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(54) ASSEMBLY COMPRISING A HOUSING MEMBER FOR A CONNECTOR WHICH CAN BE PLUGGED TOGETHER WITH A MATING CONNECTOR AND A PIVOT LEVER WHICH CAN BE ATTACHED TO THE HOUSING MEMBER TO BE PIVOTAL, CONNECTOR, AND PLUGGING ASSEMBLY

(57) The invention relates to an assembly (100), comprising a housing member (20) for a connector (10) which can be plugged together with a mating connector (200), a pivot lever (50) which can be attached to the housing member (20) to be pivotal, and a locking mechanism (77) comprising a locking element (70) which can be slidable by the mating connector (200) from a locked position (170) to a release position (180) and which, in the locked position (170), affixes the pivot lever (50) in an initial position (150) and by way of which, in the release position (180), a pivotal motion of the pivot lever (50) relative to the housing member (20) is enabled. The invention additionally relates to a connector (10) comprising such an assembly (100). The invention furthermore relates to a connector assembly (300) comprising such an assembly (100) and a mating connector (200).

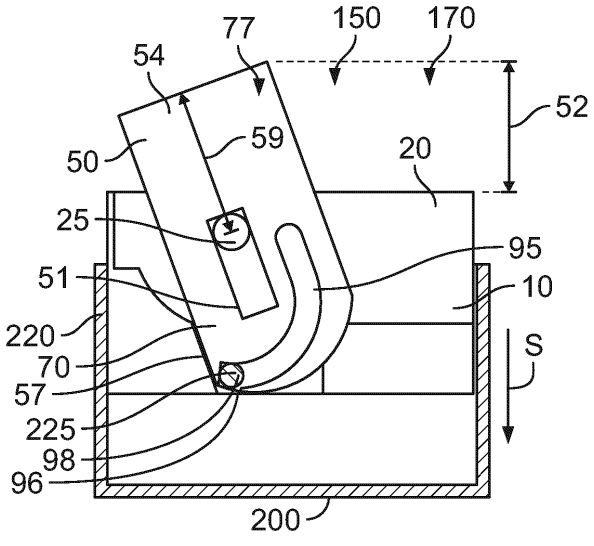


Fig. 2A

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Description

[0001] The invention relates to an assembly comprising a housing member for a connector which can be plugged together with a mating connector and a pivot lever that can be attached to the housing member to be pivotal.

[0002] The invention furthermore relates to a connector comprising such an assembly.

[0003] The invention additionally relates to a plugging assembly comprising such an assembly and a mating connector.

[0004] Connectors with pivot levers are known. With some known connectors, the pivot lever is used, for example, to press the connector onto or into the mating connector. However, assembly of such connectors is often complex.

[0005] One object of the invention is to enable simple assembly of the connector to the mating connector.

[0006] The invention satisfies this object by an assembly with a locking mechanism which comprises a locking element which is slidable by the mating connector from a locked position to a release position and which, in the locked position, affixes the pivot lever in an initial position and by way of which, in the release position, a pivotal motion of the pivot lever relative to the housing member is enabled.

[0007] With this solution, the pivot lever is affixed in the initial position when the connector is not yet connected to the mating connector. The connector can then simply be connected to the mating connector without the need for cumbersome alignment of the pivot lever. When the connector is assembled with the mating connector, the pivot lever is automatically released and can carry out the pivotal motion, for example, to secure the connector to the mating connector or to draw the connector onto or into the mating connector using lever force.

[0008] The invention can be further improved by the following developments and configurations which are advantageous each by itself and can be combined with one another at random.

[0009] In an advantageous embodiment, the locking element is formed by a section of the pivot lever which is slidable relative to the housing member. This means that the number of components required is small. In addition to being pivotable relative to the housing member, the pivot lever can also be slidable relative to the housing member. The pivotablity can there be given in one position and the slidability in another position.

[0010] The locking element can be part of a slide attached to the pivot lever. This allows for easy manipulation.

[0011] In a space-saving configuration, the locking element in the locked position can be inserted into a slot in the housing member. The slot can extend substantially along the plugging direction, somewhat along the plugging direction, or along a direction that runs at an angle to the plugging direction, in particular at an angle of less than 60 degrees, to enable easy sliding. The slot can be rectilinear at least in part and/or curved at least in part. It can have a uniform cross-section to enable easy guidance.

[0012] To make manipulation easier, it can be provided that the locking element is guided in the slot in an exclusively slidable manner.

[0013] In order to simplify a pivotal motion, the locking element in the release position can be pushed out of the slot.

[0014] According to a further advantageous embodiment, the slot opens to a side of the housing member facing the mating connector. As a result, the locking element can be accessible to the mating connector and a simple deflection by the mating connector can be possible.

[0015] In a simple and space-saving structure, the pivot lever can be guided along a connecting link relative to the housing member.

[0016] In an advantageous embodiment, the pivot lever has a connecting link into which a sliding block of the mating connector can be inserted in the locked position. This can allow for simple assembly. In particular, the sliding block can be insertable into the connecting link only in the locked position. The connecting link there is to be understood to be a guide assembly for an associated sliding block and enables the sliding block to move only along a single path of motion. The connecting link can comprise side walls that are used as guide or bearing elements and can be formed somewhat as a groove, slot and/or by projecting strips.

[0017] The connecting link can form a forced guide for the pivot lever. This allows the motion to be carried out particularly easily and reliably in the predetermined direction.

