding edge 5b of the first straight section 4a that adjoins the guiding edge of the second straight section 4b). The angle α is shown most clearly in Figures 3A to 3C.

[0089] In the illustrated embodiment, the guiding edge 5b of the second straight section 4b lies at an angle α of 135 degrees relative to the longitudinal axis L of the first straight section 4a. Accordingly, the necessary offset between the datum points 8a, 8b, 8c in a direction parallel to the longitudinal axis L is equal to the offset of the datum points 8a, 8b, 8c in a direction perpendicular to the longitudinal axis L. Thus, for a 135 degree angle, the distance between the first perpendicular alignment plane A1 and the second perpendicular alignment plane A2 is 7mm, a distance between the second perpendicular alignment plane A2 and the third perpendicular alignment plane A3 is 25mm, and a distance between the first perpendicular alignment plane A1 and the third perpendicular alignment plane A3 is 32mm. Accordingly, by positioning the alignment member 8 (and thus the datum point 8a, 8b, 8c) on an appropriate one of the first to third perpendicular alignment planes the jig 1 can be aligned correctly in a direction parallel to the longitudinal axis L of the guide channel 4 for the desired inset size.

[0090] However, it will be appreciated that the necessary offset between the datum points 8a, 8b, 8c in a direction parallel to the longitudinal axis L may not necessarily be equal to the offset of the datum points 8a, 8b, 8c in a direction perpendicular to the longitudinal axis L, where the angle α between the guiding edge 5a of the second straight section 4b and the longitudinal axis L of the first straight section 4a is a different angle (i.e. not 135 degrees).

[0091] For any given angle α: where a distance between the first datum point 8a and the second datum point 8b in a direction parallel to the longitudinal axis L of the first straight section 4a is defined as X; and where a distance between the first datum point 8a and the second datum point 8b in a direction perpendicular to the longitudinal axis of the first straight section is defined as Y, the relationship between the necessary distances can be described by the following equation (1):

$$\tan(180 - \alpha) = Y / X \qquad (1).$$

[0092] With the above arrangement, in each predetermined position of the alignment device 6, the alignment member 8 lies on a single, common plane C (i.e. the same plane) that is parallel to and spaced from the guiding edge 5b of the second straight section 4b of the guide channel 4. This can be seen most clearly in Figure 3D. By arranging the jig 1 in this way, it can be ensured that the alignment member 8 (and thus datum point 8a, 8b, 8c) of the alignment device 6 is in the correct position according to the desired inset size.

[0093] Figure 4 is an enlarged view showing the alignment device 6 in more detail. The alignment device 6 comprises a secondary reference edge 10 which, in use, abuts an edge of a workpiece to be cut, as will be described in greater below. The alignment member 8 comprises a terminal point of the secondary reference edge 10, which is a linear (straight) edge of the alignment device 6. Accordingly, each datum point 8a, 8b, 8c is defined by a terminal point of the secondary reference edge 10.

[0094] Referring again to Figures 1 and 2, in particular, it can be seen the secondary reference edge 10 of the female alignment device 6 lies on the same parallel alignment plane as the datum point 8a (i.e. on the same plane that is parallel to a longitudinal axis L of the guide channel 4). Therefore, the secondary reference edge 10 of the alignment device 6 provides a surface that can be abutted against an edge of a workpiece to be cut, so as to ensure that the longitudinal axis L of the guide channel 4 is aligned parallel to the edge of the workpiece to be cut. This will be further understood from the following description.

[0095] Referring again to Figure 4, the alignment device 6 comprises an attachment system comprising a first pair of apertures 12A, a second pair of apertures 12B, and a third pair of apertures 12C. Each of the pairs of apertures 12A, 12B, 12C is associated with a desired inset size and therefore is also associated with one of the first to third predefined positions of the female alignment device 6 when attached to the main body 2 of the jig 1.

[0096] Referring now to Figure 5, the main body 2 of the jig 1 comprises corresponding pairs of apertures, namely a first pair of apertures 14A, a second pair of apertures 14B, and a third pair apertures 14C. The alignment device 6 can be attached to the main body 2 of the jig

1 by inserting a pair of pins 16 so as to extend through one of the pairs of apertures 14A, 14B, 14C provided in the main body 2 of the jig 1, and a corresponding pair of apertures 12A, 12B, 12C provided on the alignment device 6. The provision of a pair of (i.e. at least two) pins 16 for each attachment position prevents rotational movement of the alignment device 6 when attached to the main body 2 of the jig 1.

[0097] As shown in Figure 4, each of the first to third pairs of apertures 12A, 12B, 12C of the alignment device 6 has a predefined spacing (that is, a distance between each aperture within the pair of apertures). In Figure 4, the predefined spacing is indicated from a central position of each aperture, however it will be appreciated the spacing may be defined by any appropriate reference point of the apertures, such as an inner edge of the aperture.

[0098] Each of the pairs of apertures 14A, 14B, 14C provided on the main body 2 of the jig 1 has a spacing that is equal to the spacing of the corresponding pairs of apertures 12A, 12B, 12C on the alignment device 6.

[0099] The respective spacing of each pair of apertures 12A, 12B, 12C provided on the alignment device 6 is not equal to the spacing of the other pairs of apertures. This can be understood from Figure 4, which shows a first spacing X between the apertures of the first pair of apertures 12A, a spacing Y between the apertures of the second pair of apertures 12B, and a spacing Z between the pair of apertures of the third pair of apertures 12C. The first spacing X, the second spacing Y, and the third spacing Z are unequal. That is to say, each of the respective pairs of apertures has a different spacing.

[0100] This arrangement ensures that the alignment device 6 cannot be attached to the main body 2 of the jig 1 in an incorrect position for the desired inset size. By way of example, if a 3mm inset is desired, the pins are first inserted through the first pair of apertures 14A in the main body 2 of the jig 1. The alignment device 6 is then offered up to the main body 2 of the jig 1 so as to insert the pins through the corresponding first pair of apertures 12A provided in the alignment device 6. Since the spacing of the first pair of apertures 14A on the main body 2 is equal to the spacing of the first pair of apertures 12A on the alignment device 6, and this spacing is not equal to the spacing of either the second or third pairs of apertures, the pins can only be inserted through the first pair of apertures 12A on the alignment device 6. This ensures that the alignment device 6 is attached in the correct position on the main body 2 of the device, such that the alignment member 8 of the alignment device 6 overlaps the guide channel 4 in the correct position, so as to provide the first datum point 8a in the correct position for a 3mm inset.

[0101] In this manner, the first pair of apertures 12A of the alignment device 6 in combination with the first pair of apertures 14A of the main body 2 represent a first arrangement for attaching the alignment device 6 to the main body 2 in a first position. Since the arrangement of the apertures does not allow the pins to be inserted into either the second or third pair of apertures of the alignment device 6, the arrangement is unique to the first position, thus ensuring that the alignment member 8 is correctly positioned in two-dimensional space to define the desired datum point 8a.

[0102] In the same way, the second pair of apertures 12B of the alignment device 6 in combination with the second pair of apertures 14B of the main body 2 represent a second arrangement for attaching the alignment device 6 to the main body 2 in a second position, the second arrangement being unique to the second position to define the second datum point 8b. The third pair of apertures 12C of the alignment device 6 in combination with the third pair of apertures 14C of the main body 2 represent a third arrangement for attaching the alignment device 6 to the main body 2 in a third position, the third arrangement being unique to the third position to define the third datum point.

[0103] Referring now to Figures 1, 2 and 6, in particular, the jig 1 further comprises a positioning device 18 that is removably attachable to the main body 2 of the jig 1. Specifically, the positioning device 18 is removably accommodated within the guide channel 4, even more specifically within the first straight section 4a of the guide channel 4. The positioning device 18 comprises a body portion 20 that is arranged to be received within the guide channel 4. The body portion 20 has two stepped portions 20A, 20B on opposing edges of the body portion 20, each stepped portion 20A, 20B being arranged to engage with an edge of the guide channel 4 so as to locate the body portion 20 on the guide channel 4.

[0104] The body portion 20 has a pair of apertures 22A, 22B, each being suitable to receive a common pin 24 (positioning member). In use, the pin when inserted into one of the apertures 22A, 22B extends through the guide channel 4 so as to extend beneath a bottom surface of the main body 2 of the jig 1. In use, the pin 24 is arranged to abut an edge of the workpiece to be cut, as will be described in greater detail below, and thus the surface of the pin 24 that abuts an edge of the workpiece represents an abutting surface of the positioning device 18, the abutting surface being located on a positioning plane that is parallel to the longitudinal axis L of the first straight section 4a of the guide channel 4.

[0105] When inserted in the first aperture 22A, the abutting surface of the pin 24 (positioning member) is located on a first parallel positioning plane, which coincides with the first parallel alignment plane on which the first datum point 8a defined by the alignment device 6 is located when the alignment device is in the first position. Accordingly, the first datum point 8a is located on the first parallel positioning plane, or put another way, the first parallel alignment plane and the first parallel positioning plane are the same plane. Therefore, the first datum point 8a and the first abutting surface lie on the same plane that is parallel to the longitudinal axis of the first straight section 4a of the guide channel 4.

[0106] In the same way, when a pin 24 is received in the second aperture 22B of the positioning device 18, an abutting surface of the pin 24 (positioning member) is located on a second parallel positioning plane, which coincides with the second parallel alignment plane on which the second datum point 8b defined by the alignment device 6 is located when the alignment device 6 is in the second position. Accordingly, the second datum point 8b is located on the second parallel positioning plane, or put another way, the second parallel alignment plane and the second parallel positioning plane are the same plane. Therefore, the second datum point 8b and the second abutting surface lie on the same plane that is parallel to the longitudinal axis of the first straight section 4a of the guide channel 4.

[0107] Accordingly, the positioning device 18 defines a first abutting surface and a second abutting surface, depending on which aperture the pin is inserted into. A distance between the first parallel positioning plane and the second parallel positioning plane is equal to a distance between the first perpendicular alignment plane and the second perpendicular alignment plane of the alignment device 6. That is, a distance between the first parallel positioning plane and the second parallel positioning plane is equal to a distance between the first datum point 8a and the second datum point 8b in a direction perpendicular to the longitudinal axis L. This arrangement allows the positioning device 18 to be used to appropriately position the jig 1 in two dimensional space relative to an edge of a workpiece to be cut, according to the desired inset size.

[0108] It will be appreciated that in alternative embodiments the jig 1 may comprise a plurality of positioning devices, each defining a separate positioning member. For example, a first positioning device may comprise a first aperture appropriately positioned such that when the device is accommodated within the guide channel 4, an abutting surface of a positioning member (pin) inserted within the first aperture lies on the first parallel positioning plane. A second positioning device may comprise a second aperture appropriately positioned such that when a positioning member (pin) is inserted into the second aperture, an abutting surface of the positioning member (pin) lies on the second parallel positioning plane. Thus, in such arrangements, the two positioning devices operate in the same manner as the single positioning device 18 of the illustrated embodiments to define first and second abutting surfaces.

[0109] Further non-limiting embodiments of the positioning device are described below.

[0110] The illustrated embodiment is advantageous since it provides a single positioning device 18 that can be reconfigured to provide an abutting surface in an appropriate location according to the desired inset size. The positioning member can also be moved to any desired location along the guide channel 4 by sliding the body portion 20 within the guide channel 4.

[0111] As can be seen in Figure 5, the jig 1 comprises one positioning device 18, however in alternative embodiments the jig may comprise more than one positioning device to provide additional stability.

[0112] An operation of the jig 1 for forming a female cut in an edge of a female workpiece 26 will now be described with reference to Figures 5, 7 and 8.

[0113] Firstly, with reference to Figure 5, the attachment device 6 is attached to the main body 2 of the jig 1 by insertion of pins 16 through corresponding pairs of apertures in the main body 2 of the jig 1 and in the alignment device 6 as described above. The two positioning devices are then assembled by inserting a pin in a first aperture of each positioning device 18, and subsequently inserting the body portion 20 of each positioning device 18 into the first straight section 4a of the guide channel 4. As can be seen from Figure 1, the datum point 8a of the alignment device 6 and the abutting surfaces of the positioning device 18 all lie on the same plane parallel to the longitudinal axis L of the guide channel 4. The illustrated embodiment shows the device set up to form a 3mm inset, however it will be appreciated that the jig 1 can be set up in the same manner for different sized insets by insertion of pins in alternative apertures so as to define a different datum point, as described above.

[0114] As shown in Figure 7, a reference mark 28 is drawn on a presentation edge 30 (commonly referred to as a postform edge, for example where the workpiece is laminated chipboard) of the female workpiece 26. The reference mark 28 corresponds to a width of a male workpiece with which the female workpiece 26 is to be joined.

[0115] As shown in Figure 8, the jig 1 is placed on the female workpiece 26 and the datum point 8a is aligned with the reference mark 28 drawn on the edge 30 of the female workpiece 26. At the same time, the secondary reference edge 10 of the alignment device 6 is abutted against the edge 30 to be cut. Since the secondary reference edge 10 of the female workpiece 26 is linear and lies on the same plane as the first datum point 8a, the jig 1 is brought into an appropriate alignment with the female workpiece 26, such that the guiding edge 5a of the first straight section 5a of the guide channel 4 is parallel to the edge 30 of the female workpiece 26 to be cut.

[0116] In addition, the abutting surfaces of each positioning device 18 are butted against the edge 30 of the workpiece to be cut, further ensuring a parallel alignment of the guiding edge 5a of the first straight section 5a of the guide channel 4 with the edge of the female workpiece 26 to be cut.

[0117] Once correctly positioned and oriented, the jig 1 can be clamped in place and the female alignment device 6 and positioning devices 18 can be removed so as to allow a routing operation to be performed. In such an operation, a router is received within the guide channel 4 via a guide bush and is passed along the guide channel 4 so as to cut an female recess in the edge of the female workpiece 26. A depth of the recess (the inset) is 3mm in the illustrated embodiment.

[0118] With reference to Figures 9 to 19, there is shown various embodiments of the positioning device in accordance with a second aspect of the present invention. Corresponding features are indicated with corresponding numerals. In each embodiment, the positioning device is at least partially accommodated within the guide channel, meaning that at least a part of the positioning device is located between two opposing guiding edges of the guide channel. Accommodating the positioning device within the guide channel provides convenient location of the positioning device and allows for an appropriate abutting surface to be defined, even for small inset sizes, where the abutting surface needs to be in relatively close proximity to the edge of the workpiece to be cut.

[0119] Each positioning device defines at least one abutting surface that lies on a plane such that, when the abutting surface abuts an edge of a workpiece to be cut, said edge overlaps with the guide channel.

[0120] In each embodiment, the jig comprises one or more positioning devices defining a plurality of abutting surfaces. For example, the jig may comprise one positioning device arranged to define a plurality of abutting surfaces, for example by reconfiguring or reorienting the positioning device as described for some embodiments below.

[0121] Alternatively, the jig may comprise a plurality of positioning devices, wherein each device defines a single abutting surface. The plurality of positioning devices therefore collectively define the plurality of abutting surfaces, each abutting surface being provided by a different one of the positioning devices.

[0122] Referring now to Figures 9A to 9D, there is shown a jig 101 comprising a main body 102 having a guide channel 104 for guiding a cutting tool, in use. The guide channel 104 has at least one straight section 104a, however it will be appreciated that in embodiments of the invention the guide channel 104 may also have a second straight section substantially as described above with reference to the first aspect of the invention.

[0123] The jig 101 comprises a positioning device 118 that selectively defines a plurality of abutting surfaces 134a, 134b. The positioning device 118 comprises a body portion 120 that is attachable to the main body 102 in two predefined positions. The body portion 120 comprises a first set of attachment apertures 123a and a second set of attachment apertures 123b arranged to receive attachment members in the form of pins 116. A corresponding pair of attachment apertures 132 is provided in the main body 102, such that insertion of the pins 116 through the attachment apertures 132 provided in the main body and through one of the sets of attachment apertures 123a, 123b in the body portion 120 of the positioning device 118 selectively attaches the body portion 120 in a first position (shown in Figures 9A and 9B) or in a second position (shown in Figures 9C and 9D).

[0124] In the first position (Figure 9B), a first abutting surface 134a of the body portion 120 lies on a first parallel positioning plane P1 that is parallel to a longitudinal axis L of the straight section 104a. In the second position (Figure 9D), a second abutting surface 134b of the body portion 120 lies on a second parallel positioning plane P2 that is parallel to the longitudinal axis L of the straight section 104a. Accordingly, the positioning device 118 defines two abutting surfaces that lie on different respective planes parallel to the longitudinal axis L of the straight section 104a of the guide channel 104. Here, it will be appreciated that the same distal surface of the body portion 120 defines both the first abutting surface 134a and the second abutting surface 134b, depending on its position with the guide channel 104.

[0125] Referring now to Figures 10A to 10D, there is shown a jig 201 substantially as described above. The jig 201 comprises a first positioning device 218a and a second positioning device 218b, each comprising a body portion 220a, 220b that is dimensioned to define one of a first abutting surface 234a (Figures 10A and 10B) and a second abutting surface 234b (Figures 10C and 10D).

[0126] Each positioning device 218a, 218b comprises an attachment member 216a, 216b that is arranged to be received within an attachment aperture 222 provided in the main body 202 of the jig 201, so as to attach the positioning device 218a, 218b on the main body 202 of the jig 201. At the same time, an inner edge 236 of the body portion 220a, 220b engages with an edge of the guide channel 204 to secure the positioning device 218a, 218b in place.

[0127] With this arrangement, the jig 201 comprises a plurality of positioning devices 218a, 218b that collectively define a plurality of abutting surfaces 234a, 234b. The first positioning device 218a (Figure 10B) defines a first abutting surface 234a that lies on a first parallel positioning plane P1 that is parallel to a longitudinal axis L of a straight section 204a of the guide channel 204. The second positioning device (Figure 10D) defines a second abutting surface 234b that lies on a second parallel positioning plane P2 that is parallel to the longitudinal axis L of the straight section 204a.

[0128] Referring now to Figures 11A and 11B, there is shown a jig 301 substantially as described above. The jig 301 comprises a positioning device 318 comprising a body portion 320 having two opposing recess 338a, 338b. Each recess 338a, 338b is dimensioned such that opposing upper and lower internal surfaces 340, 342 of the recess 338a, 338b engage with respective upper and lower surfaces 344, 346 of a main body 302 of the jig 301, so as to locate the body portion 320 on the jig in one of two orientations. With this means of attachment, the positioning device is slidably movable along the length of a straight section 304a of a guide channel 304 of the jig, without being limited to the position of attachment features such as attachment apertures. Accordingly, the position of the positioning device 318 can be easily adjusted according to the particular workpiece to be cut and routing operation.

[0129] The body portion 320 defines two abutting surfaces 334a, 334b, depending on which recess 338a,

338b is engaged with the main body 302 of the jig 301. In a first orientation, as shown in Figure 11A, recess 338a is engaged with the main body 302 to locate the positioning device 318 within the guide channel 304. In this orientation, the body portion 320 defines a first abutting surface 334a that lies on a first parallel positioning plane that is parallel to a longitudinal axis L of a straight section 304a of the guide channel 304. In a second orientation, as shown in Figure 11B, recess 338b is engaged with the main body 302 to locate the positioning device 318 within the guide channel 304. In this orientation, the body portion 320 defines a second abutting surface 334b that lies on a second parallel positioning plane that is parallel to a longitudinal axis L of a straight section 304a of the guide channel 304.

[0130] Accordingly, by attaching the positioning device 318 in one of two possible orientations, the positioning device 318 can selectively define both first and second abutting surfaces 334a, 334b.

[0131] Referring now to Figures 12A and 12B, there is shown a jig 401 substantially as described above. The jig 401 comprises a first positioning device 418a (Figure 12A) and a second positioning device 418b (Figure 12B). A body portion 420a, 420b has an engagement part 448 that engages with opposing edges 405 of a guide channel 404 so as to locate the body portion 420a, 420b within the guide channel 404 between the opposing edges.

[0132] Each body portion 420a, 420b further comprises a downwardly protruding positioning member 450a, 450b. The positioning member 450a of the first positioning device 418a is dimensioned to define a first abutting surface 434a that lies on a first parallel positioning plane P1 that is parallel to a longitudinal axis L of a straight section 404a of the guide channel 404. The positioning member 450b of the second positioning device 418b is dimensioned to define a second abutting surface 434b that lies on a second parallel positioning plane P2 that is parallel to a longitudinal axis L of a straight section 404a of the guide channel 404.

[0133] As for the embodiment of Figures 10A and 10D, with the arrangement shown in Figures 12A and 12B, the jig 401 comprises a plurality of positioning devices 418a, 418b that collectively define a plurality of (i.e. two) abutting surfaces 434a, 434b. However, it will be appreciated that in a similar arrangement, the body portion could be accommodated within the guide channel in the same manner by means of an engagement part that engages with opposing edges of a guide channel, with a downwardly positioning member that is configured to provide a first abutting surface when the positioning device is accommodated in the guide channel in a first orientation, and a second abutting surface when the positioning device is accommodated in the guide channel in a second orientation.

[0134] Referring now to Figures 13A and 13D, there is shown a jig 501 substantially as described above. The jig 501 comprises a positioning device 518 having a body portion 520. The body portion 520 has an engagement part 548 that is arranged to be received within a pair of tracks 552 provided in opposing edges 505 of the guide channel 504. Each track 552 comprises a recess formed in an edge 505 of the guide channel 504 and extends in a direction of a longitudinal axis of a straight section 504a of the guide channel 504.