[0018] The pivot lever can be forcibly guided in a translational and rotational manner, i.e., only a defined motion is forced upon the pivot lever. The position of the pivot lever relative to the housing member can be restricted to various positions disposed along a defined path. In particular, it can be forcibly guided in a translational manner in a first section of the connecting link and a rotational manner in a second section of the connecting link. The second section can follow the first section of the connecting link. These configurations can make the manipulation easier because the direction of motion is defined in each case.

[0019] In a particularly simple configuration, the pivot lever can be mounted to be pivotal on a pin. The pin can be in particular a stub axis. The pin can be configured to be circular cylindrical to enable easy rotation.

[0020] According to a further embodiment, the pin can be slidable in a groove, which is preferably rectilinear.

[0021] In a possible configuration, the pin is arranged at the housing member and the groove at the pivot lever.

[0022] According to a further possible configuration, the pin can be arranged at the pivot lever and the groove at the housing member. As a result, the mass of the lever

that needs to be moved can be smaller, making the manipulation easier.

[0023] The assembly can be configured such that the mating connector is drawn towards the connector by the pivotal motion. In particular, the connector can be pushed or drawn into the mating connector or vice versa. Due to the pivotal motion, the distance between the connector and the mating connector can be shortened.

[0024] According to a further configuration, the distance between the connector and mating connector can remain constant during the pivotal motion. The pivotal motion can then serve, for example, to secure the connector to the mating connector without pressing the two onto each other.

[0025] In an advantageous configuration, a lever length of the pivot lever is longer in the release position than in the locked position. As a result, the force required by the user can be less. At the same time, the risk of damage in the locked position can be minimized since external forces generate smaller forces due to the smaller lever effect.

[0026] In order to have the smallest possible volume for transport and to reduce the risk of damage, an overhang length of the pivot lever measured in the plugging direction relative to the housing member can be greater in the release position than in the locked position.

[0027] According to an advantageous configuration, the pivotal motion can be blocked in a secured position. In the secured position, only a translational motion of the pivot lever relative to the connector and/or the mating connector can be possible. Unintentional release, in particular of the connector from the mating connector, can be prevented by the lack of pivotability.

[0028] In order to increase safety, the secured position can be disposed opposite the initial position with respect to the pivotal motion. The pivot range of the pivotal motion can be between the initial position and the secured position. In particular, the initial position can be accessible at one end and the secured position at another end opposite the one end of the pivotal motion. This can reduce the risk of the assembly unintentionally moving from the secured position to the initial position, since it would first have to carry out the pivotal motion.

[0029] In a configuration that is easy to manufacture, the pivot lever can be formed as one piece. Alternatively, the pivot lever can consist of several elements that are immovably connected to one another.

[0030] The assembly can comprise at least one bearing element to support the housing member and/or the pivot lever for the pivotal motion and/or a translational motion. The bearing element can be configured as a track, hole, elongate hole, projection, strip, flat surface, curved surface or a partially cylindrical surface. Additional bearing elements can be present at the mating connector.

[0031] According to the invention, a connector comprising an assembly according to the invention is also provided. The connector can furthermore have contact elements, in particular electrical contact elements, to establish contact with the mating connector. They can be arranged in contact element receptacles that are accessible to corresponding mating contact elements of the mating connector. The contact element receptacles can define the plugging direction. They can be elongate and/or extend along the plugging direction.

[0032] A plugging assembly according to the invention comprises in particular an assembly according to the invention and a mating connector. The mating connector can be configured to be plugged together with the connector which is part of the housing member. Specifications of the connector and/or mating connector can be defined in national, international, proprietary or other standards.

[0033] In an advantageous configuration, the plugging assembly can comprise a gear mechanism for reducing the distance between the connector and the mating connector. The gear mechanism can comprise at least one tooth projecting transverse to the plugging direction. It can comprise a gear wheel, a gear wheel segment, or a gear rack.

[0034] According to a further configuration, the plugging assembly can comprise a spiral guide mechanism for reducing the distance between the connector and the mating connector. The spiral guide mechanism can comprise a wall, for which the distance to a center of rotation which can be defined by a pin, decreases along an angular direction.

[0035] According to the invention, a housing member is also provided for an assembly according to the invention. Furthermore, a pivot lever is provided for an assembly according to the invention.

[0036] The invention shall be explained in more detail hereafter by way of example on the basis of advantageous configurations with reference to the drawings. The advantageous further developments and configurations illustrated there are each independent of one another and can be combined with one another at random, depending on how this is necessary for the application.

[0037] In the figures,

Figs. 1A-C show schematic perspective views of various parts of a first embodiment of a plugging assembly;

Figs. 2A-E show schematic sectional side views of the first embodiment of a plugging assembly in various stages of a connection process;

Figs. 3A-D show schematic perspective views of various parts of a second embodiment of a plugging assembly; and;

Figs. 4A-E show schematic sectional side views of the second embodiment of a plugging assembly in various stages of a connection

process.

[0038] Two different exemplary plugging assemblies 300 are shown in the figures. These are similar in some respects.

[0039] They each comprise a connector 10, a pivot lever 50, and a mating connector 200. Connector 10 is only represented schematically there by housing member 20. However, it can also comprise further elements such as contact elements, receptacles for mating contact elements, attachment elements for a cable or the like. The same applies to mating connector 200 which is configured to be plugged together with connector 10 along a plugging direction S. This can be achieved in particular in that guide elements at connector 10 and/or at mating connector 200 are configured accordingly, at least some of them, for example, in that they extend along plugging direction S.