[0135] The body portion 520 comprises a downwardly protruding positioning member 550 that defines a first abutting surface 534a when the positioning device 518 is accommodated in a first orientation (Figures 13A and 13B) and a second abutting surface 534b when the positioning device 518 is accommodated in a second orientation (Figures 13C and 13D).

[0136] The guide channel 504 comprises an opening 554 at one end of the guide channel 504 (in this case, at a terminal end of the straight section 504a of the guide channel 504). The tracks 552 connect to the opening 554. The opening 554 has a dimension in a direction perpendicular to the longitudinal axis L of the straight section 504a that is larger than a corresponding dimension of the body portion 520 that is received within the tracks 552. Accordingly, the body portion 520 can slide along the tracks 552 into the opening 554 to allow the positioning device 518 to be removed from the main body 502 of the jig 501. Alternatively, the straight section 504a of the guide channel 504 could be made sufficiently long so that the body portion 520 can be moved to an end part of the guide channel 504 to be positioned clear of an edge of a workpiece being cut, without needing to be removed. The opening 554 could therefore be omitted.

[0137] Referring now to Figures 14A to 14D, there is shown jig 601 similar to the jig 501 of Figures 13A to 13D. Corresponding features are indicated with corresponding numerals.

[0138] The jig 601 differs in that the body portion 620 comprises a first positioning member 650a extending from the engagement part 648 in a first direction and a second positioning member 650b extending from the engagement part 648 in a second direction opposing the first direction. The first positioning member 650a defines a first abutting surface 634a and the second positioning member 650b defines a second abutting surface 634b. Thus, in a first orientation (Figures 14A and 14B), the first positioning member 650a extends below the main body 602 of the jig 601, such that the first abutting surface 634a can be used to abut an edge of a workpiece to be cut. In a second orientation (Figures 14C and 14D), the second positioning member 650b extends below the main body 602 of the jig 601, such that the second abutting surface 634b can be used to abut an edge of a workpiece to be cut.

[0139] It will be appreciated that the embodiments of Figures 13A to 13D and Figures 14A to 14D could be combined to provide a positioning member defining four abutting surfaces, each lying in a different plane parallel to the longitudinal axis of the straight section.

[0140] Referring now to Figures 15A and 15B, there is

shown a jig 701 comprising a positioning device 718 that is similar to the positioning device 18 described above with reference to Figures 1 to 5. The positioning device 718 comprises a body portion 720 having a pair of opposing stepped portions 720a, 720b that engage with opposing edges of the straight section 704a of the guide channel 704. The body portion 720 comprises a pair of positioning apertures 722 each arranged to receive a positioning member 724 in the form of a pin. In a first positioning aperture 722a, the positioning member 724 defines a first abutting surface 734a of the positioning device 718 (Figure 15B). Although not shown, it will be understood that when the positioning member 724 is received in the second positioning aperture 722b, the positioning device 718 defines a second abutting surface that lies in a different plane parallel to the longitudinal axis L of the straight section 704a of the guide channel 704. The positioning device 718 therefore defines a plurality of abutting surfaces, depending on its configuration.

[0141] The body portion 720 comprises an upper part 721a and a lower part 721b that are detachable from each other. The upper part 721a defines an upper internal surface 740 of a recess 738 of the body portion 720 and the lower part 721b defines a lower internal surface 742 of the recess 738. The upper internal surface 740 engages with an upper surface 744 of the jig 701 and the lower internal surface 742 engages with a lower surface 746 of the jig 701. An edge portion of the jig 701 is therefore received within the recess 738 for secure attachment of the positioning device 718 to the main body 702 of the jig 701.

[0142] The upper and lower parts 721a, 721b each comprise an attachment aperture 723 arranged to receive an attachment member 716 in the form of pin. The main body 702 comprises a corresponding attachment aperture 732, such that insertion of the attachment member 724 through the apertures 723, 732 engages the upper and lower parts 721a, 721b of the body portion 720 with the main body 702 of the jig 701.

[0143] Figures 16A and 16B show an embodiment of a jig 801 in which the positioning device 818 is received within tracks 852 formed in opposing edges 805 of the guide channel 804, in the same manner as described above in relation to Figures 13A to 13D. The body portion 820 of the positioning device 818 comprises a pair of positioning apertures 822, each arranged to receive a positioning member 824 in the form of a pin, so as to define a first abutting surface 834a (Figure 16A) lying on a first parallel positioning plane P1 and a second abutting surface 834b (Figure 16B) lying on a second parallel positioning plane P2 in the manner described above.

[0144] In a similar embodiment, the guide channel may comprise a single track formed in one edge of the guide channel, arranged to engage with one side of an engagement part of the body portion. An opposing side of the body portion may comprise a stepped portion that is arranged to engage the opposing edge of the guide channel, for example by engaging with an upper surface of the jig on the opposing side of the guide channel to the track.

[0145] Figures 17A and 17B show a further embodiment of a jig 901, which also comprises a pair of positioning apertures 922, each arranged to receive a positioning member 924 in the form of a pin, so as to define a first abutting surface 934a (Figure 17A) and a second abutting surface 934b (Figure 17B) in the manner described above.

[0146] In the embodiment of Figures 17A and 17B, the main body 902 of the jig 901 comprises a pair of tracks 952 formed in an upper surface 944 of the jig 901. An engagement part 948 of the body portion 920 of the positioning device 918 comprises a pair of legs 956 arranged to be received with the tracks 952 to locate the positioning device 918 within the guide channel 904. The positioning device 918 is slidably moveable along the length of the guide channel 904 to adjust its position as desired.

[0147] Figures 18A to 18C show a further embodiment of a jig 1001. The positioning device 1018 comprises a body portion 1020 having an upper part 1021a and a lower part 1021b, which join together to form the body portion 1020. The upper part 1021a defines two upper internal surfaces 1040 of a pair of recess 1038 provided on opposing sides of the body portion 1020, and the lower part 1021b defines lower internal surfaces 1042 of the recesses 1038. The main body of the jig 1001 comprises a pair of tracks 1052 on opposing edges of the guide channel 1004 arranged to be received within recesses 1038 to locate the positioning device 1018 within the guide channel 1004, and to allow the positioning device 1018 to slide along the guide channel 1004 to a desired position.

[0148] In this embodiment, the tracks 1052 define edge portions of the guide channel 1004. An upper surface 1044 of each track 1052 is an upper surface of an edge portion of the jig 1001 and a lower surface 1046 of each track 1052 is a lower surface of an edge portion of the jig 1001.

[0149] Providing the body portion 1020 with upper and lower parts 1021a, 1021b allows the body portion 1020 to be disassembled for removal of the positioning device 1018 from the main body 1002, and to be assembled for attachment of the positioning device 1018 to the main body 1002. However, in a similar embodiment, the body portion 1020 may be provided as a unitary component and the jig may comprise an opening formed at one end of the guide channel to allow the positioning device to be removed, as described above. Alternatively, the guide channel may be of sufficient length to allow the positioning device to be moved to a position in which it does not interfere with a cutting operation, without needing to be removed from the main body of the jig.

[0150] The body portion 1020 comprises a pair of positioning apertures 1022 arranged to receive a positioning member 1024 in the form of a pin. When received in a first of the positioning apertures 1022, the positioning

member 1024 defines a first abutting surface 1034a lying on a first parallel positioning plane P1 (Figure 18B), and when received in a second of the positioning apertures 1022, the positioning member 1024 defines a second abutting surface 1034b lying on a second parallel positioning plane P2 (Figure 18C)

[0151] Figures 19A to 19D show a further embodiment of a jig 1101 having a positioning device 1118 comprising a body portion 1020 having a pair of recesses 1158 formed in opposing upper and lower surfaces of the body portion 1120. Each recess 1158 is shaped to accommodate a suitable portion of the main body 1102 of the jig 1101 so as to attach the positioning device 1118 to the main body 1102. In particular, in the illustrated embodiment, each recess 1158 accommodates a section of the jig extending between an edge 1105 of the guide channel 1104 and a slot 1160 formed in the main body 1102, which is a slot used for a different cut that may be performed using the same jig 1101. In the illustrated example, the slot 1160 is a slot that is used to form a recess in the workpiece for receiving a connecting bolt when joining two mating workpieces together. However, other jigs may comprise other slots that, in combination with the guide channel 1104, provide a suitable portion of section of the jig 1101 that can be accommodated within the recesses 1158 formed in the upper and lower surfaces of the body portion 1120 of the positioning device 1118.

[0152] The body portion 1120 comprises two head portions 1162 arranged on either side of the recesses 1158. A dimension of each head portion 1162 in a direction perpendicular to the longitudinal axis L of the straight section 1104a of the guide channel 1104 is set so as to define two different abutting surfaces 1134a, 1134b, depending on the orientation in which the positioning device 1118 is attached (i.e. depending on which recess 1158 is used to attach the positioning device 1118 to the main body 1002.

[0153] In a first orientation, as shown in Figures 19A and 19B, a first head portion 1162a defines a first abutting surface 1134a. In a second orientation, as shown in Figures 19C and 19D, a second head portion 1162b defines a second abutting surface 1134b.

[0154] The invention has been described above with reference to specific embodiments, given by way of example only. It will be appreciated that different arrangements of the system are possible, which fall within the scope of the appended claims.

Claims

1. A jig for cutting an edge on a workpiece, the jig comprising a main body having guide channel for guiding a cutting tool, in use, the guide channel comprising a straight section having a longitudinal axis,

   the jig further comprising one or more positioning devices arranged to be at least partially accommodated within the guide channel, in use, wherein the one or more positioning devices define a plurality of abutting surfaces,

   wherein, in use, each abutting surface lies on a plane intersecting the guide channel such that, when the abutting surface abuts an edge of a workpiece to be cut, said edge overlaps with the guide channel,

   and wherein, in use, each abutting surface lies on a different respective plane that is parallel to the longitudinal axis of the straight section of the guide channel.

2. A jig as claimed in claim 1, wherein a single positioning device selectively defines a plurality of abutting surfaces.

3. A jig as claimed in claim 2, comprising a positioning device arranged to be accommodated within the guide channel in a plurality of orientations, and wherein in each orientation, the positioning device defines a different one of the plurality of abutting surfaces.

4. A jig as claimed in claim 2, wherein the positioning member comprises a body portion that is attachable to the main body of the jig in a plurality of predefined positions, wherein in a first predefined position, the body portion defines a first abutting surface of the positioning device, and in a second predefined position, the body portion defines a second abutting surface of the positioning device.

5. A jig as claimed in any preceding claim, comprising a positioning device that includes a body portion arranged to be accommodated within the guide channel, in use, the body portion being provided with one or more positioning apertures, wherein the positioning device further includes one or more positioning members arranged to be received within a respective one of the one or more positioning apertures to selectively define a respective abutting surface of the positioning device.

6. A jig as claimed in claim 5, wherein the body portion comprises a first positioning aperture and a second positioning aperture, each positioning aperture being arranged to receive a positioning member, wherein the first positioning aperture and the second positioning aperture are spaced in a direction perpendicular to the longitudinal axis of the straight section, such that a positioning member received in the first positioning aperture defines a first abutting surface and a positioning member received in the second positioning aperture defines a second abutting surface.

7. A jig as claimed in any preceding claim, wherein the positioning device comprises at least one stepped portion for engaging with an edge of the guide channel.

8. A jig as claimed in any preceding claim, wherein the at least one positioning device is movable along the guide channel so as to adjust the position of the positioning device along the longitudinal axis of the straight section.

9. A jig as claimed in claim 8, wherein the at least one positioning device is slidably movable along the guide channel, and wherein the main body comprises a track extending in a direction of the longitudinal axis of the straight section, the track being arranged to engage with a body portion of the positioning device so as to locate the body portion within the guide channel.

10. A jig as claimed in claim 9, wherein the track is provided on a guiding edge of the guide channel, and wherein the track comprises a recess formed in the guiding edge of the guide channel, the recess being arranged to receive a part of the body portion of the positioning device, or wherein the track comprises a protrusion formed on the guiding edge of the guide channel, the protrusion being arranged to be received within a recess formed in the body portion of the positioning device.

11. A jig as claimed in any preceding claim, wherein the positioning device comprises a body portion arranged to engage with opposing edges of the guide channel so as to locate the body portion within the guide channel between the opposing edges.

12. A jig as claimed in any preceding claim, wherein the positioning device comprises a body portion having a recess arranged such that opposing surfaces of the recess engage respective upper and lower surfaces of the main body of the jig, so as to locate the body portion on an edge portion of the guide channel.

13. A jig as claimed in claim 12, wherein the body portion comprises an upper part defining an internal upper surface of the recess that is arranged to engage with the upper surface of the main body of the jig, in use, and a lower part defining an internal lower surface of the recess that is arranged to engage with the lower surface of the jig, in use, and wherein the first part is detachable from the second part so as to allow the body portion to be removed from the edge portion of the guide channel.

14. A method of cutting an edge of a workpiece, the method comprising:

- providing a jig as claimed in any preceding claim;
- placing the jig on a workpiece to be cut;
- arranging one of the one or more positioning devices so as to be at least partially accommodated within the guide channel and to define an abutting surface of the positioning device;
- engaging said abutting surface against an edge of the workpiece to be cut so as to position the jig relative to the workpiece to be cut;
- rearranging the positioning device so as to be clear of the edge of the workpiece to be cut; and
- forming a cut on the workpiece using a cutting tool guided by the guide channel of the jig.

15. A method as claimed in claim 14, wherein rearranging the positioning device comprises detaching the positioning device from the main body of the jig, or wherein rearranging the positioning device comprises moving the positioning device to a position within the guide channel in which the positioning device does not abut the edge of the workpiece to be cut.

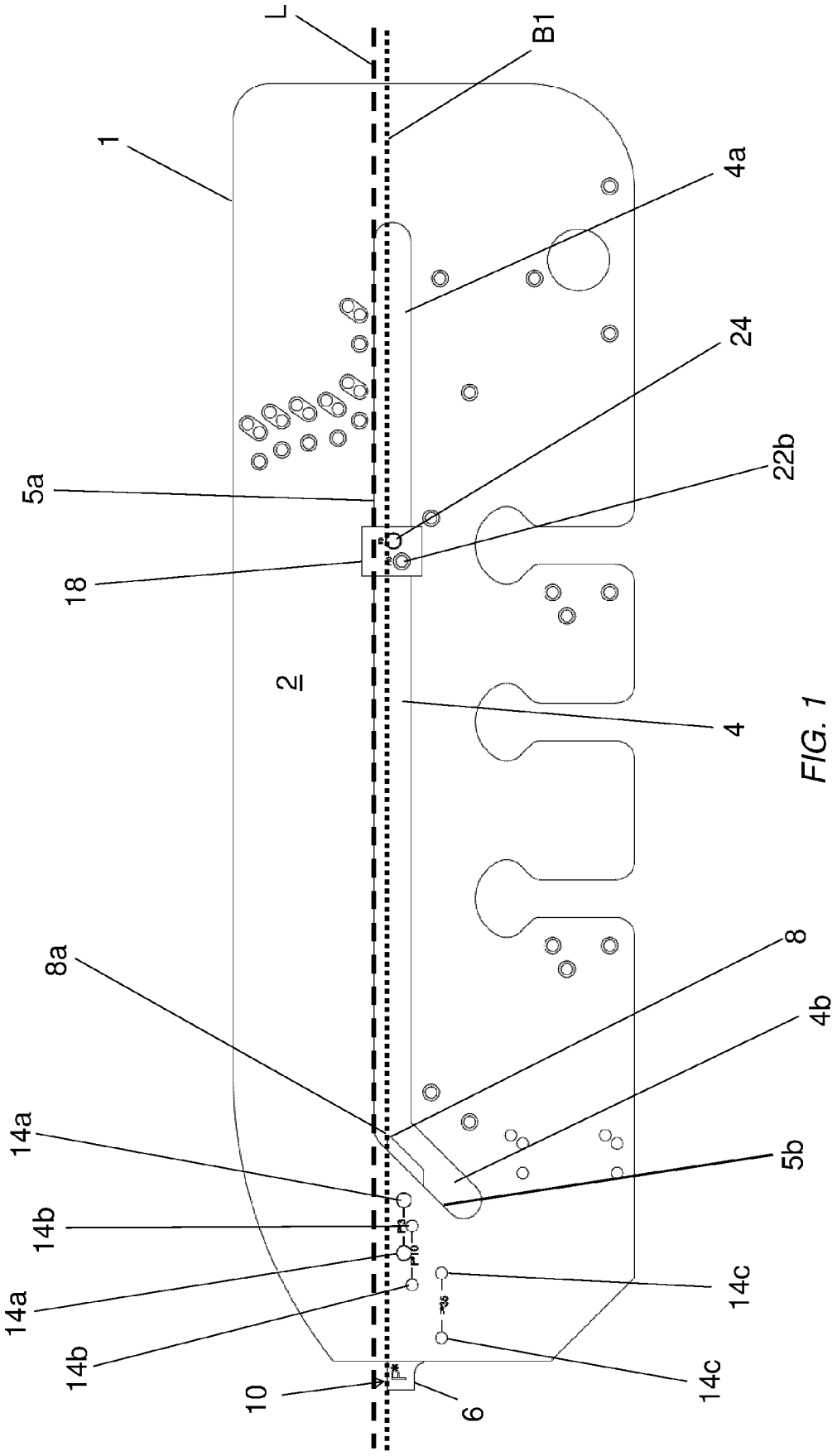

FIG. 1

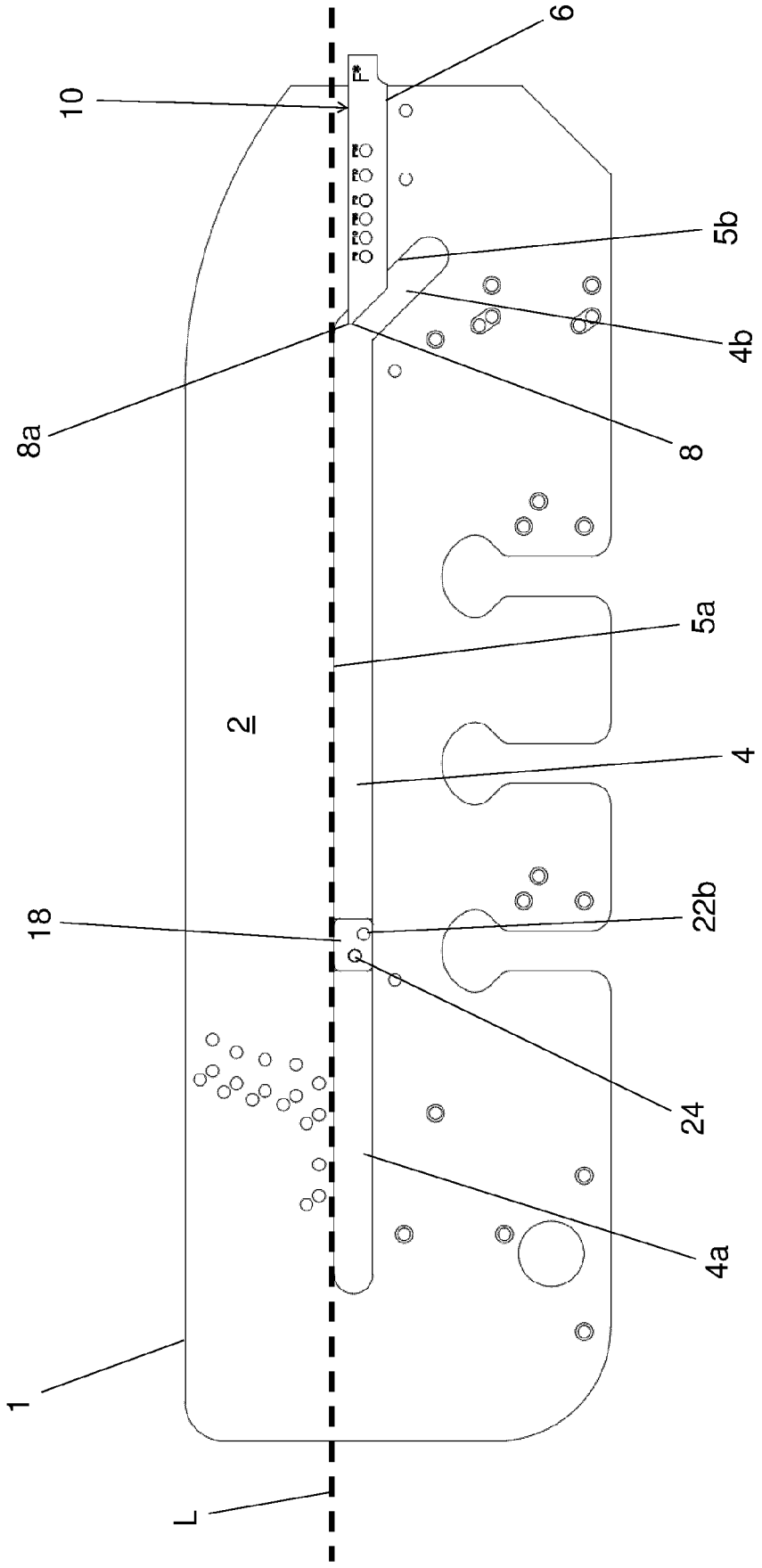

FIG. 2

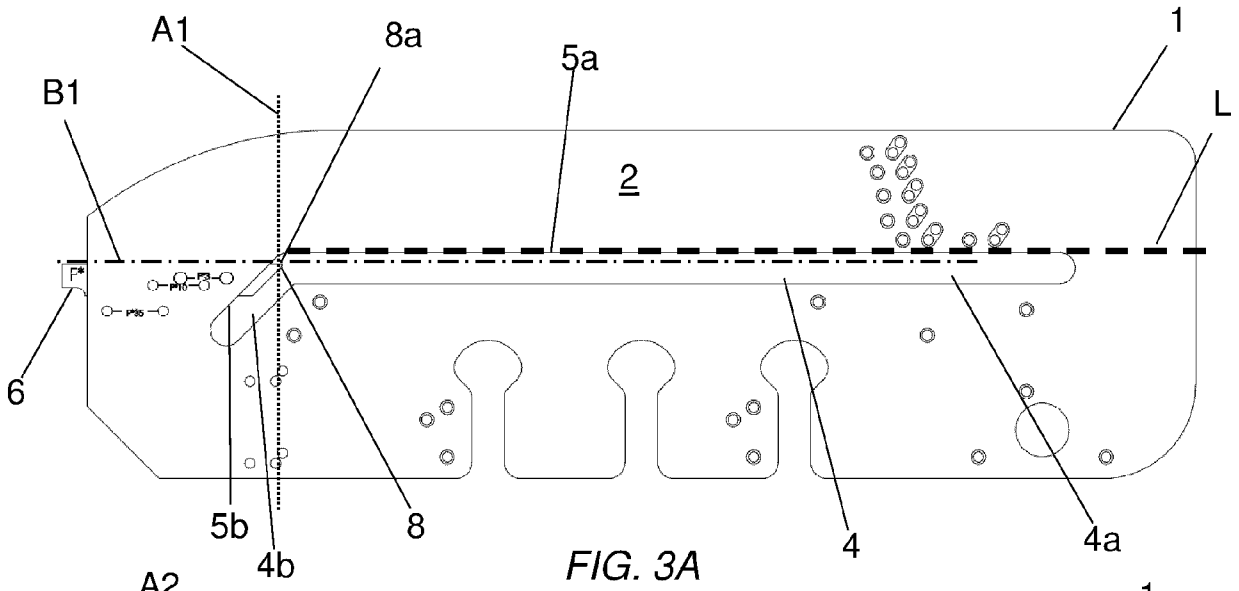

FIG. 3A

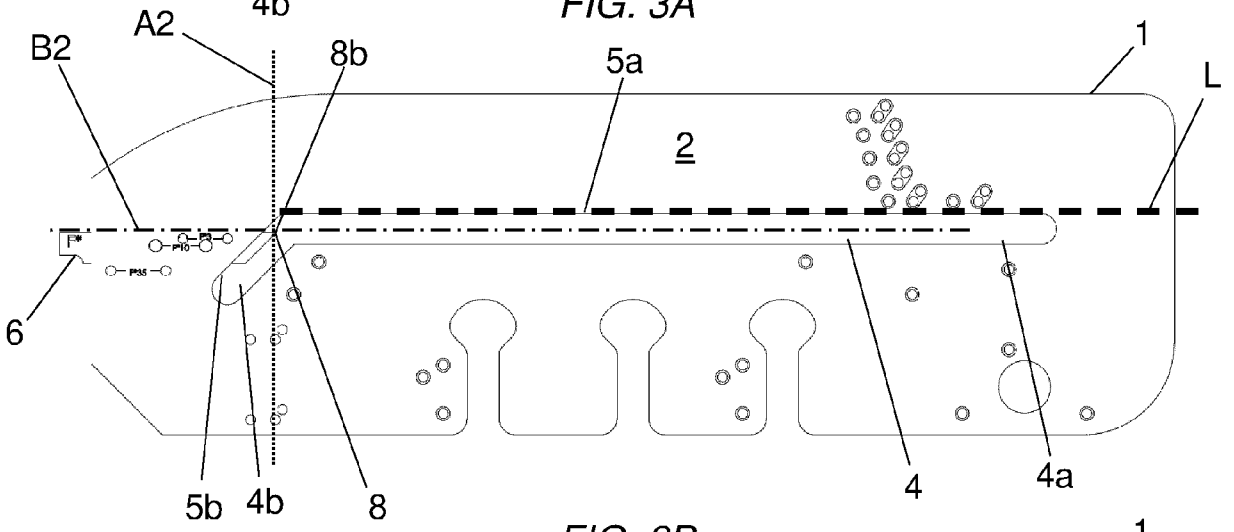

FIG. 3B

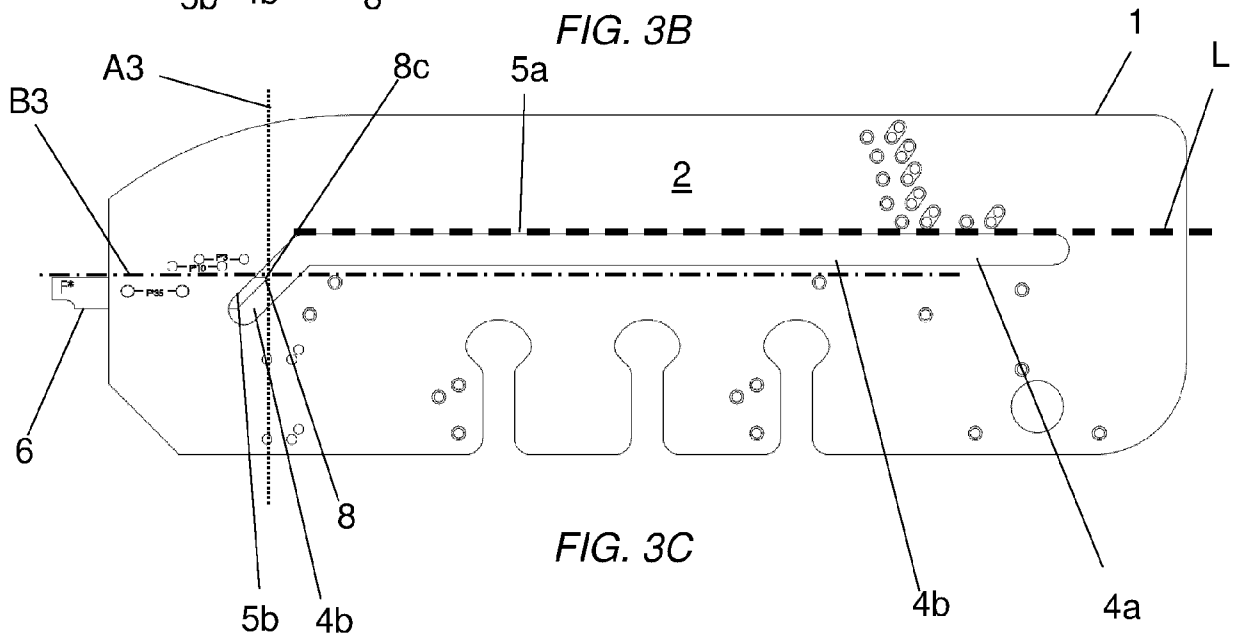

FIG. 3C

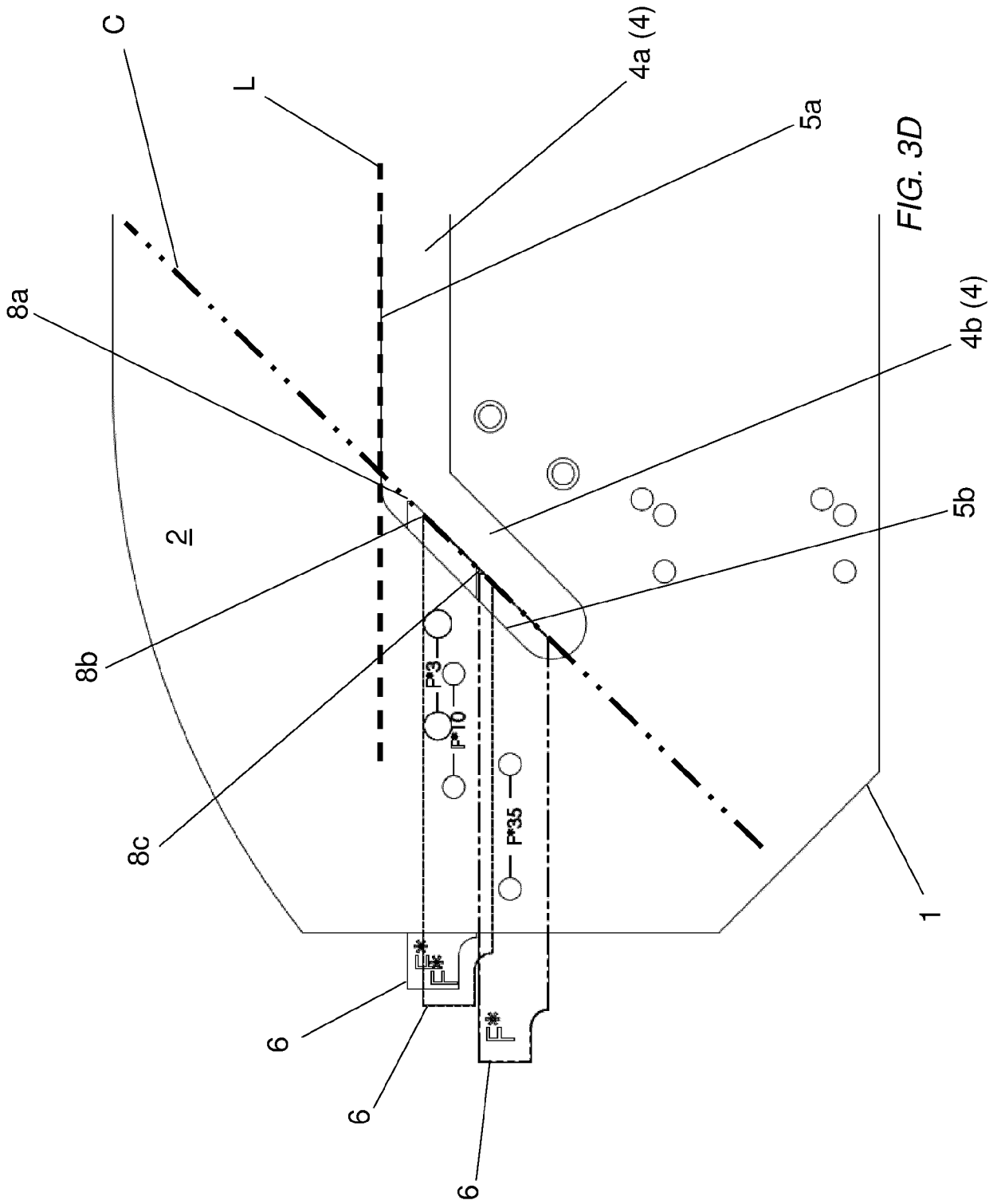

FIG. 3D

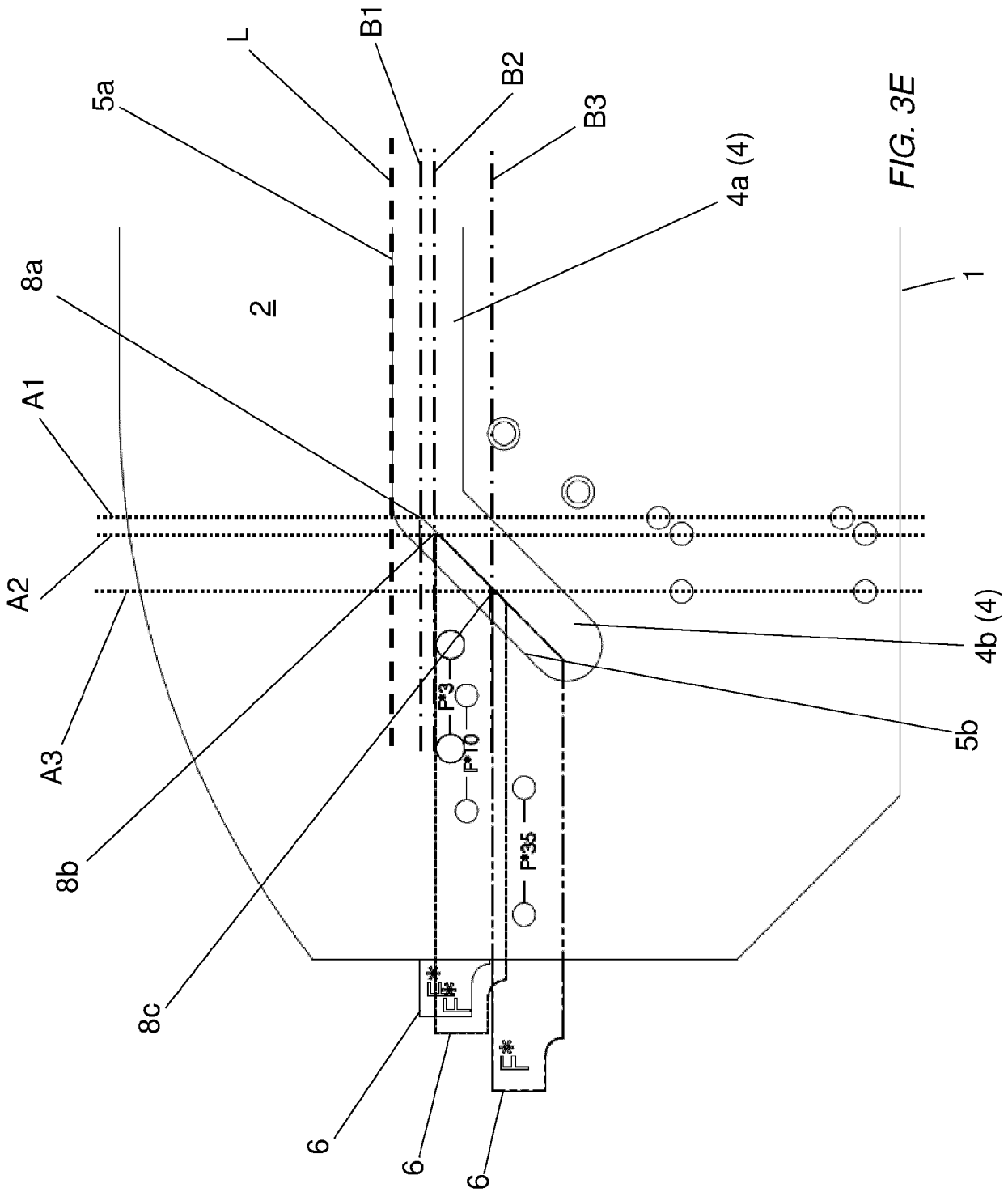

FIG. 3E

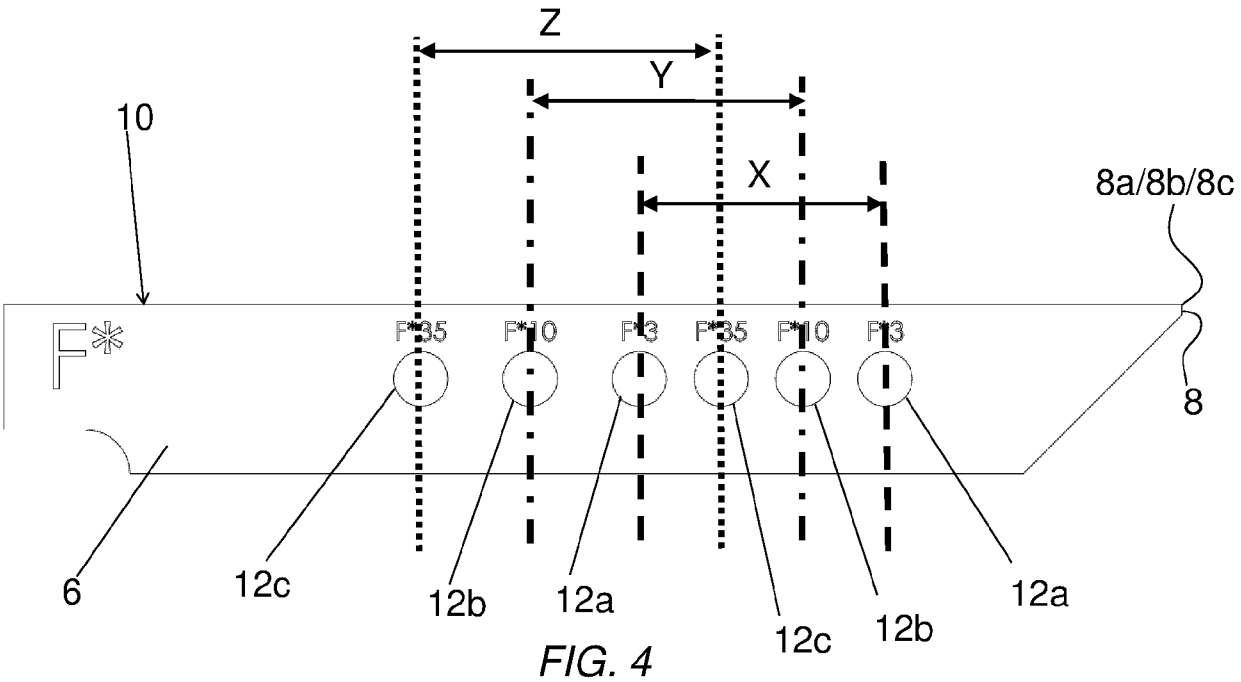
Z
Y
X
10
8a/8b/8c
F*
F*35
F*10
F*3
F*35
F*10
F*3
8
6
12c
12b
12a
12c
12b
12a

FIG. 4

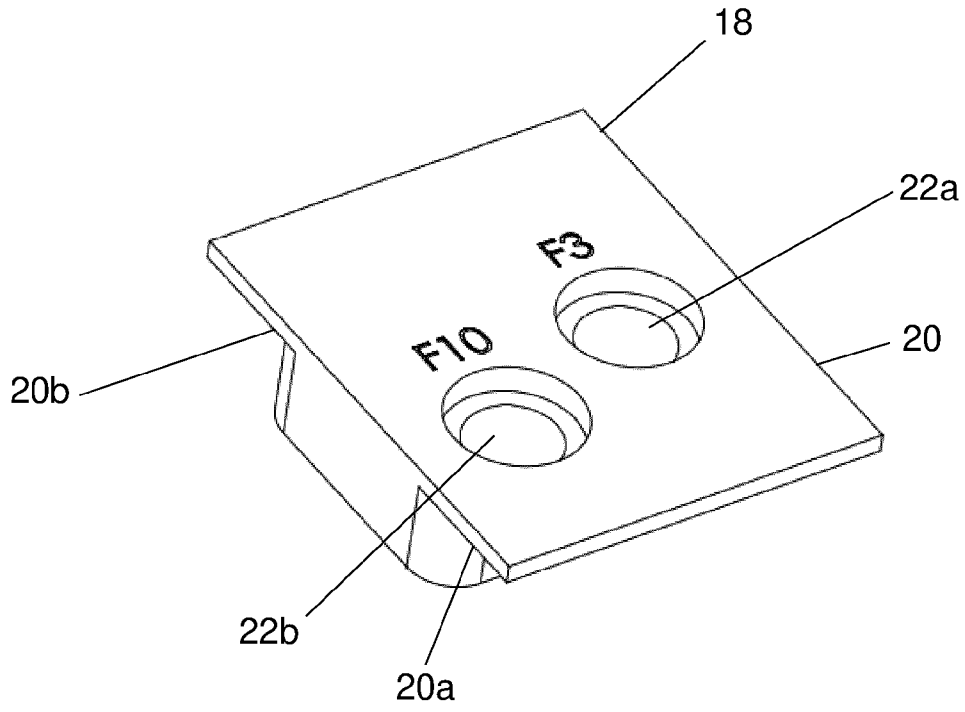
18
22a
F3
F10
20
20b
22b
20a

FIG. 6

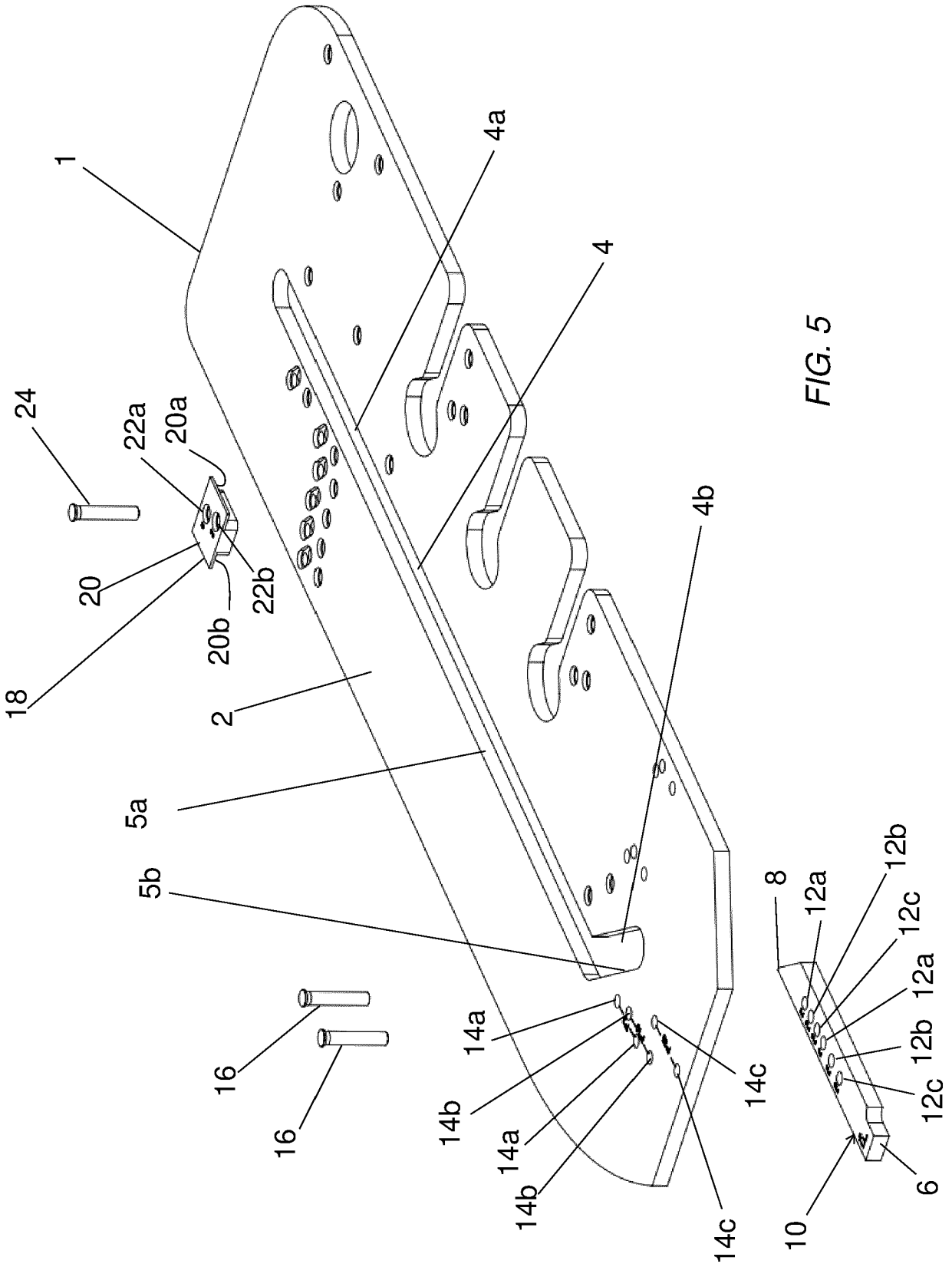
1
4a
4
24
22a
20a
20
22b
20b
18
2
5a
5b
4b
16
16
14a
14b
14a
14b
14c
14c
8
12a
12b
12c
12a
12b
12c
6
10