[0040] Pivot lever 50 is configured to be attached to housing member 20. When attached, the movability between housing member 20 and pivot lever 50 is restricted to different positions relative to one another. In certain positions, pivot lever 50 can be pivoted, i.e. rotated, relative to housing member 20. In other positions, only a translational slidability between housing member 20 and pivot lever 50 is possible. Furthermore, it is conceivable that a combined motion of rotation and translation is possible between pivot lever 50 and housing member 20, but this is not illustrated in the examples shown.

[0041] Generally speaking, bearing elements 60 are used to restrict relative motions between individual parts. Bearing elements 60 can serve as parts of translational and/or rotational bearings. In particular, bearing elements 60 shown are configured as sliding bearings. There are no further elements such as balls or rollers present between two moving parts. Instead, a motion is achieved through sliding friction between the surfaces involved. In order to keep the force that arises during sliding friction small, the individual elements can be manufactured from certain materials or have a special configuration on the sliding surfaces, for example, have a coating there.

[0042] An assembly 100 consisting of a connector 10 and a pivot lever 50 each comprises a locking mechanism 77 which comprises a locking element 70 that can be moved by mating connector 200 from a locked position 170 to a release position 180. In locked position 170, pivot lever 50 is affixed in an initial position 150. In initial position 150, it has a fixed rotational position relative to housing member 20. In release position 180, however, a pivotal motion of pivot lever 50 relative to housing member 20 is enabled.

[0043] The embodiments shown are furthermore configured such that pivot lever 50 in a secured position 190 is slidable relative to housing member 20 such that connector 10 is secured to mating connector 200. Secured position 190 is disposed opposite initial position 150 with respect to the pivotal motion. They are each at one end of the pivoting range in the examples shown. In secured position 190, the relative position between connector 10 and mating connector 200 no longer changes or changes only slightly. A relative rotation between pivot lever 50 and housing member 20 is not enabled in the secured position.

[0044] In the two embodiments shown, the motion that can be carried out by pivot lever 50 in secured position 190 runs along a transverse direction Q, which runs perpendicular to plugging direction S. This makes it possible to easily create a positive fit connection with little force. When completely secured, corresponding positive-fit elements or stops 56, 206 abut against one another at housing member 20, at pivot lever 50, and at mating connector 200 and thus hinder a relative motion along plugging direction S.

[0045] The pivotal motion allows connector 10 to be drawn towards mating connector 200 in the examples shown. This makes it possible to generate, for example, desired contact forces between contact elements and mating contact elements. In other embodiments, not shown, the pivotal motion can be used only to secure connector 10 relative to mating connector 200, without a relative motion of the two being forced.

[0046] The two embodiments shown differ in terms of the mechanisms shown by way of example that are used to draw connector 10 towards mating connector 200. In the embodiment according to Figures 1 and 2, a spiral guide mechanism 320 is used in which the distance between connector 10 and mating connector 200 is shortened during the pivotal motion by a guided motion of a sliding block 98 arranged on mating connector 200 in a connecting link 95 at pivot lever 50. This is achieved in particular in that the distance between connecting link 95 and a pin 25 used as an axis of rotation at housing member 20 varies at different positions of the rotational motion.

[0047] In the embodiment of Figures 3 and 4, however, a gear mechanism 310 is used in which teeth 53, 211 on pivot lever 50 and on a housing member 220 of mating connector 200 mesh with each other and thereby convert the rotational or pivotal motion into a translational motion.

[0048] In both embodiments, lever length 59 of pivot lever 50 is extended when locking mechanism 77 is moved from locked position 170 in the direction towards release position 180. This is achieved in that pivot lever 50 and housing member 20 are connected to one another by an elongate hole 51 and a pin 25 mounted therein and movable therein. Circular cylindrical pin 25 serves as a bearing for the pivotal motion. In the embodiments shown, elongate hole 51 is arranged at pivot lever 50 and pin 25 at housing member 20, respectively. Alternatively, reverse configurations are also possible.

[0049] Furthermore, an overhang length 52, which pivot lever 50 projects along plugging direction S relative to housing member 20, is extended towards the release position 81 during such sliding within locked position 170. This has the advantage that pivot lever 50 protrudes little

in a transport position and the risk of damage is therefore lower than with a rigid pivot lever. However, should pivot lever 50 still strike against, for example, external elements, the smaller lever length 59 means that the force acting upon assembly 100 is smaller and any possible damage is thereby prevented or is smaller.

[0050] In both embodiments, assembly 100 is slid to release position 180 by mating connector 200. This occurs automatically when mating connector 200 is inserted into connector 10 in an initial plugging motion.

[0051] Locking elements 70 are each formed by a section 57 of pivot lever 50 which in locked position 170 is slidable relative to housing member 20. In the embodiment of Figures 1 and 2, section 57 is disposed on a side surface of pivot lever 50. In the embodiment of Figures 3 and 4, an inwardly projecting pin 55 at pivot lever 50 serves as a locking element 70.

[0052] In both cases, locking element 70 is inserted into a slot 21 of housing member 20 in locked position 170. It is guided there in only a slidable manner. In release position 180, locking element 70 is pushed out of slot 21. The rotation lock of the purely translational slidable guide is lifted. Slot 21 opens in a direction opposite to plugging direction S, i.e. it is open to a side 22 of housing member 20 facing mating connector 200.

[0053] In other embodiments, locking element 70 can be part of a slide attached to pivot lever 50.

[0054] Pivot lever 50 is guided along a connecting link 90, 95 relative to housing member 20. Connecting link 90, 95 forms a forced guide for pivot lever 50.

[0055] In the embodiment according to Figures 1 and 2, pivot lever 50 comprises a connecting link 95 into which a sliding block 98 of mating connector 20 can be inserted only in locked position 170.

[0056] In the embodiment of Figures 3 and 4, pivot lever 50 is forcibly guided in a translational manner in a first section 91 of connecting link 90 and in a rotational manner in a second section 92 adjoining first section 91 of connecting link 90.

[0057] In the configuration of Figures 1 and 2, pins 225 are respectively present at housing member 20 of connector 10 and housing member 220 of mating connector 200 and engage in corresponding grooves 61 at pivot lever 50.

[0058] In the configuration of Figures 3 and 4, a respective pin 25, 55 and a groove 61 are formed at housing member 20 and at pivot lever 50 and interact with groove 61 or pin 55, 25 on respective other element 50, 20.

[0059] Depending on the desired motion, the grooves 61 can be configured to be rectilinear, curved, angular and/or in the shape of a partial circle.

[0060] Pivot levers 50 shown are each in one piece. Alternatively, pivot lever 50 can consist of several elements that are immovably connected to one another.

[0061] Pivot lever 50 is configured to be U-shaped. An operating section 54, at which, for example, manual or mechanical operation is possible, is disposed between two legs, at the end of which pivot lever 50 is mounted at housing member 20.

[0062] In the embodiments shown, mating connector 200 is only illustrated by a housing member 220 which, for example, forms a receptacle 201 for connector 10. In other embodiments, such a receptacle 201 can be missing at mating connector 200 or can be configured to be more open at the side.

[0063] In the embodiment of Figures 3 and 4, teeth 211 of mating connector 200 are formed at housing member 220 as a gear rack 210 running along the plugging direction. Teeth 211 there protrude along transverse direction Q and are configured for a positive-fit connection with at least one tooth 53 at pivot lever 50.

[0064] As can be seen in particular in Figures 2 A to E, this embodiment is configured such that pin 225 or sliding block 98 of housing member 220 of mating connector 200 is disposed along plugging direction S exactly behind pin 25 at housing member 20 of connector 10. This allows a good transmission of the tensile force generated by the rotational motion without connector 10 jamming with mating connector 200 due to transverse forces.

[0065] The connection process proceeds in a similar manner in both embodiments, as can be seen in Figures 2A to E and 4A to E. First, mating connector 200 is approached to connector 10 along plugging direction S (Figures 2A and 4A). Locking mechanism 77 is in locked position 170 in which pivot lever 50 is affixed in an initial position 150.

[0066] Assembly 100 is slid by mating connector 200 along locked position 170 until the latter transitions into release position 180 (Figures 2B and 4B). Pivoting pivot lever 50 is possible there.

[0067] Connector 10 is drawn towards mating connector 200 by meshing parts of the spiral guide mechanism 320 or gear mechanism 310, respectively (Figures 2C and 4C).

[0068] At the end of the pivotal motion, secured position 190 is accessible (Figures 2D and 4D) with which securing connector 10 to mating connector 200 is effected by sliding pivot lever 50 along transverse direction Q (Figures 2E and 4E).

Reference characters

[0069]

10	connector
20	housing member
21	slot
22	side facing the mating connector
25	pin
26	stop
50	pivot lever
51	long hole
52	overhang length
53	tooth
54	operating section
55	pin

56	stop
57	section
59	lever length
60	bearing element
61	groove
70	locking element
77	locking mechanism
90	connecting link housing member
91	first section
92	second section
95	connecting link at the pivot lever
96	opening
98	sliding block
100	assembly
150	initial position
170	locked position
180	release position
190	secured position
200	mating connector
201	receptacle
206	stop
210	gear rack
211	tooth
220	housing member of the mating connector
225	pin
300	plugging assembly
310	gear mechanism
320	spiral guide mechanism
Q	transverse direction
S	plugging direction

Claims

1. Assembly (100), comprising a housing member (20) for a connector (10) which can be plugged together with a mating connector (200), a pivot lever (50) which is attached to said housing member (20) to be pivotal, and a locking mechanism (77) comprising a locking element (70) which can be slidable by said mating connector (200) from a locked position (170) to a release position (180) and which, in the locked position (170), affixes said pivot lever (50) in an initial position (150) and by way of which, in said release position (180), a pivoting motion of said pivot lever (50) relative to said housing member (20) is enabled.

2. Assembly (100) according to claim 1, wherein said locking element (70) is formed by a section (57) of said pivot lever (50) which is slidable relative to said housing member (20).

3. Assembly (100) according to claim 1 or 2, wherein said locking element (70) in said locked position (170) is inserted into a slot (21) of said housing member (20).

4. Assembly (100) according to claim 3, wherein said locking element (70) in said slot (21) is guided exclusively slidably.

5. Assembly (100) according to claim 3 or 4, wherein said locking element (70) is pushed out of said slot (21) in said release position (180).

6. Assembly (100) according to any one of claims 3 to 5, wherein said slot (21) opens to a side (22) of said housing member (20) facing said mating connector (200).

7. Assembly (100) according to any one of claims 1 to 6, wherein said pivot lever (50) is guided along a connecting link (90, 95) relative to said housing member (20).