FIG. 5

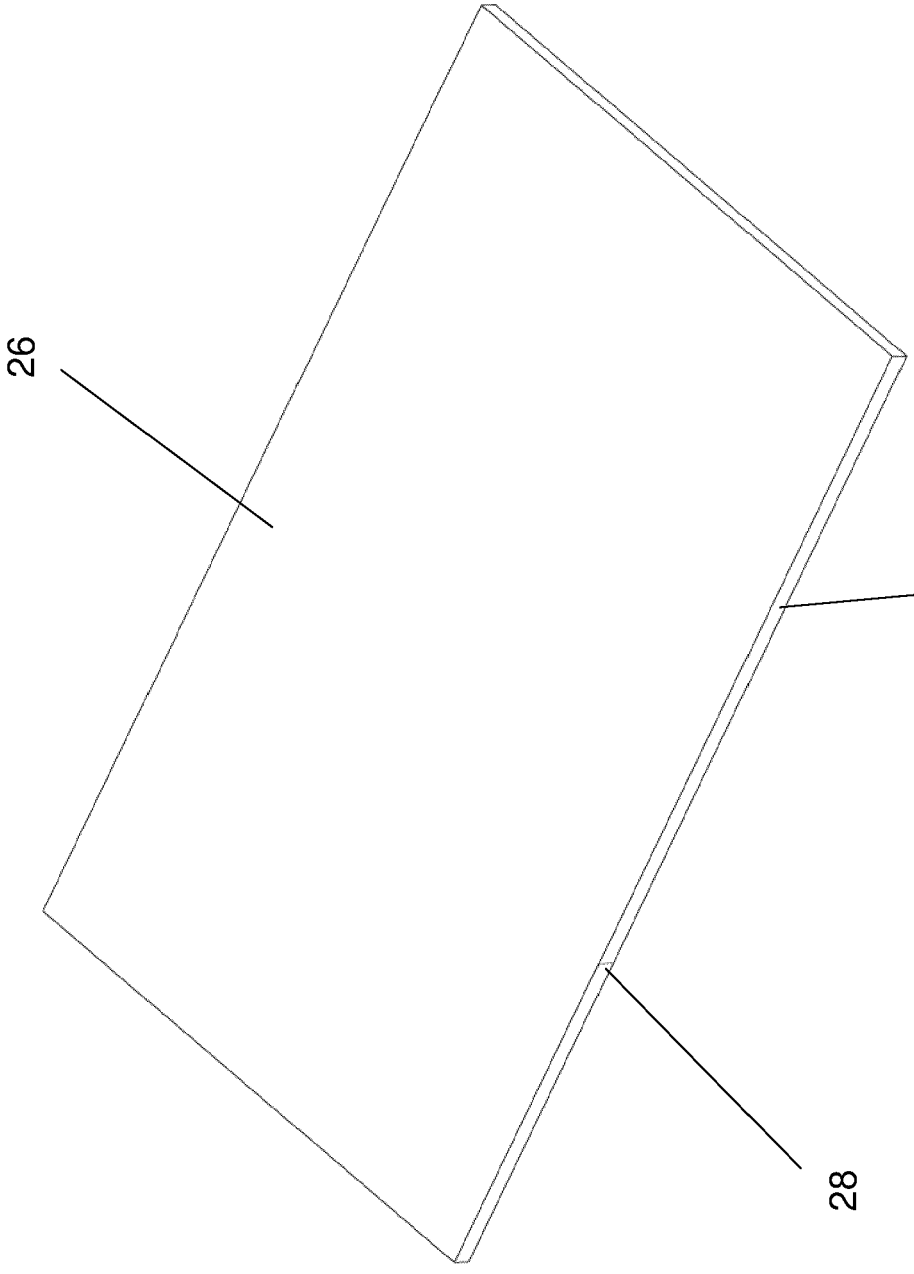

FIG.7

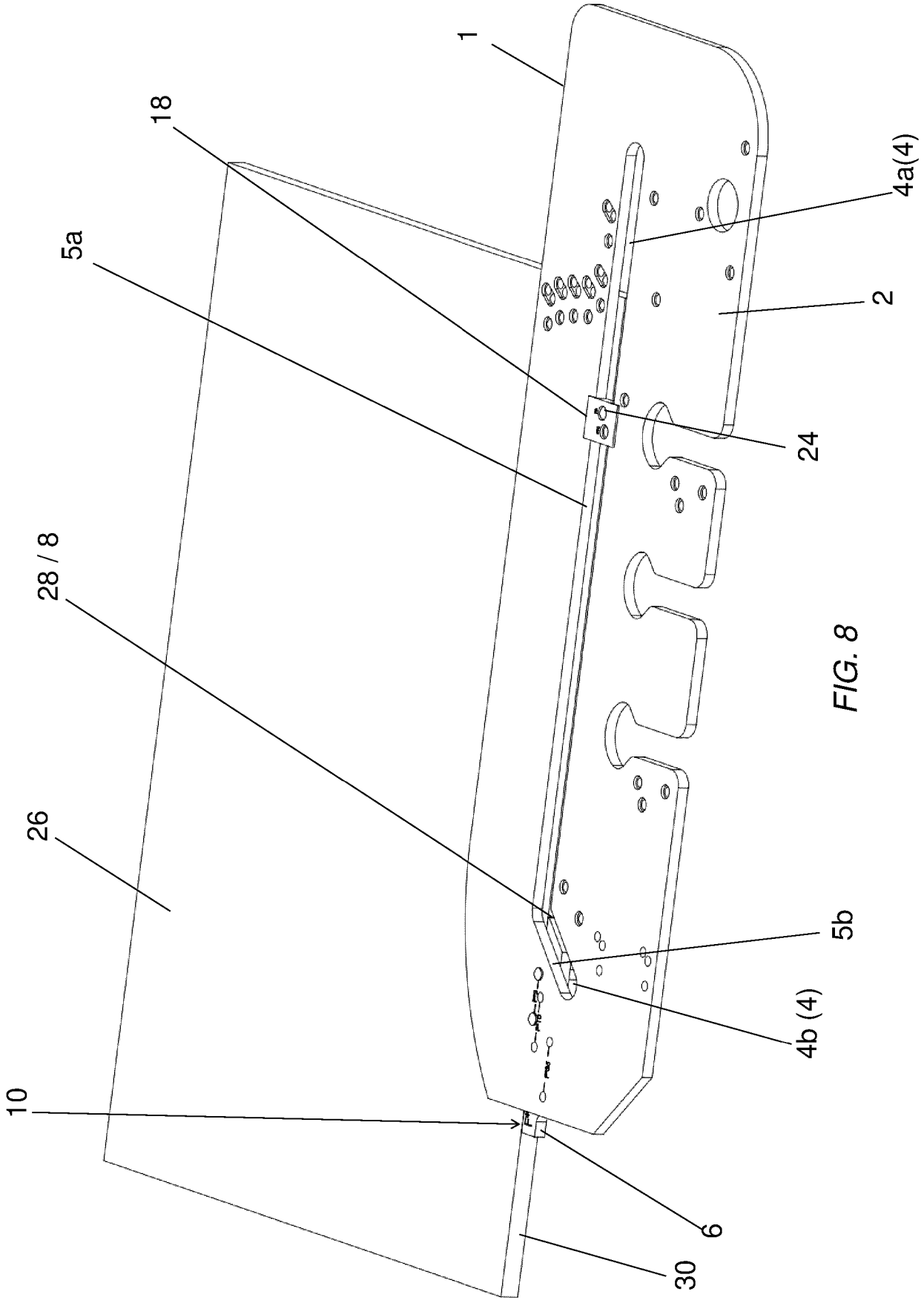

FIG. 8

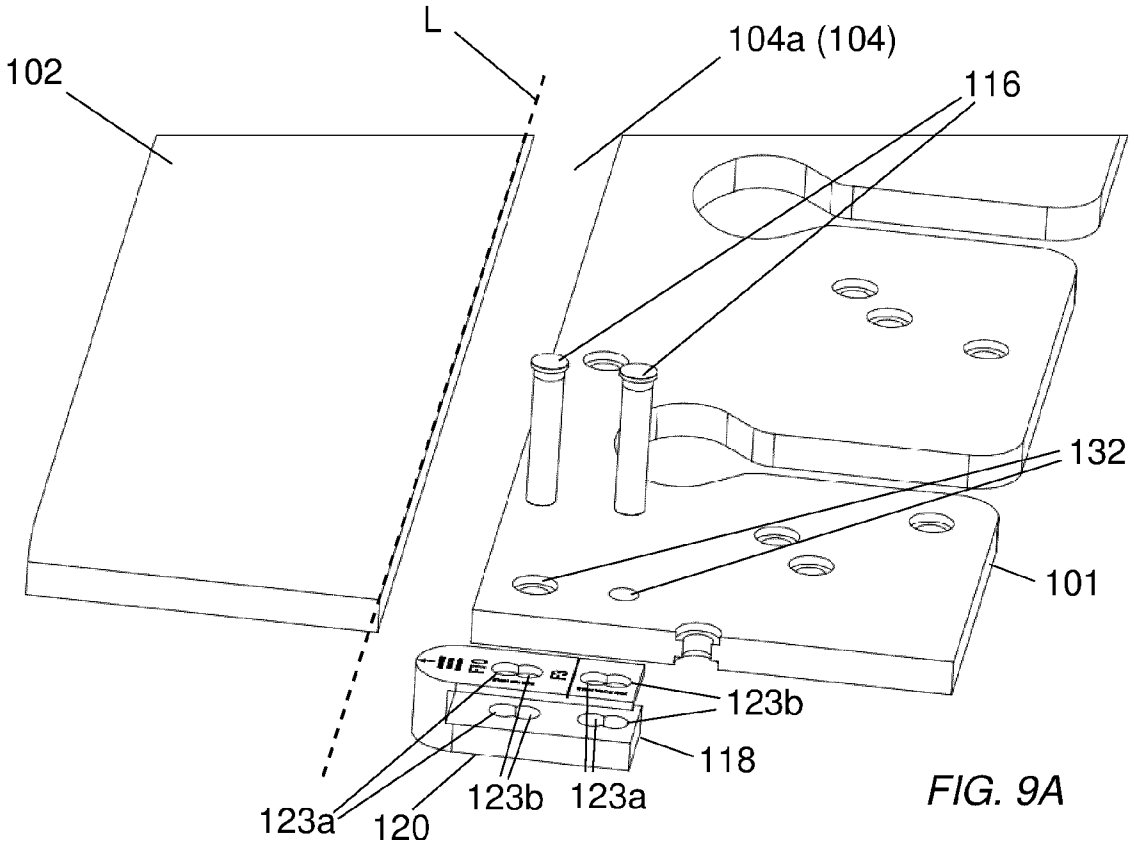
L
104a (104)
102
116
132
101
123b
118
123a
123b
123a
120

FIG. 9A

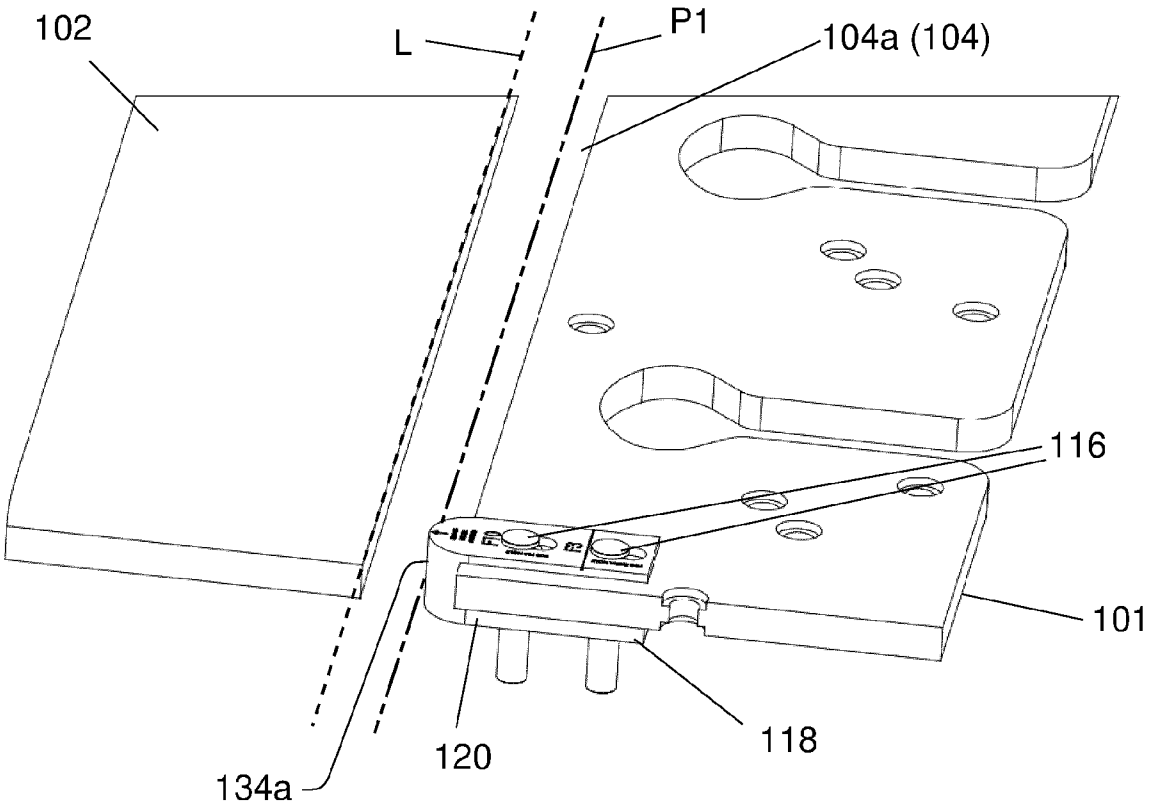
102
L
P1
104a (104)
116
101
118
120
134a

FIG. 9B

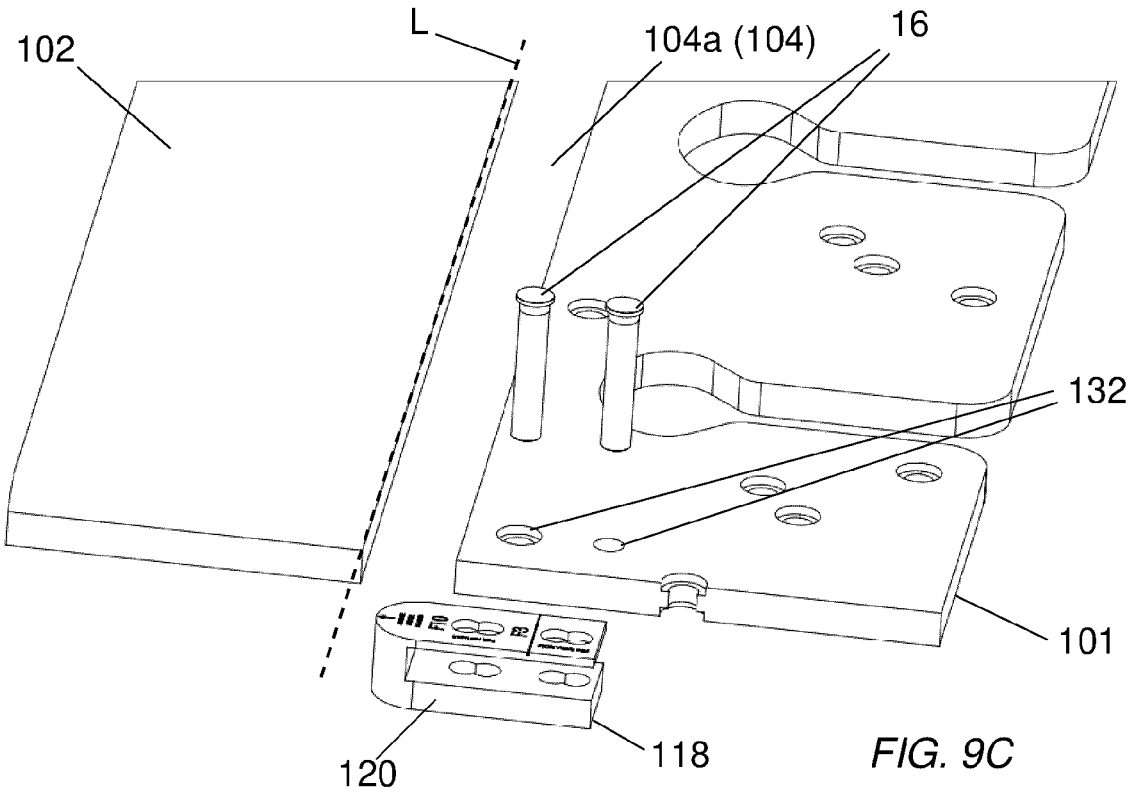
L
102
104a (104)
16
132
101
118
120

FIG. 9C

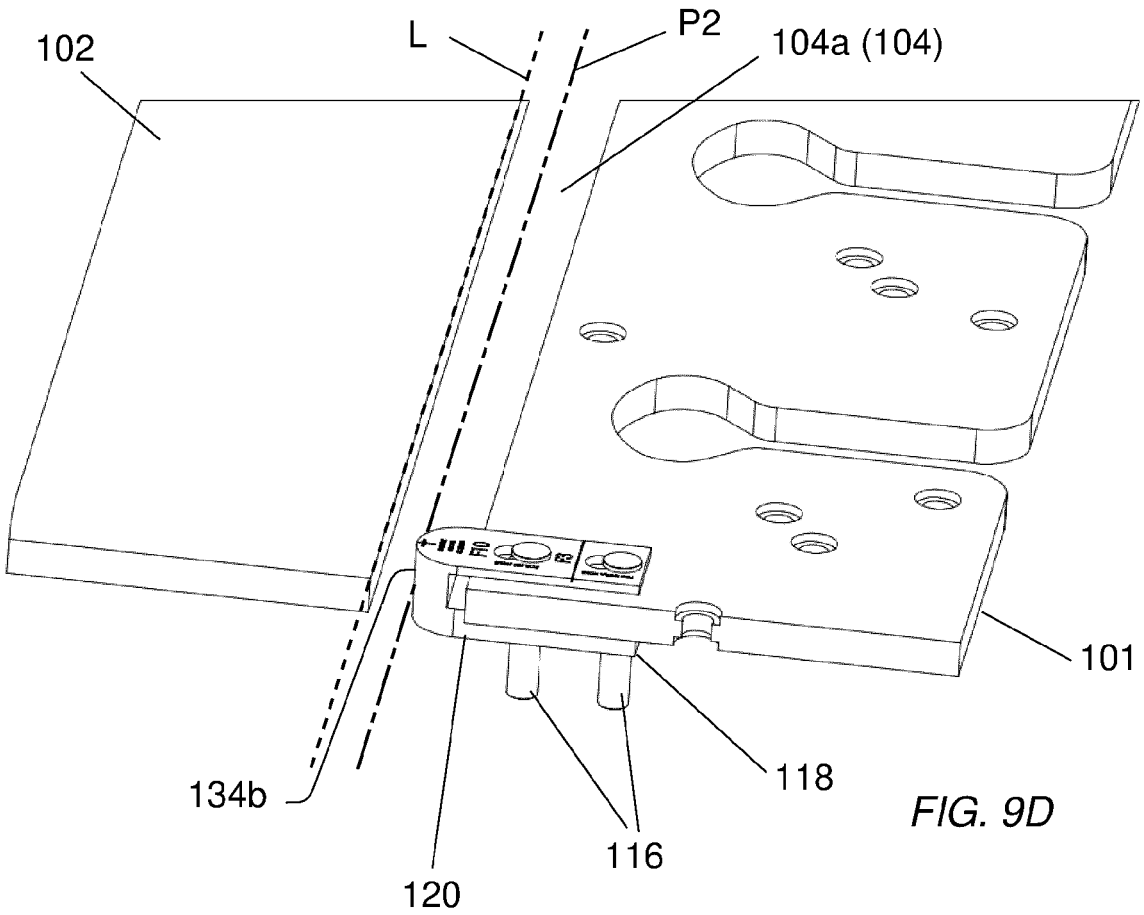
L
P2
102
104a (104)
101
118
134b
116
120

FIG. 9D

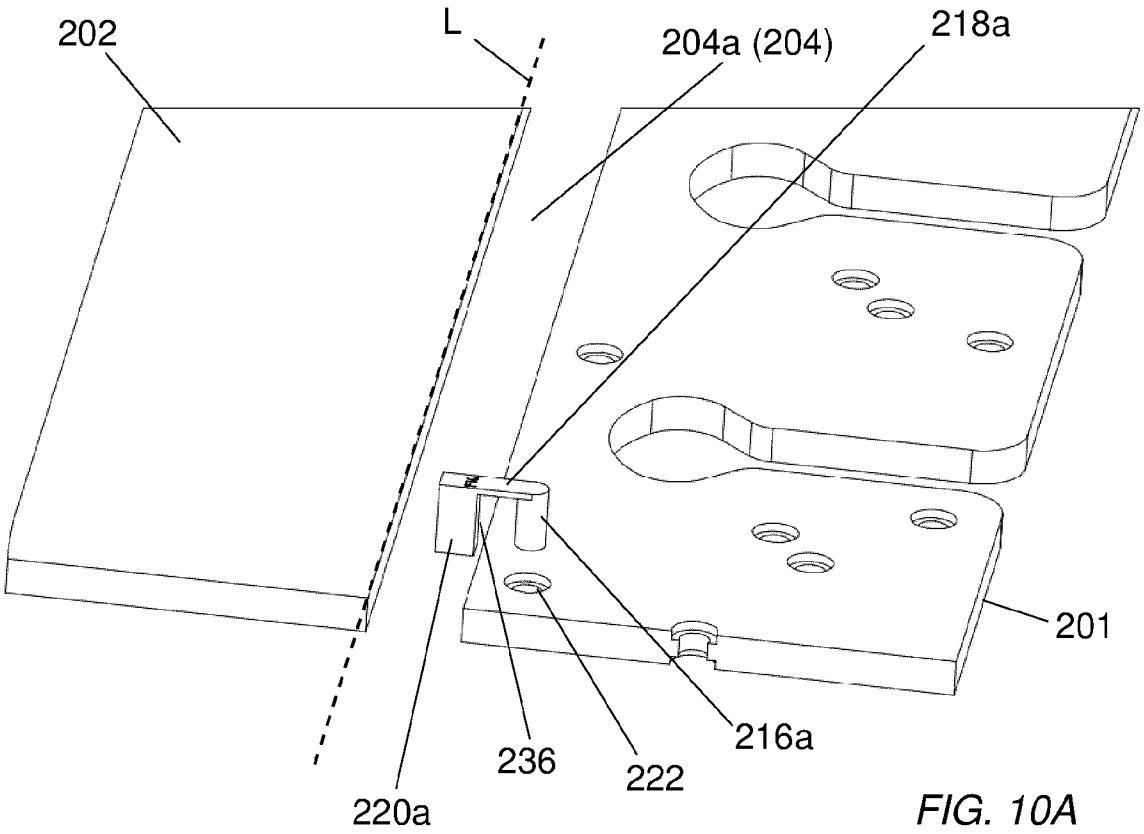

FIG. 10A

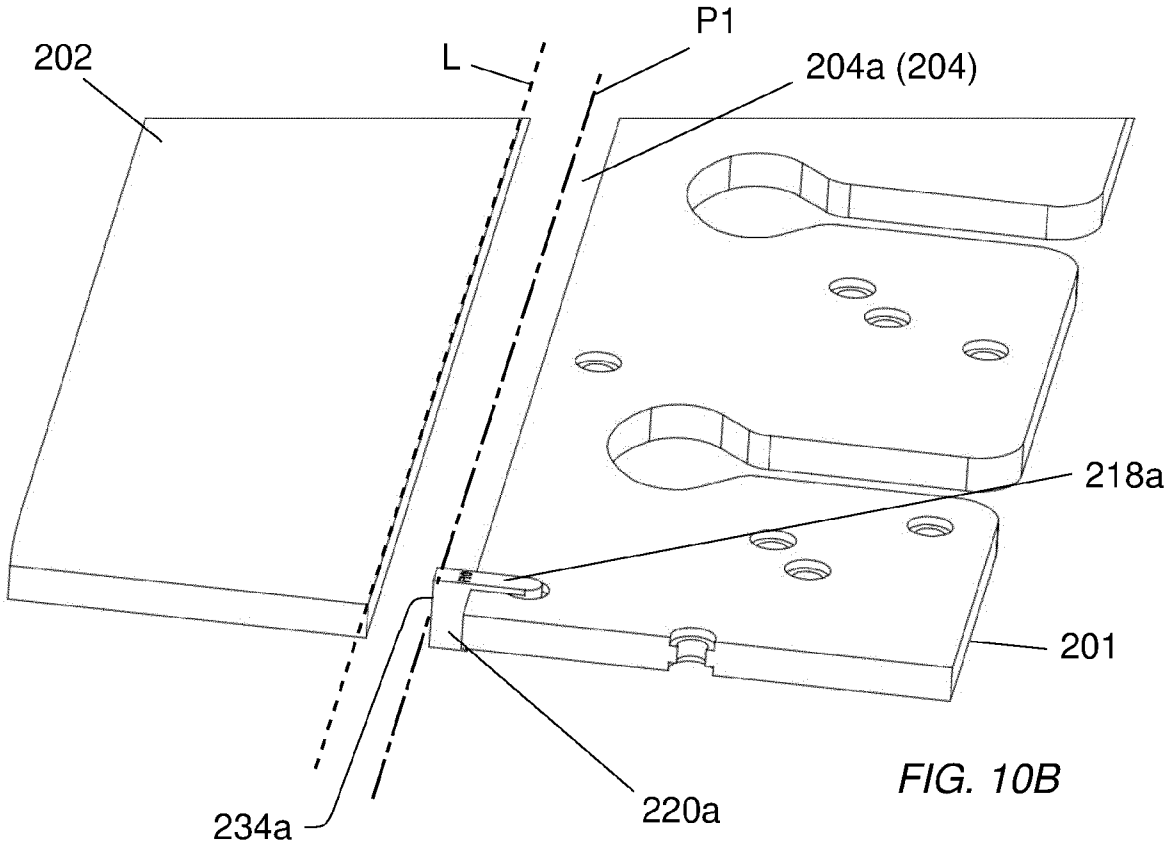

FIG. 10B

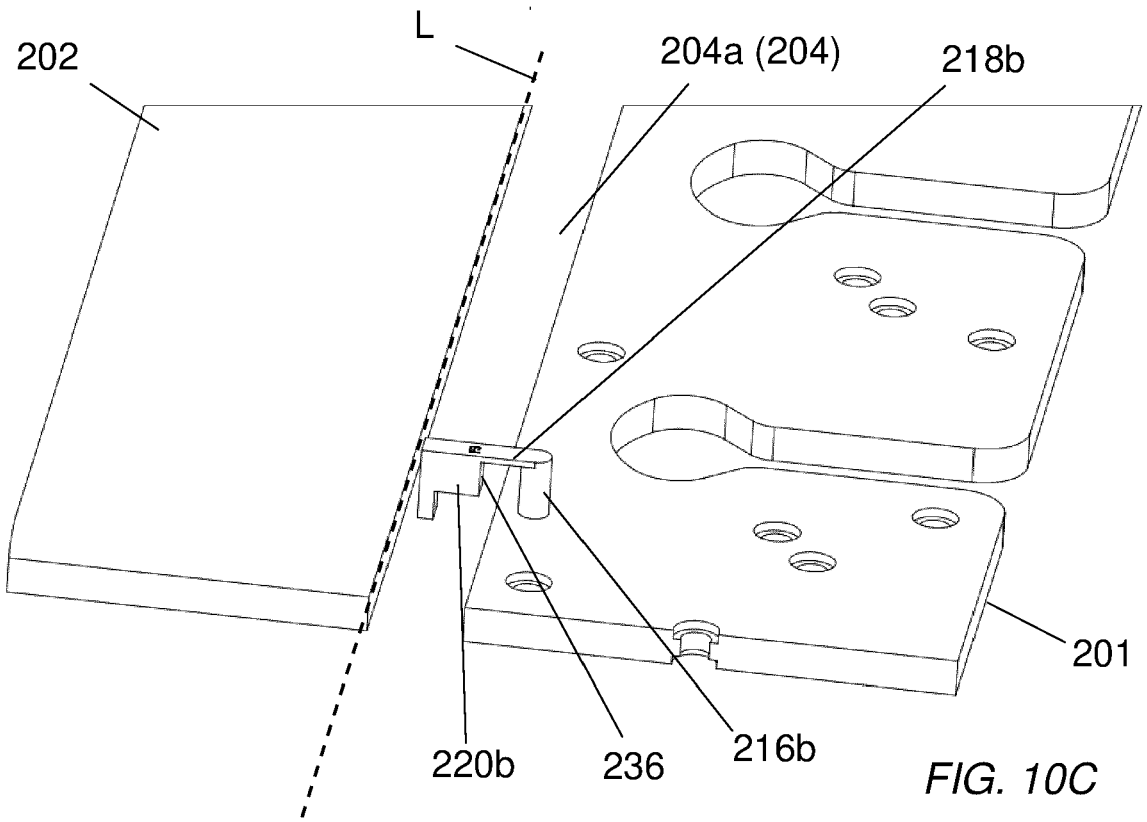

FIG. 10C

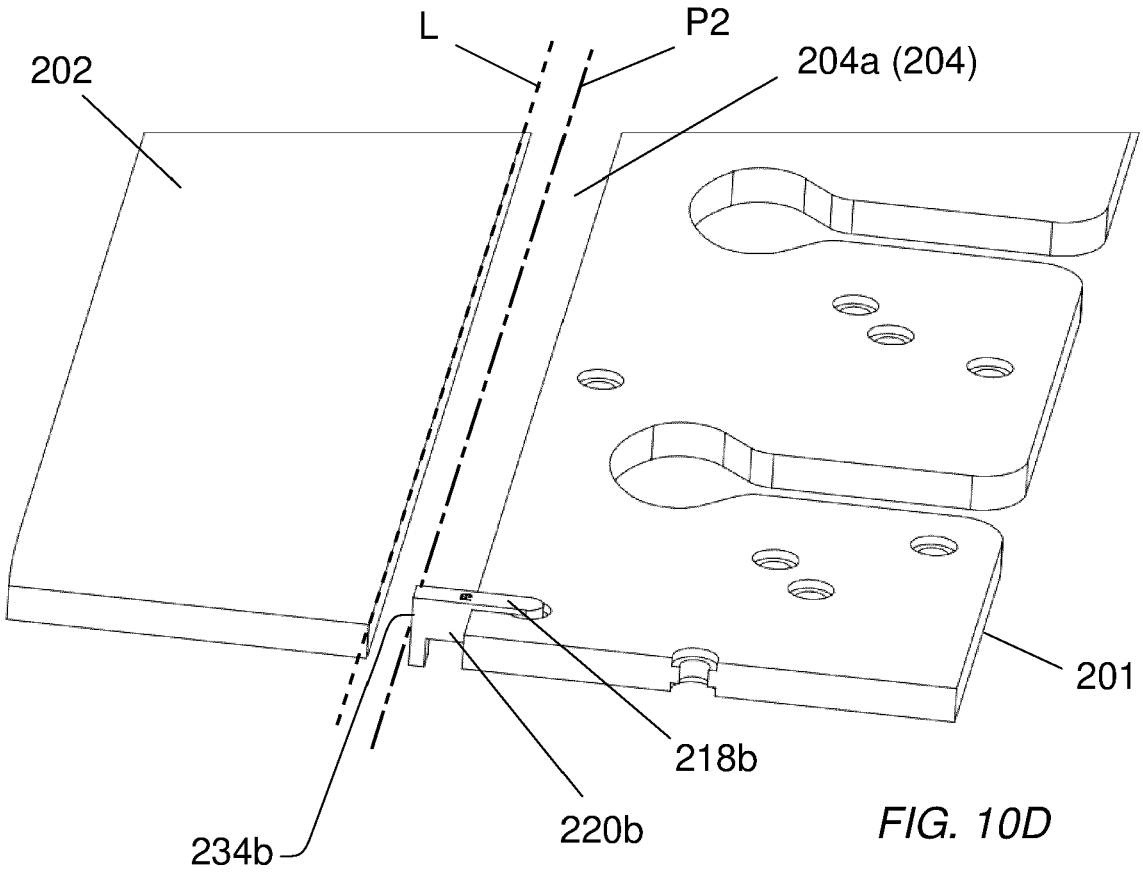

FIG. 10D

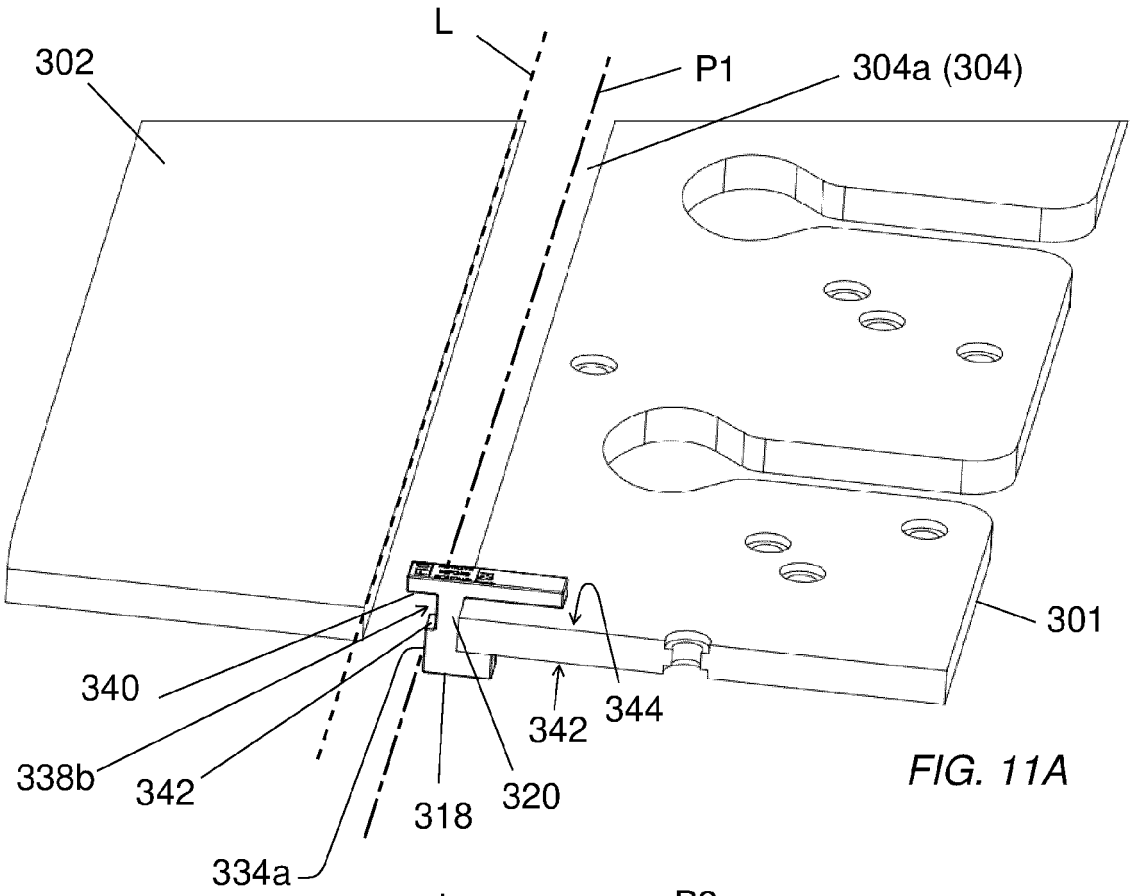

FIG. 11A

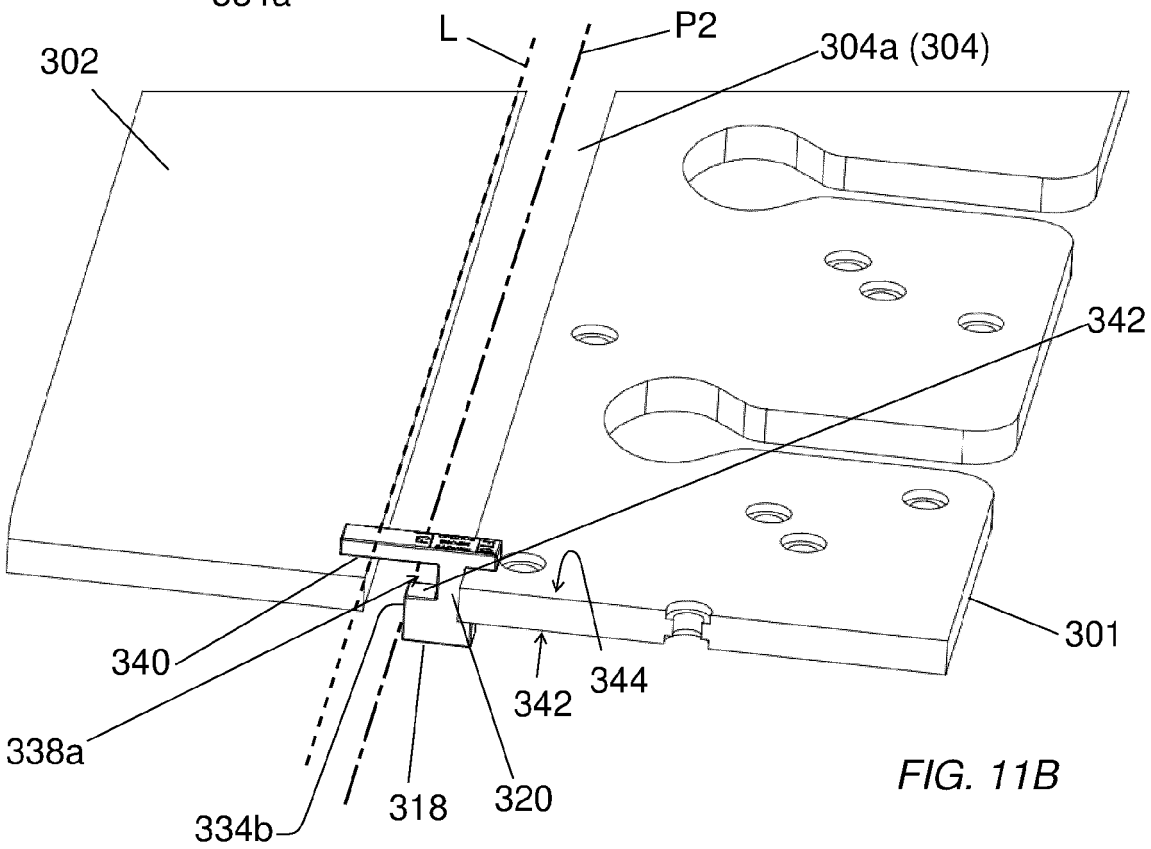

FIG. 11B

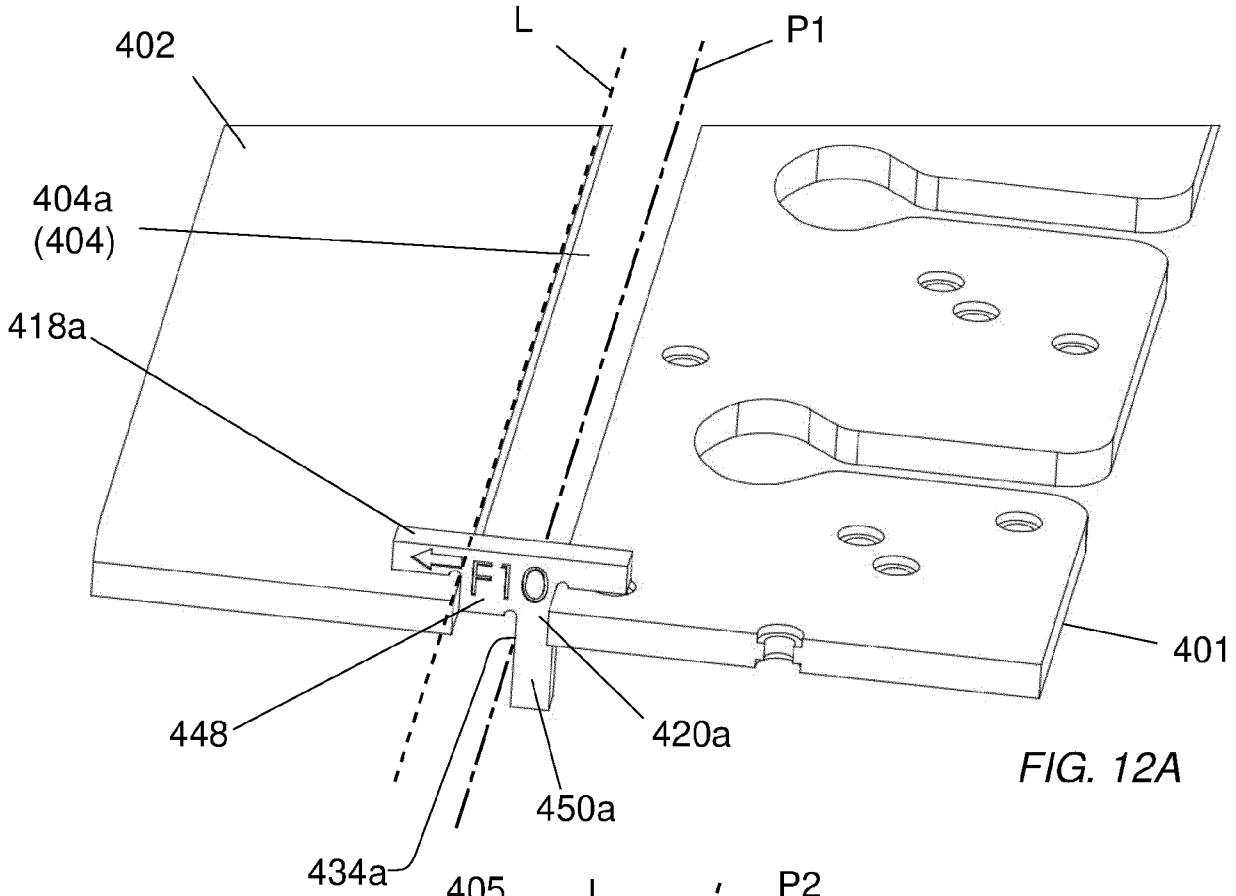

FIG. 12A

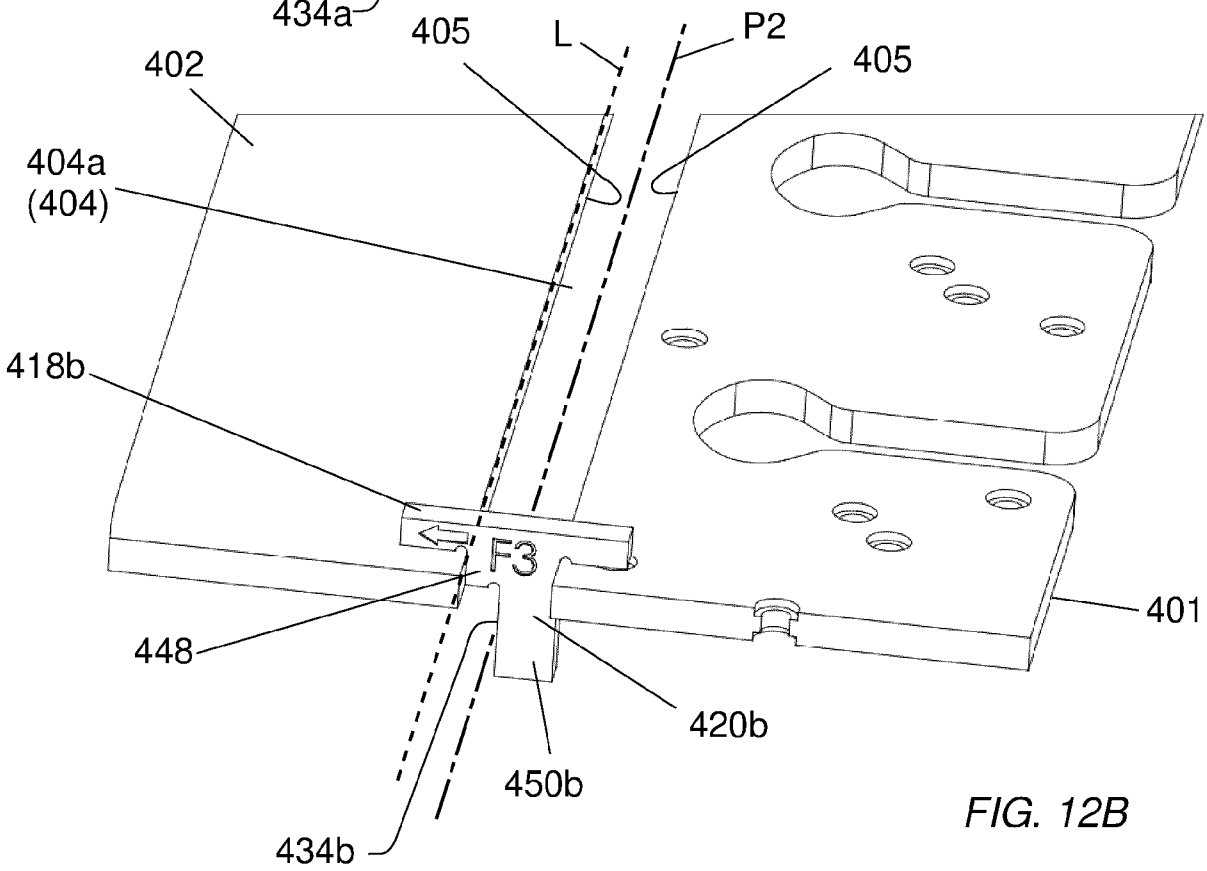

FIG. 12B

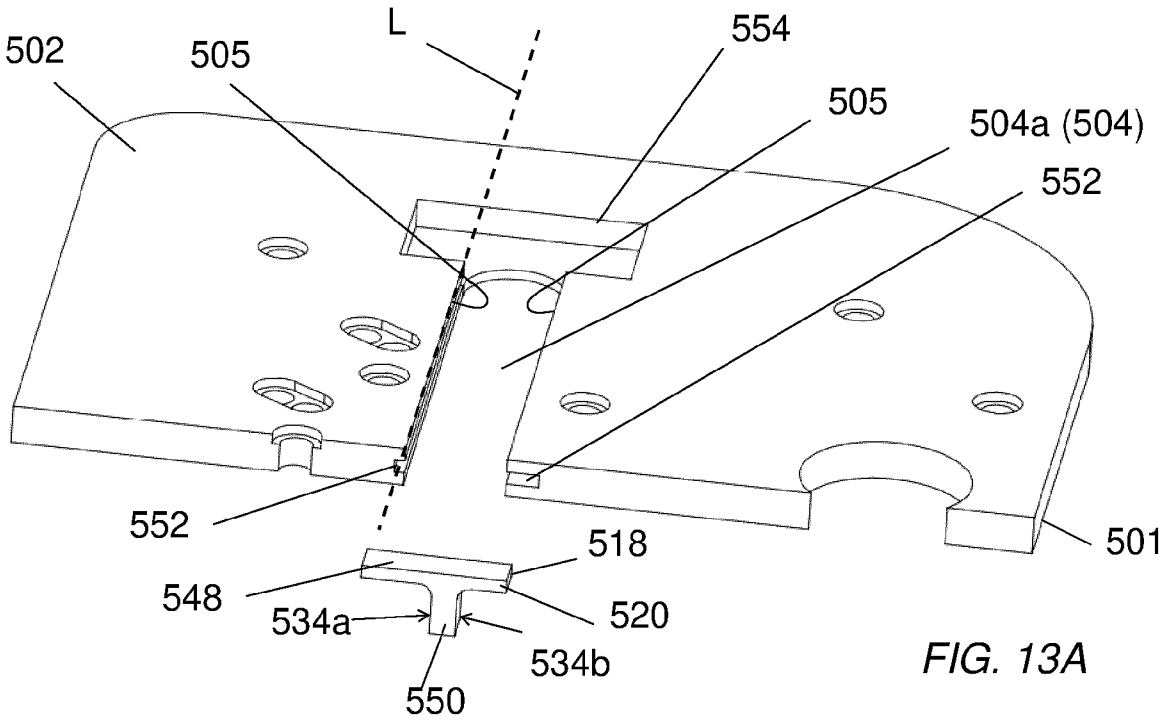

FIG. 13A

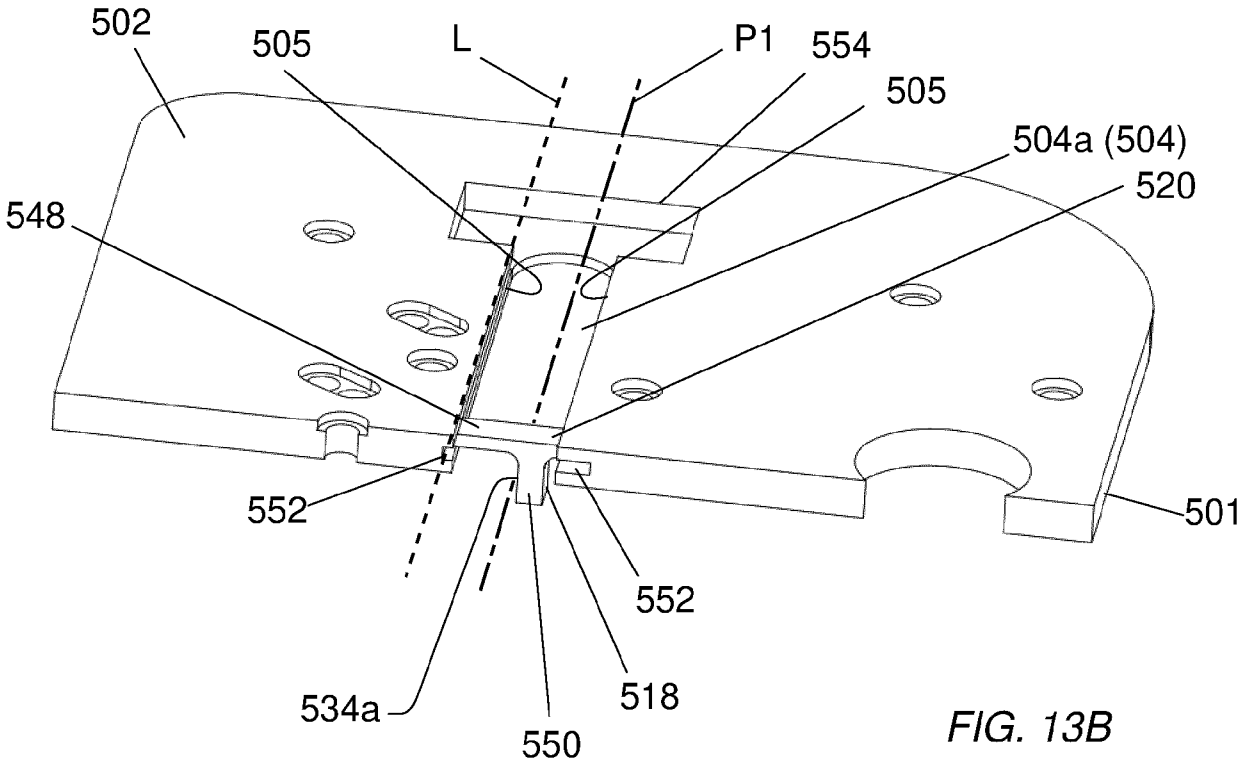