8. Assembly (100) according to any one of claims 1 to 7, wherein said pivot lever (50) comprises a connecting link (95) into which a sliding block (98) of said mating connector (200) can be inserted in said locked position (170).

9. Assembly (100) according to any one of claims 7 or 8, wherein said connecting link (90, 95) forms a forced guide for said pivot lever (50).

10. Assembly (100) according to any one of claims 1 to 9, wherein said pivot lever (50) is forcibly guided in a translational and rotational manner.

11. Assembly (100) according to any one of claims 1 to 10, wherein said pivot lever (50) is mounted to be pivotable on a pin (25, 55, 225).

12. Assembly (100) according to claim 11, wherein said pin (25, 55, 225) is slidable in a groove (61).

13. Assembly (100) according to any one of claims 1 to 12, wherein said mating connector (200) is drawn towards said connector (10) by said pivotal motion.

14. Connector (10), comprising an assembly (100) according to any one of claims 1 to 13 and contact elements.

15. Plugging assembly (300), comprising an assembly (100) according to any one of claims 1 to 13 and a mating connector (200).

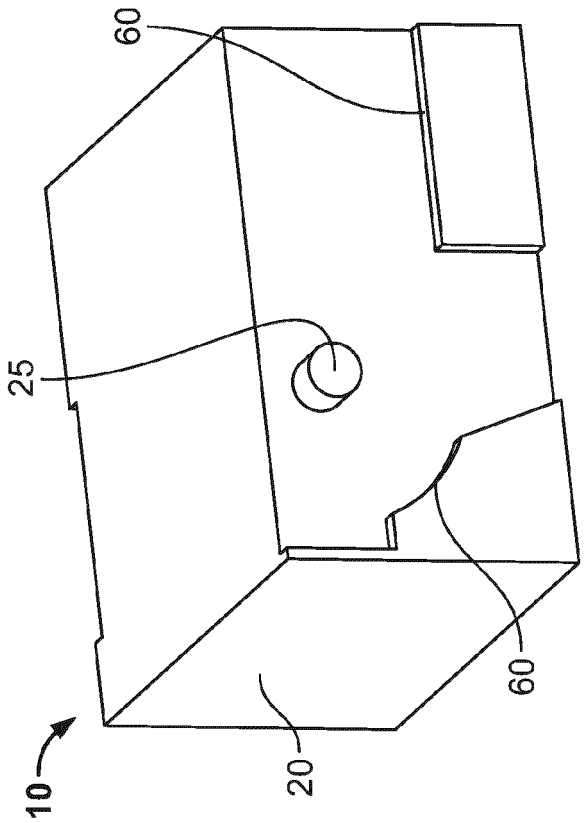


Fig. 1B

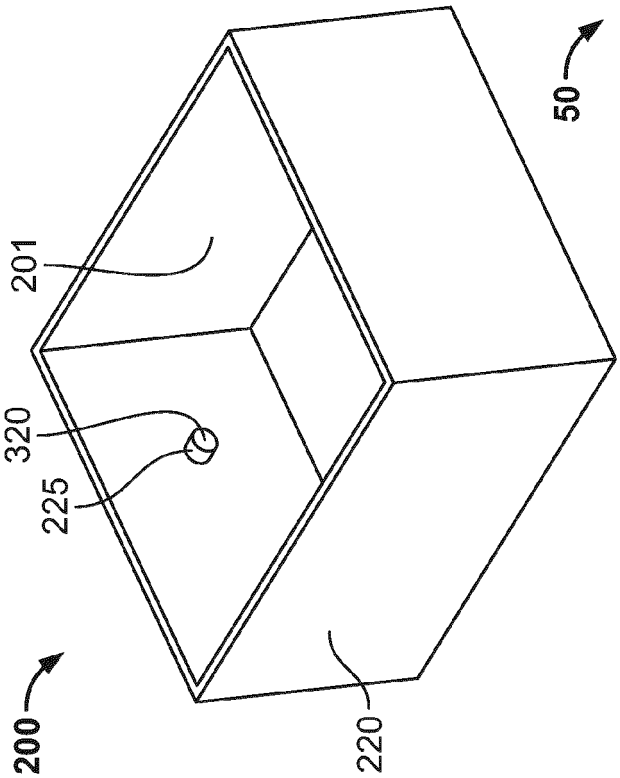


Fig. 1A

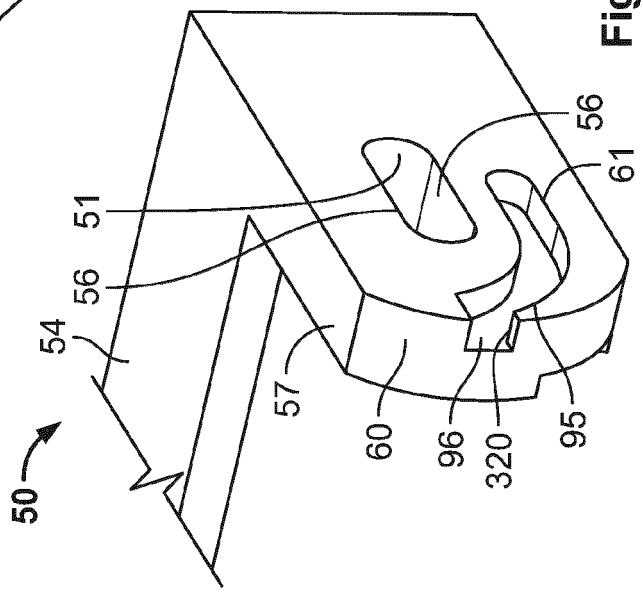
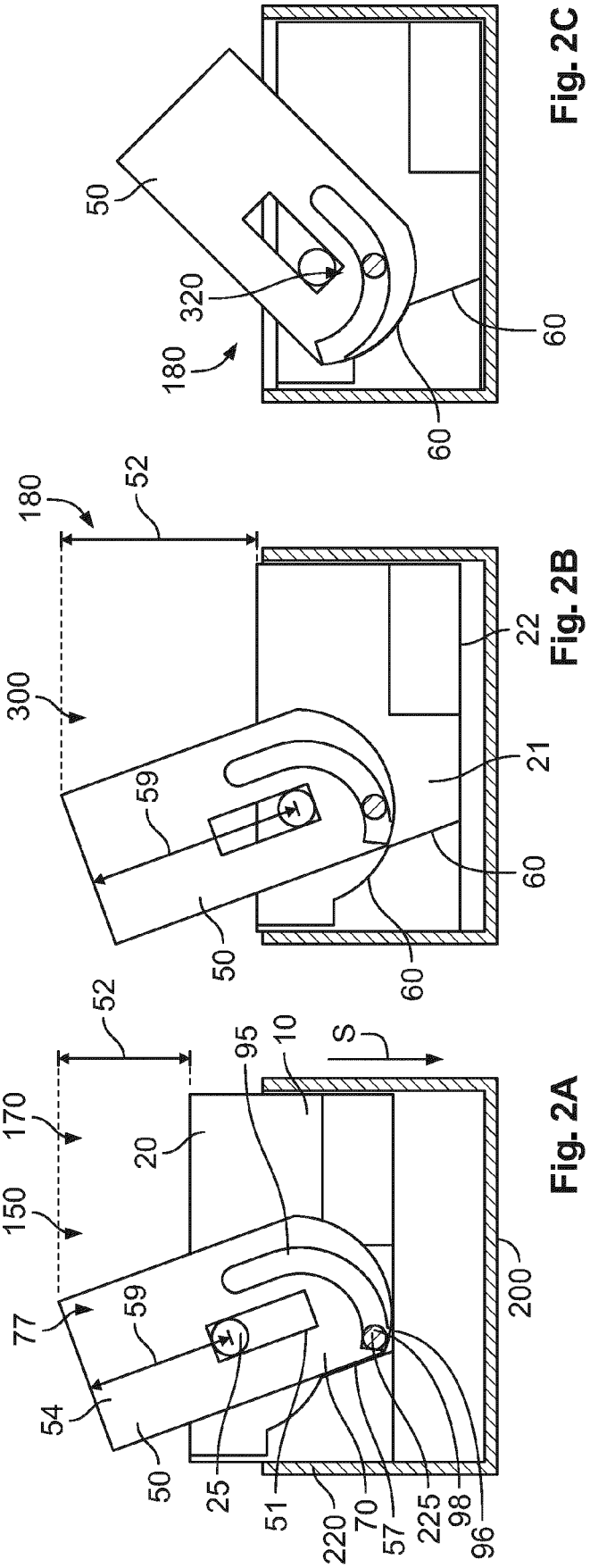
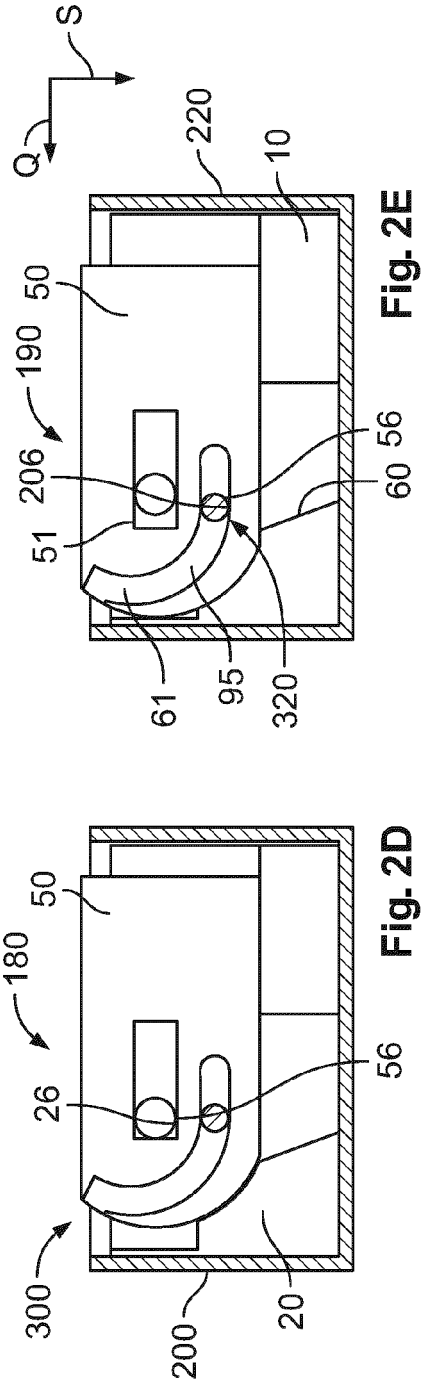


Fig. 1C


50
320
180
60
60
Fig. 2C
180
52
300
59
50
22
21
60
60
Fig. 2B
52
95
10
S
170
20
150
77
59
54
50
25
51
220
70
57
225
98
96
200
Fig. 2A