FIG. 13B

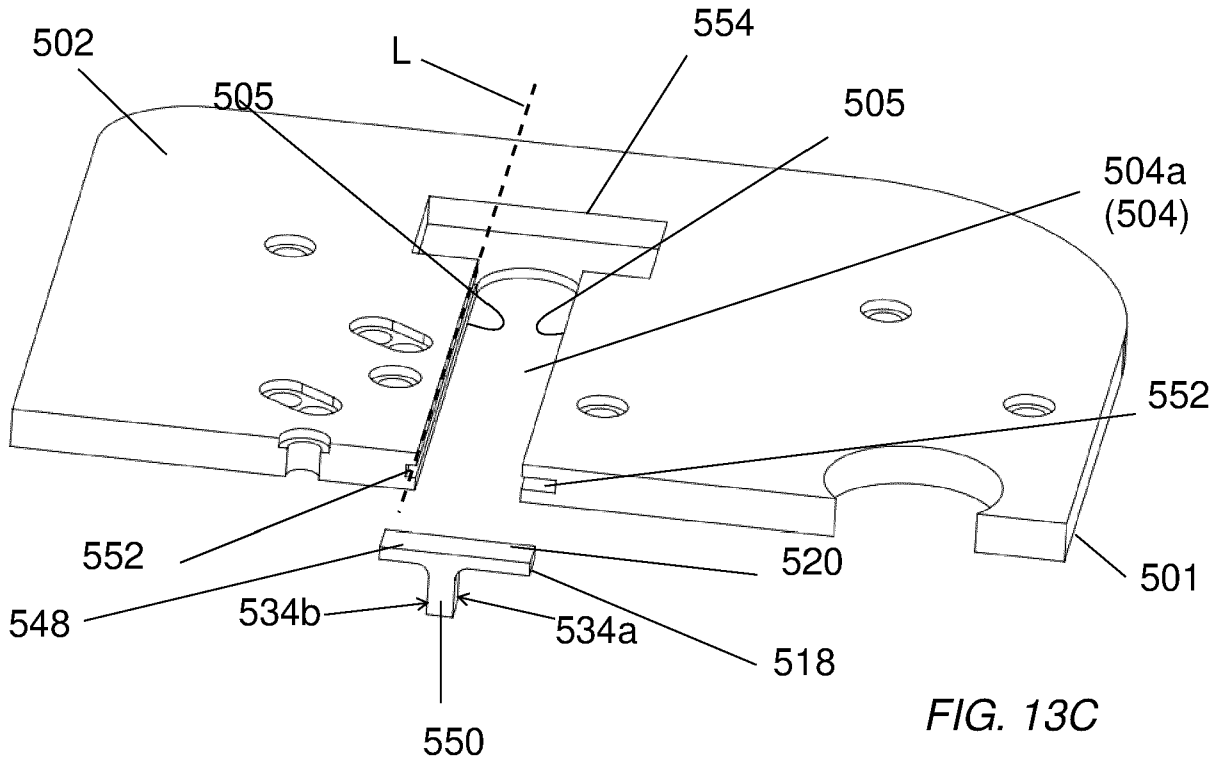

FIG. 13C

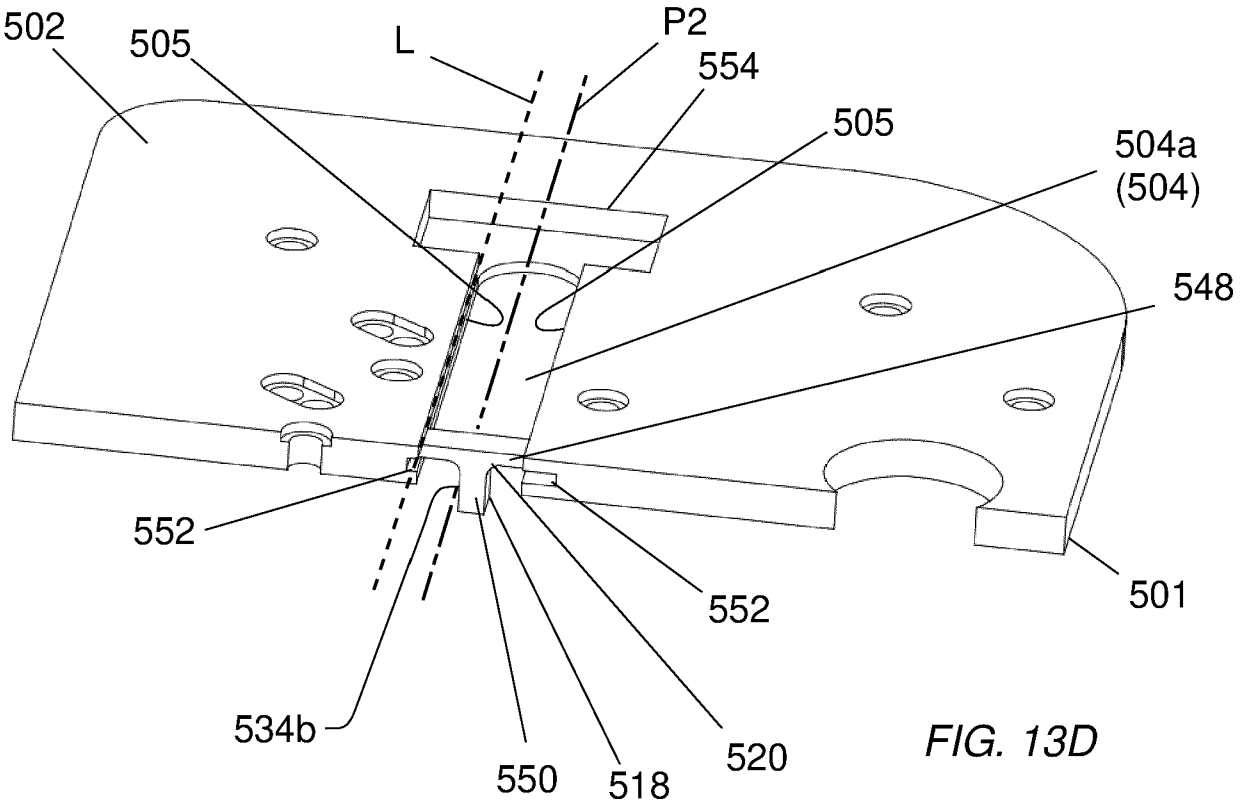

FIG. 13D

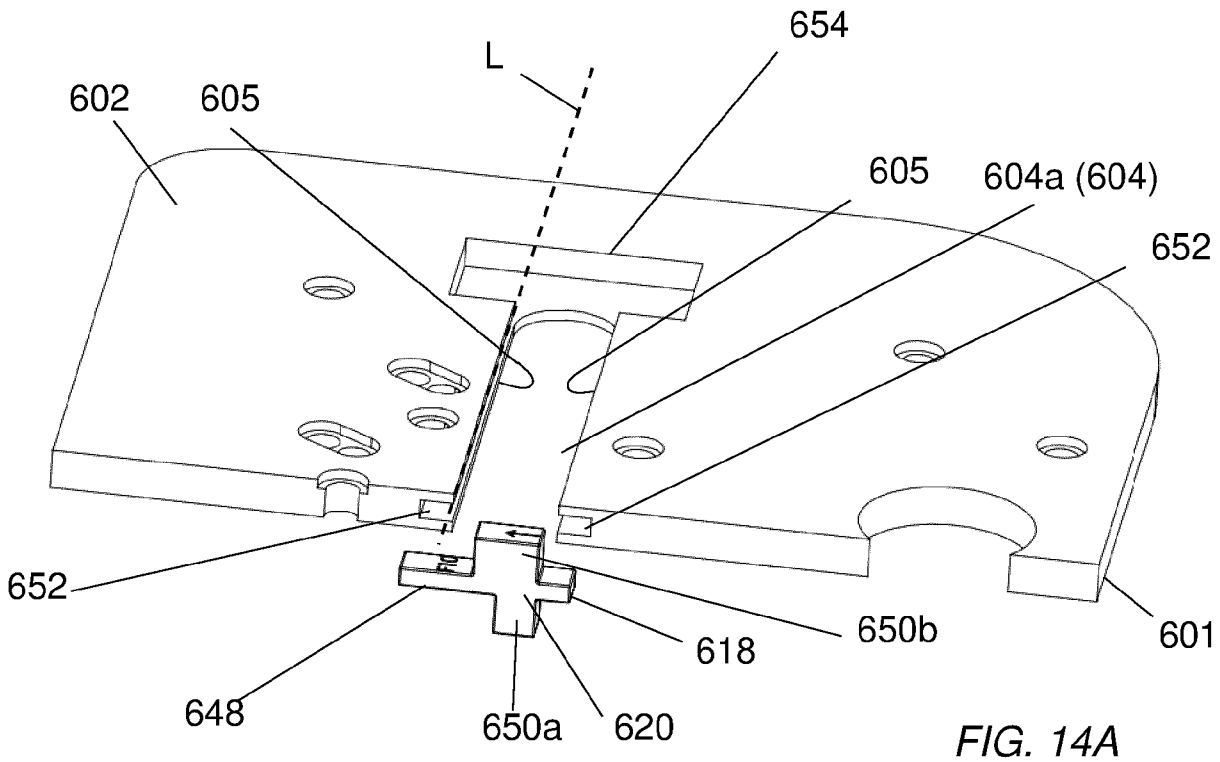

FIG. 14A

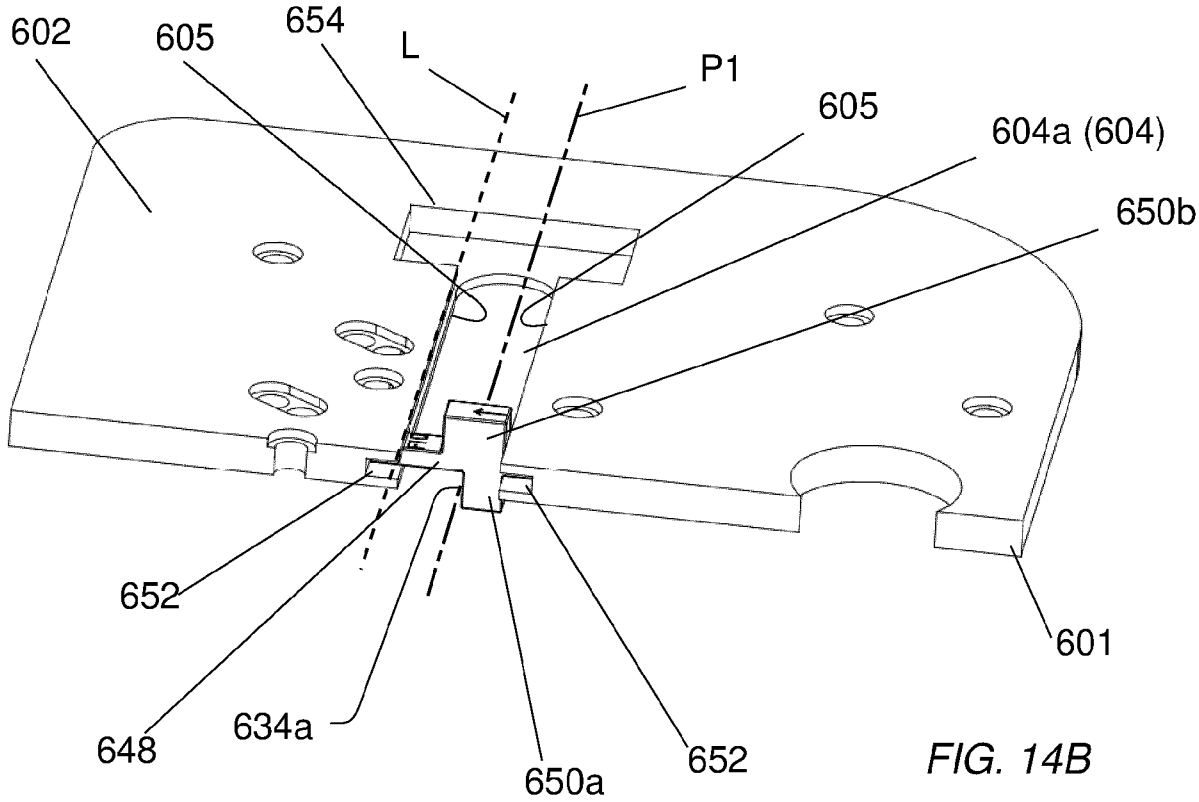

FIG. 14B

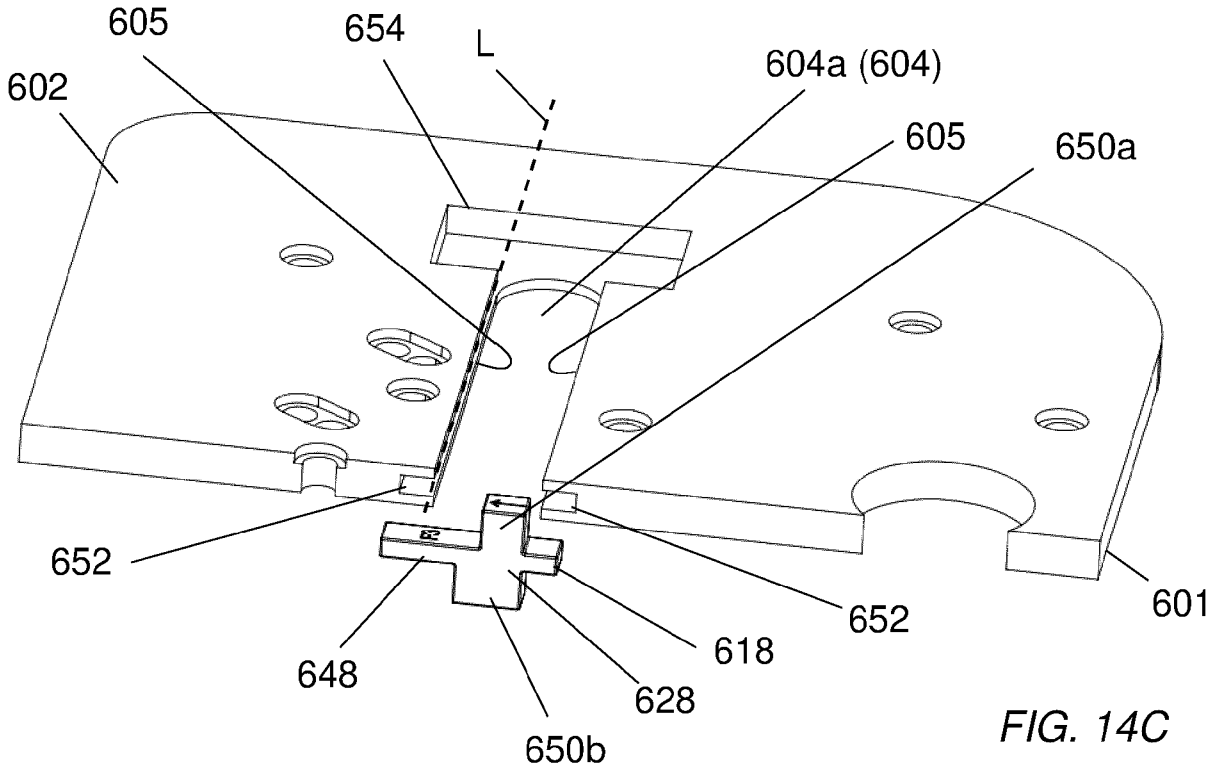

FIG. 14C

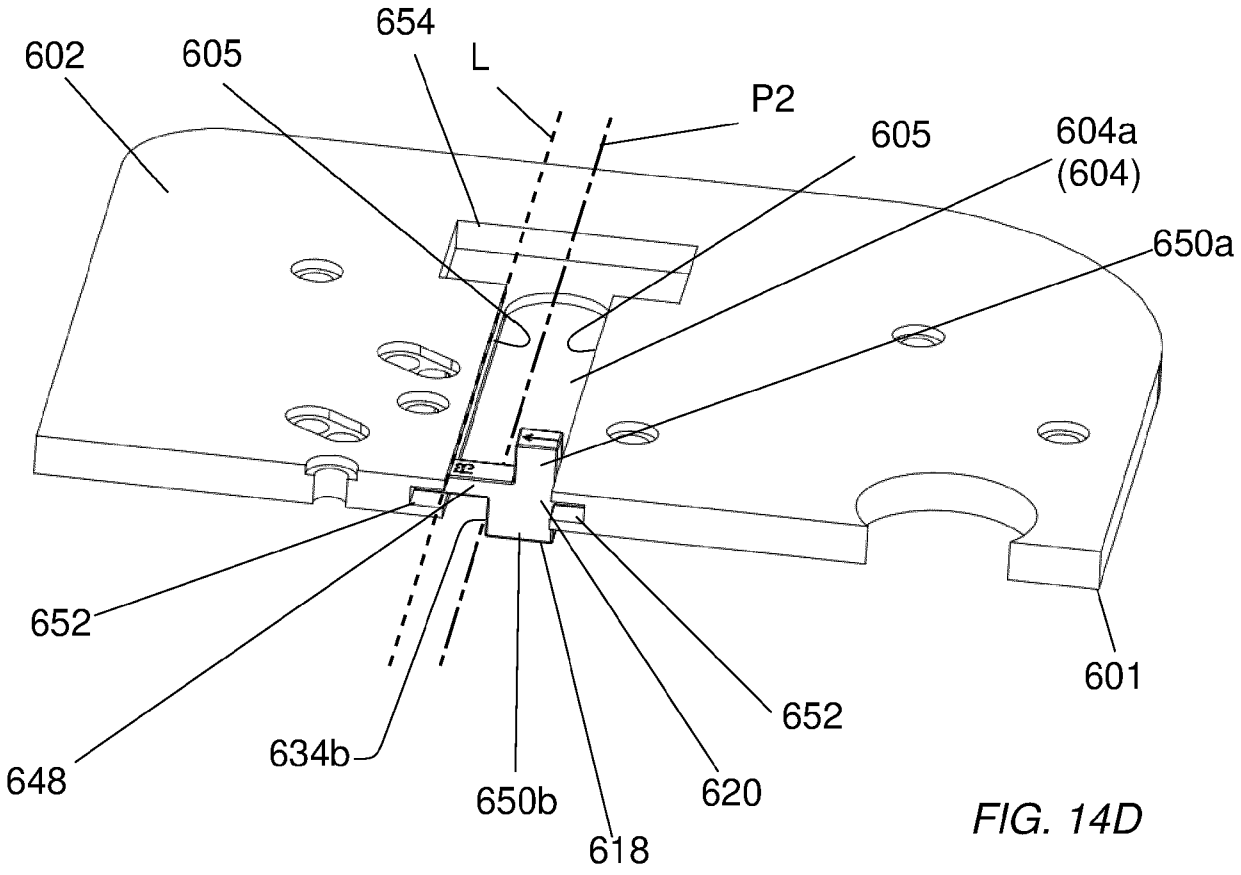

FIG. 14D

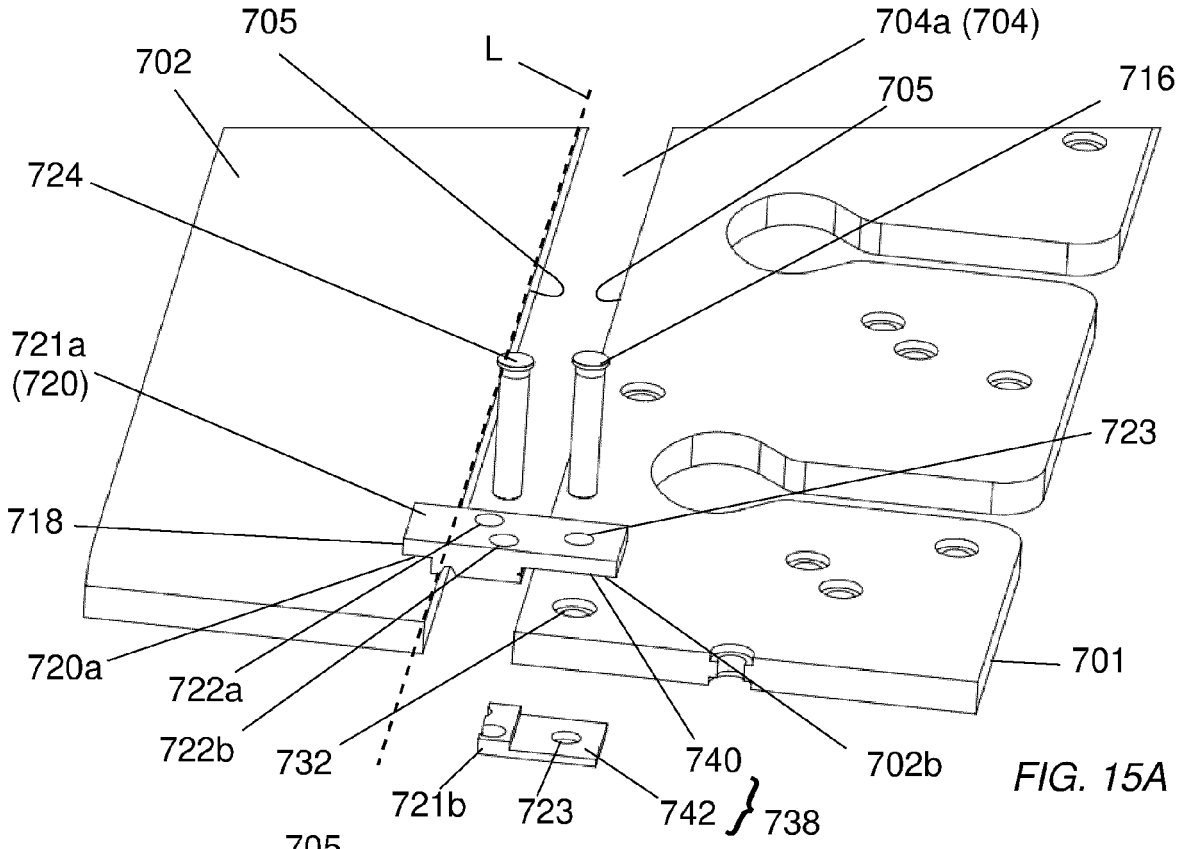

FIG. 15A

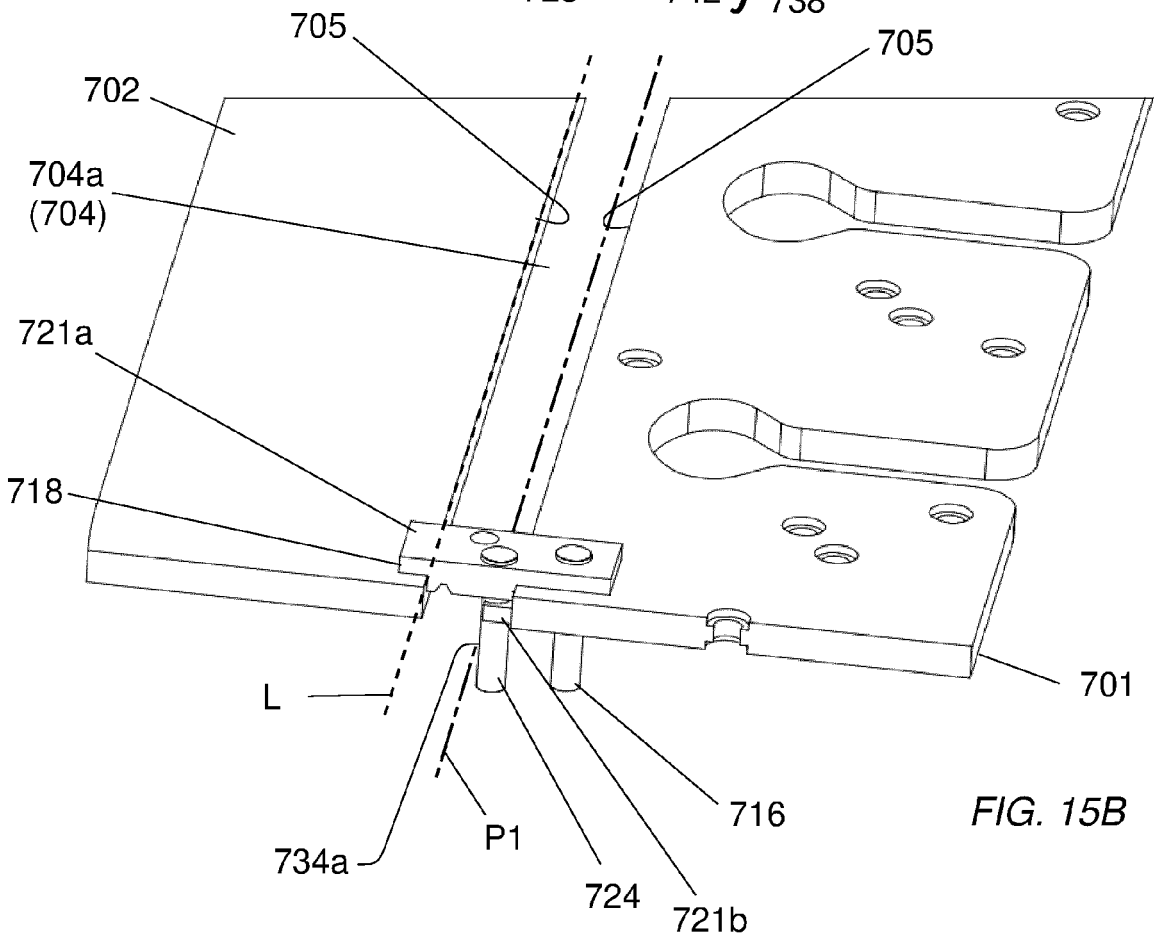

FIG. 15B

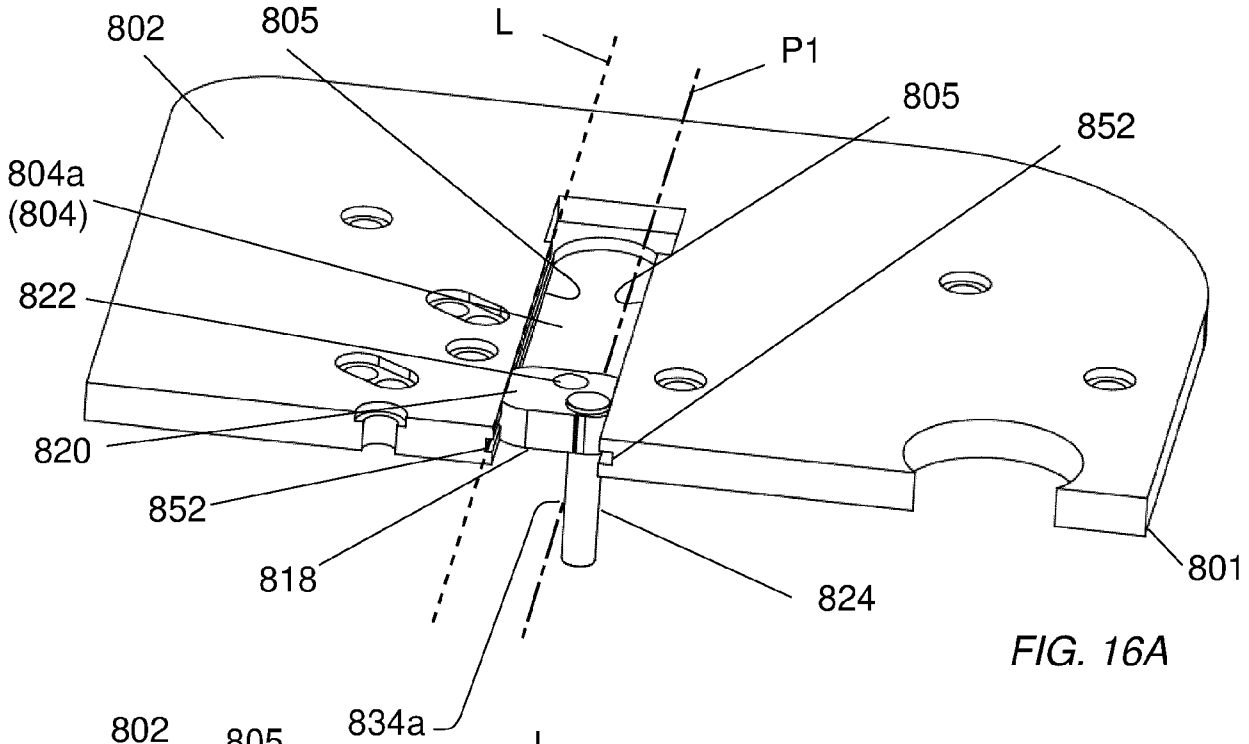

FIG. 16A

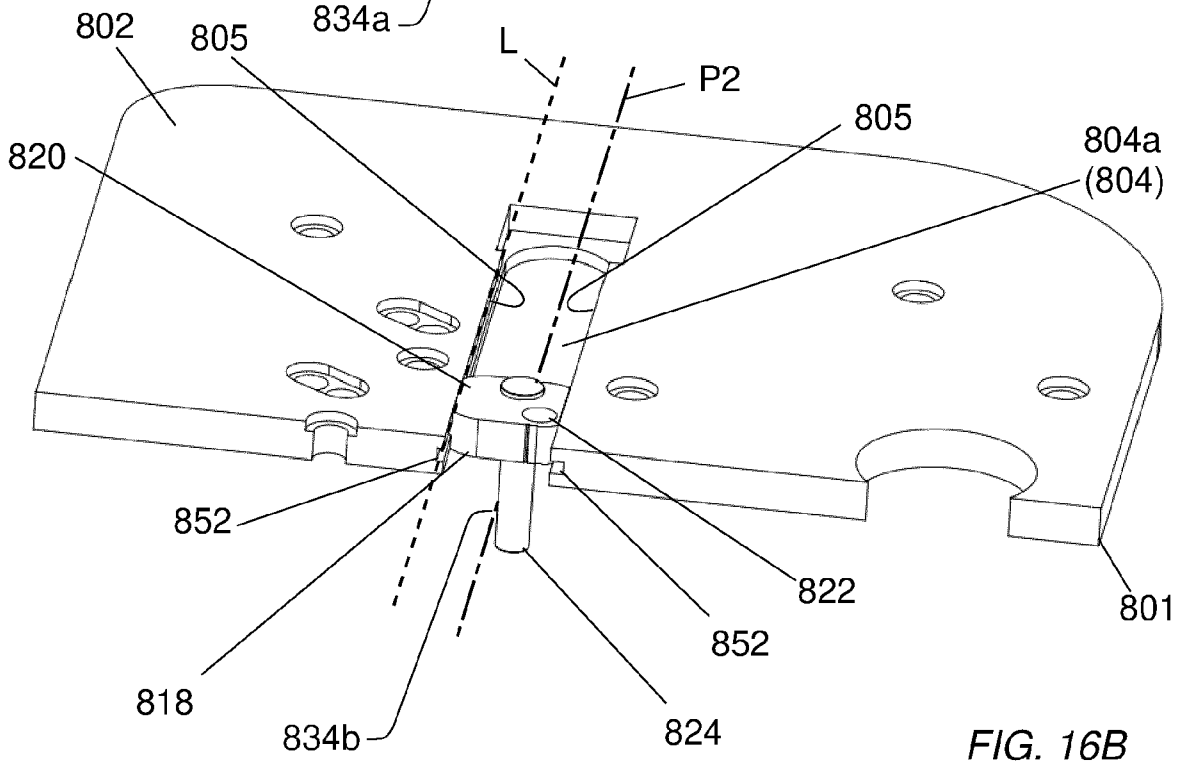