S
Q
220
10
50
190
206
51
56
60
61
95
320
Fig. 2E
180
50
26
56
300
200
20
Fig. 2D

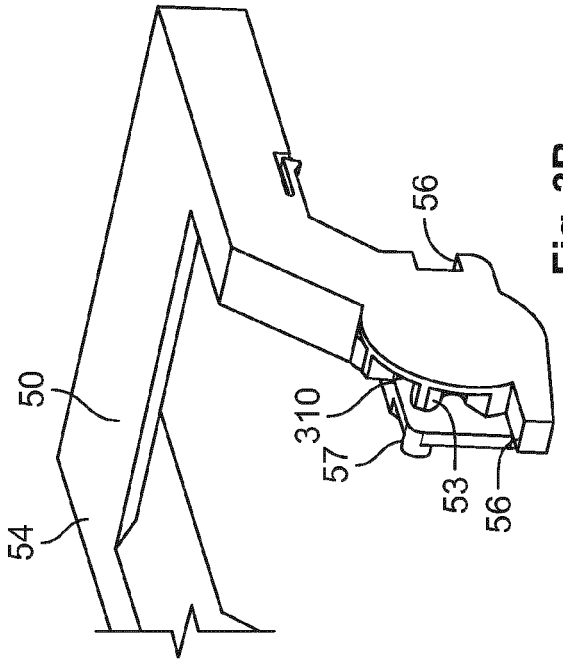


Fig. 3B

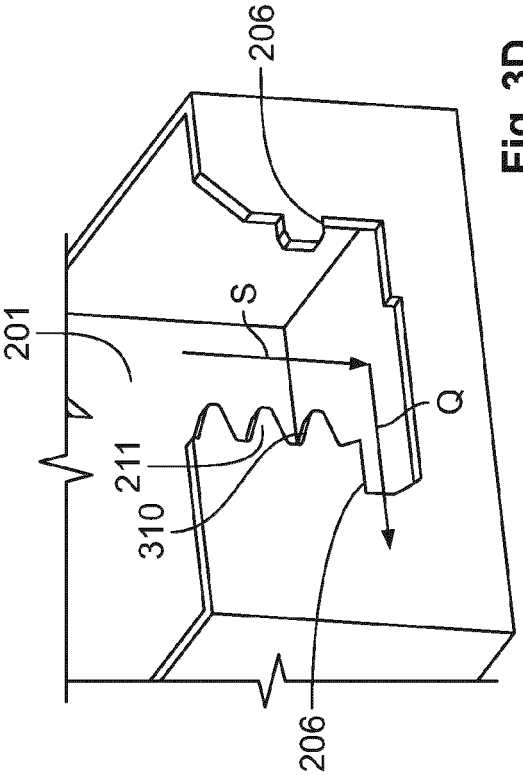


Fig. 3D

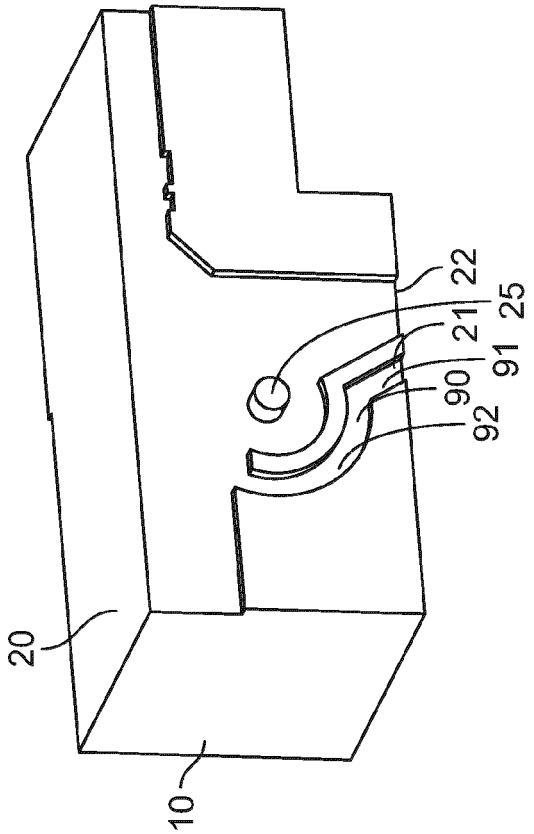


Fig. 3A

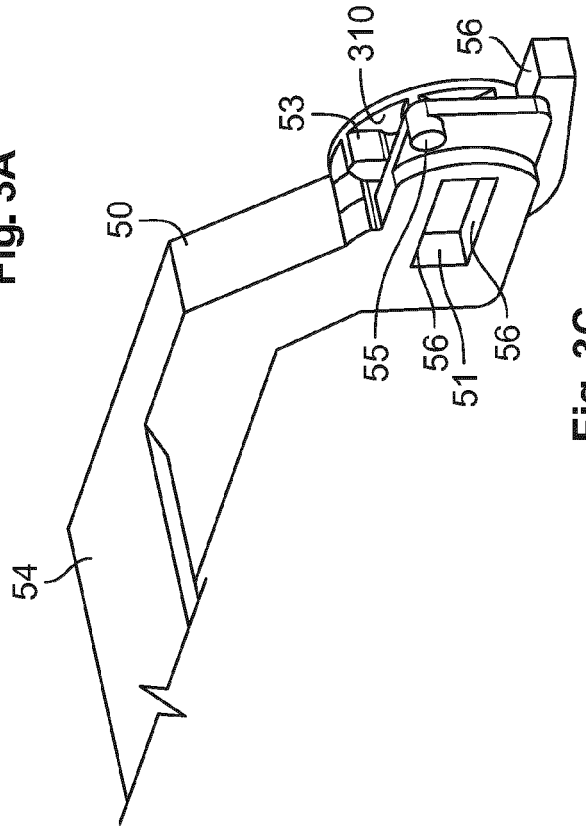


Fig. 3C

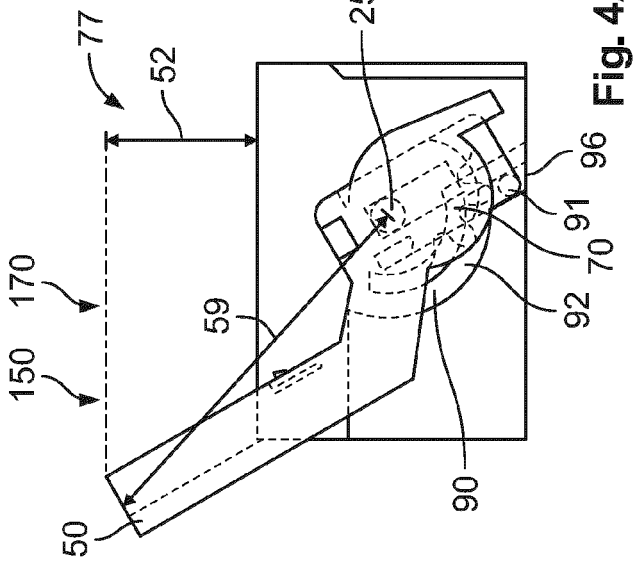


Fig. 4A

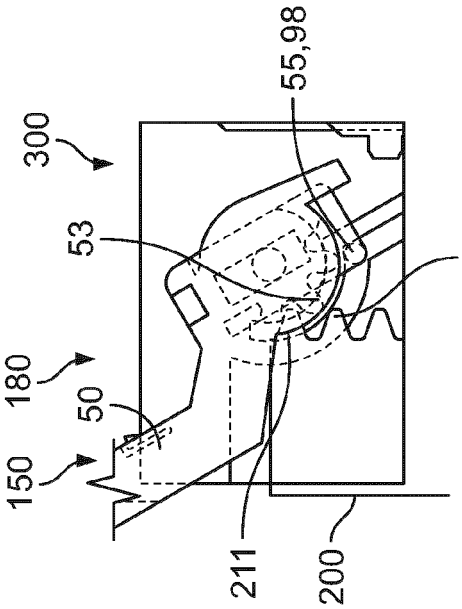


Fig. 4B

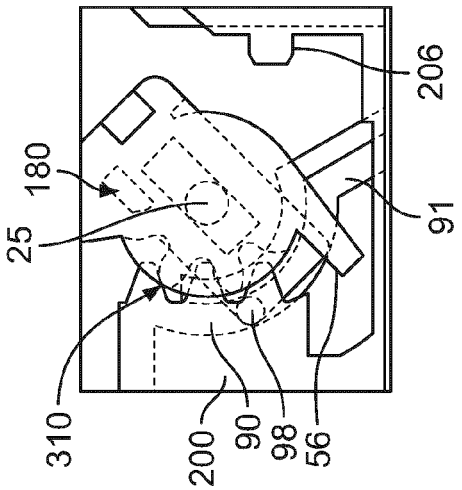