FIG. 16B

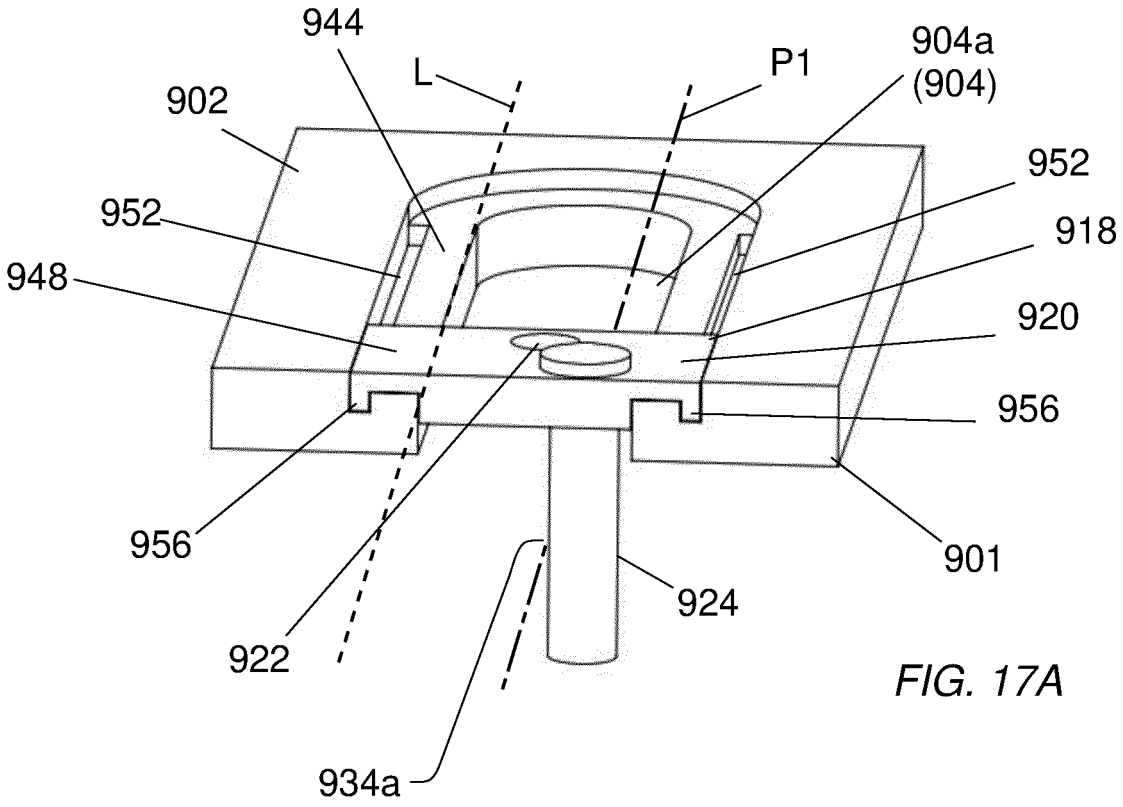

FIG. 17A

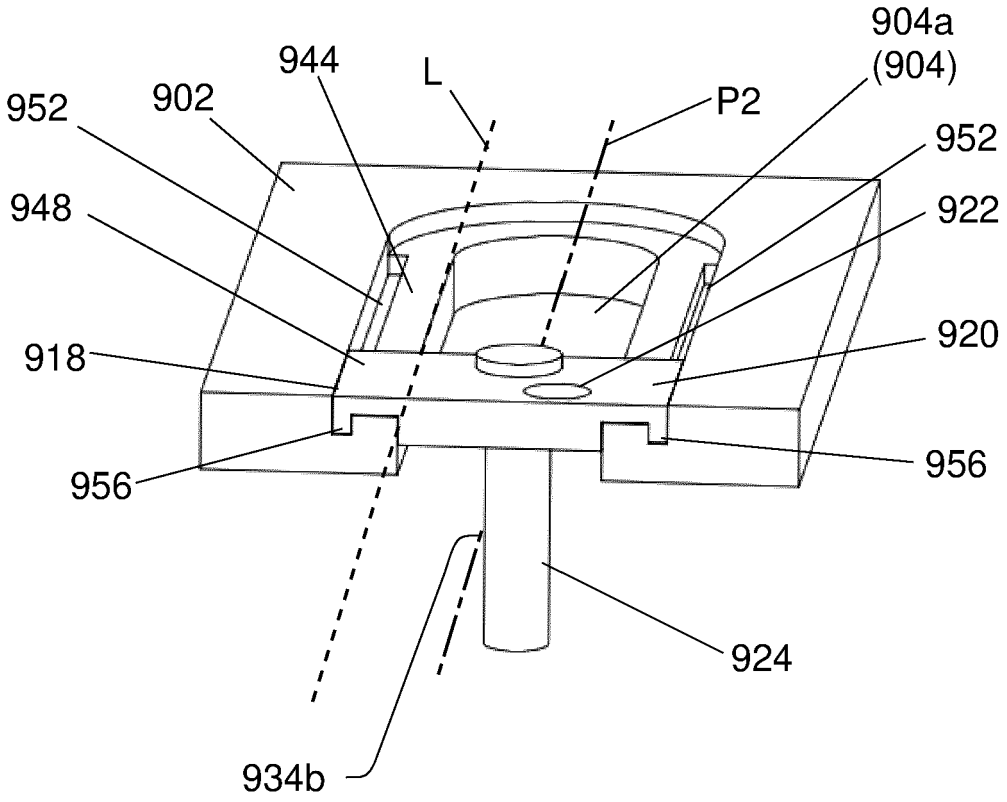

FIG. 17B

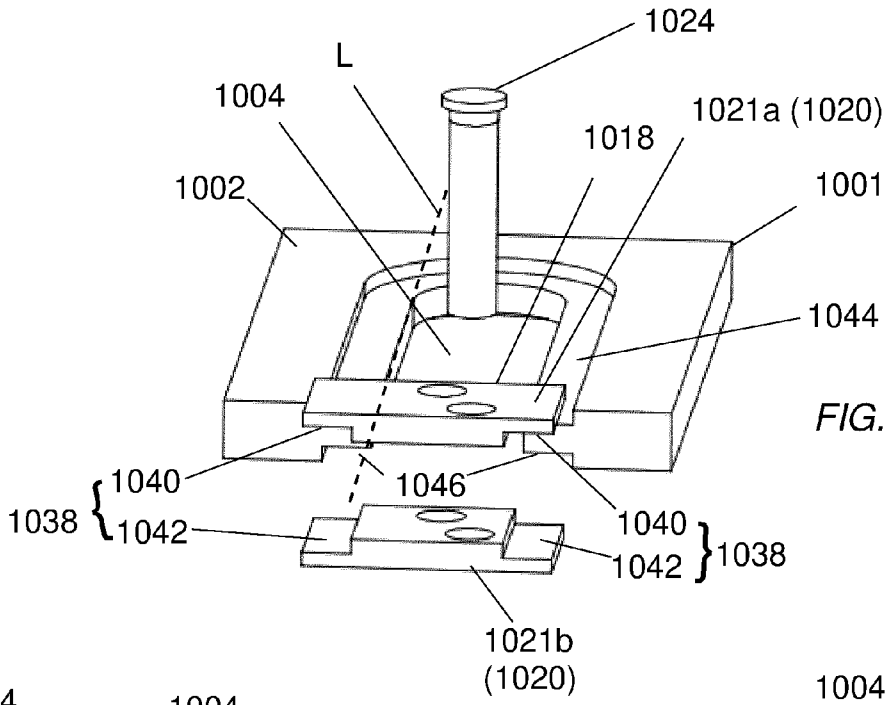

FIG. 18A

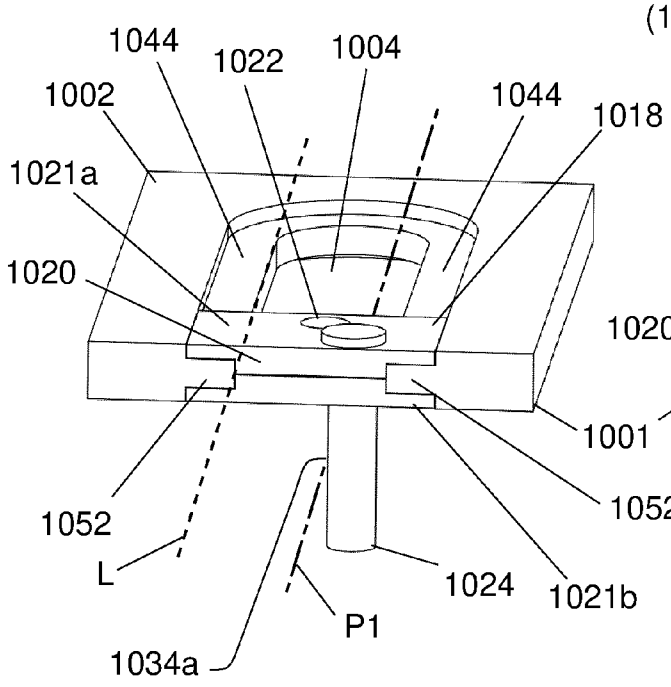

FIG. 18B

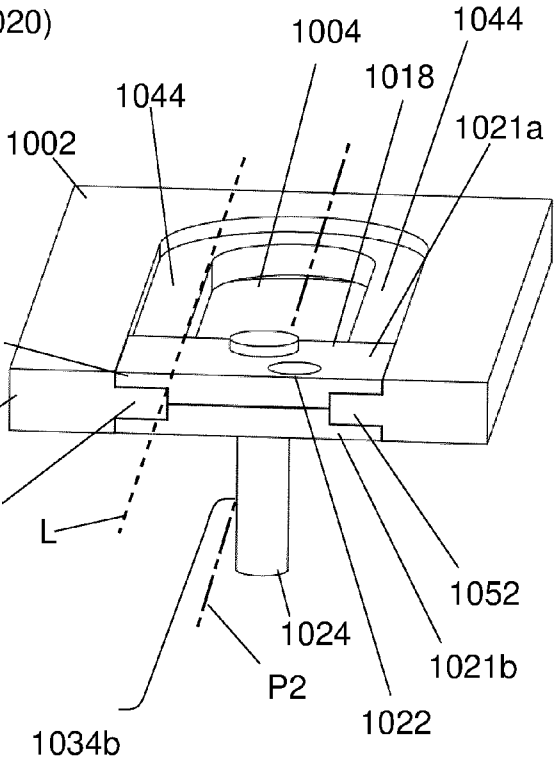

FIG. 18C

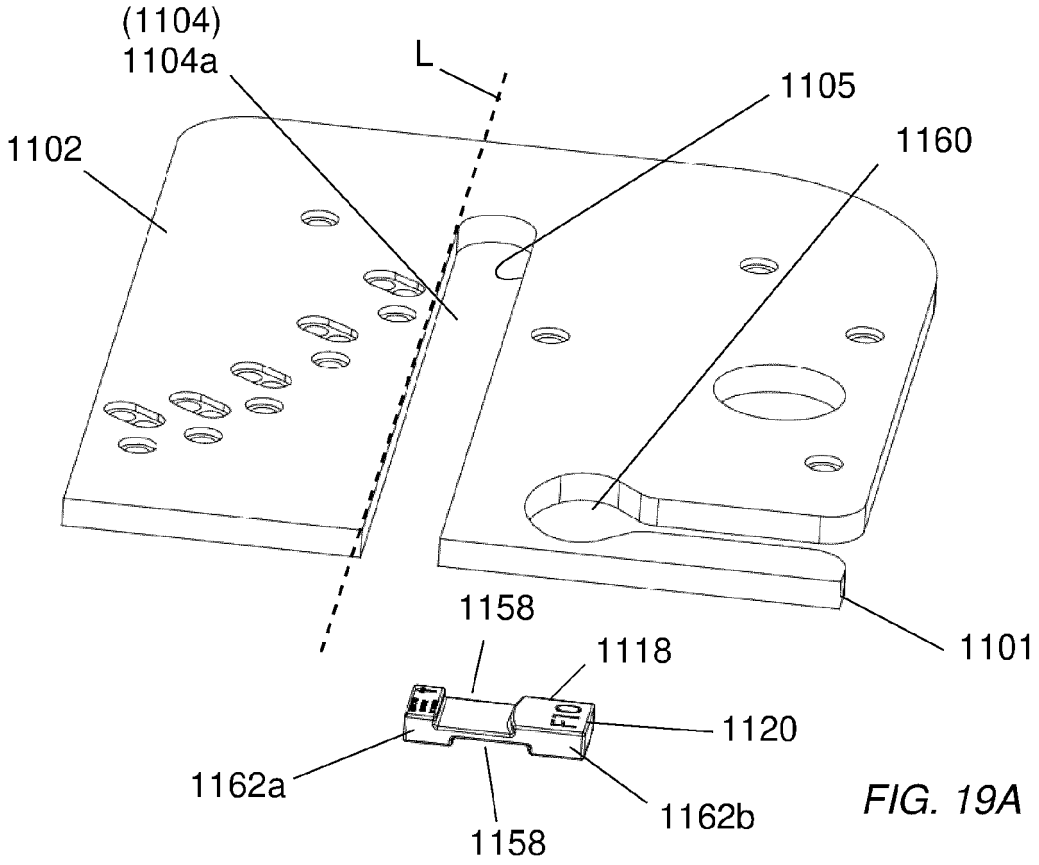

FIG. 19A

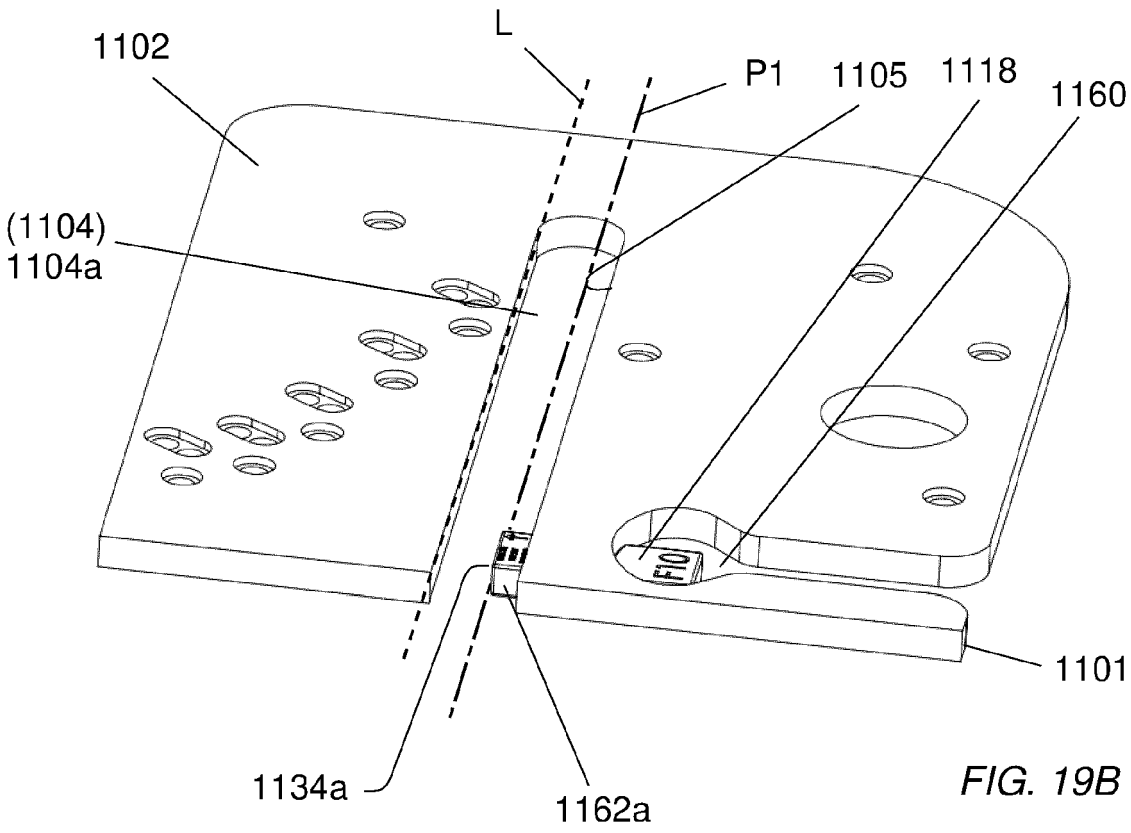

FIG. 19B

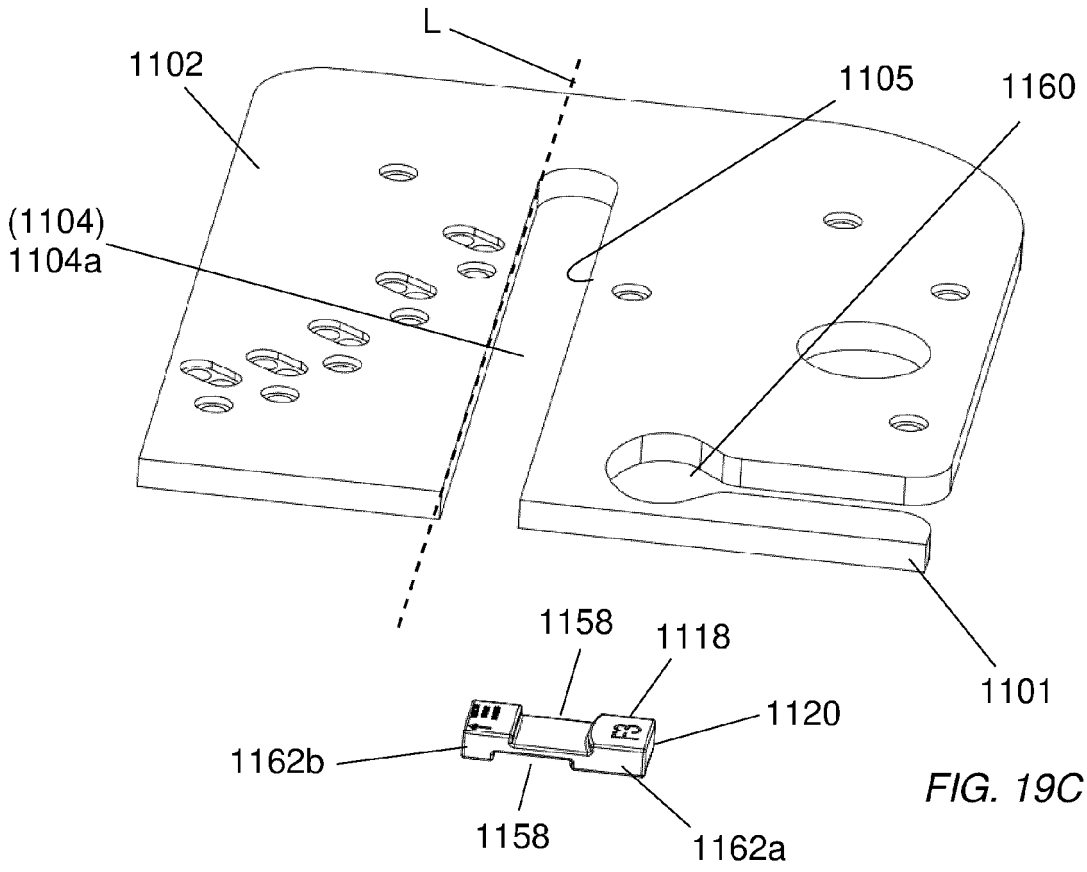

FIG. 19C

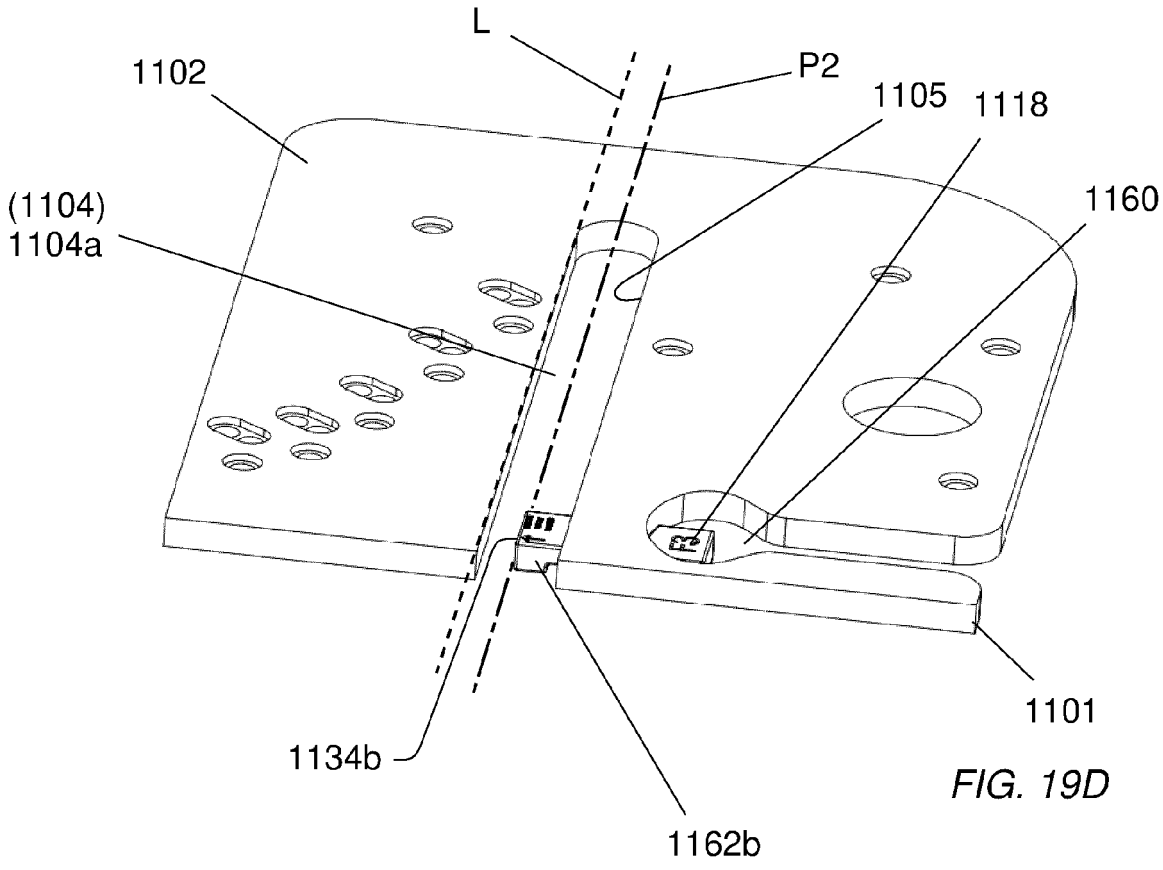

FIG. 19D

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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 6785

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* claims; figures *	3,5,6,9, 10,13	B23Q9/00

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A	* paragraphs [0001], [0007] * * claims; figures *	4-6, 8-10,13	

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B27C
B23B
B23Q
B25B
B25H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 October 2024	Hamel, Pascal

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