Fig. 4C

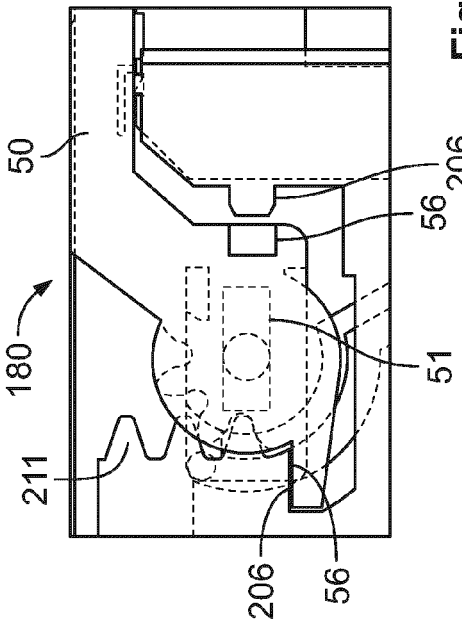


Fig. 4D

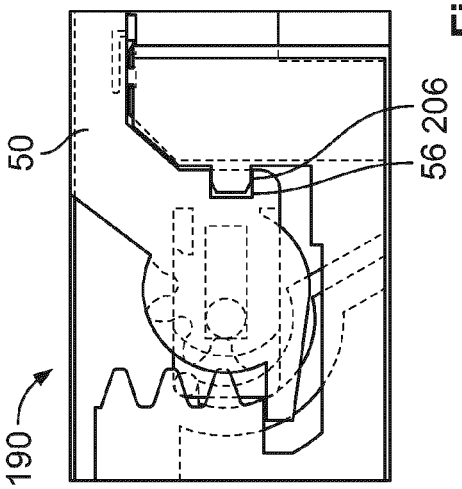


Fig. 4E

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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 8763

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Place of search	Date of completion of the search	Examiner
The Hague	19 June 2024	Vautrin, Florent

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