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(71) Applicant: **L&P Property Management Company**
**South Gate, CA 90280 (US)**

(72) Inventors:
- **COSTAGLIA, Massimo**
  **35010 Santa Giustina in Colle (PD) (IT)**
- **SLONGO, Alessandro**
  **31021 Mogliano Veneto (TV) (IT)**

(74) Representative: **Kraus & Lederer PartGmbB**
**Thomas-Wimmer-Ring 15**
**80539 München (DE)**

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# (54) COUPLING SYSTEM FOR CHAIR PARTS

(57) A coupling system (200) for coupling a chair part (106) of a chair (100) to a chair seat support structure (108) of the chair (100) is provided. The coupling system (200) comprises a receiving support (204) to be provided at one of a connecting member (120) of the chair part (106) and the chair seat support structure (108), and an insert terminal (202) to be provided at the other one of the connecting member (120) of the chair part (106) and the chair seat support structure (108). The insert terminal (202) comprises a first pin (210) and a second pin (212). In a use position of the chair (100) with the chair part (106) coupled to the chair seat support structure (108) via the coupling system (200), the first pin (210) and the second pin (212) extend horizontally from a vertical surface (214) of the insert terminal (202). The receiving support (204) provides a longitudinal support guide (206) with a stop (216) at a first end of the longitudinal support guide (206), and a pin insertion opening (218) and a recess (220) at a second end of the longitudinal support guide (206). A distance between the stop (216) and the recess (220) is essentially the same as a distance between the first pin (210) and the second pin (212) such that the second pin (212) is insertable in the recess (220) when the first pin (210) abuts the stop (216).

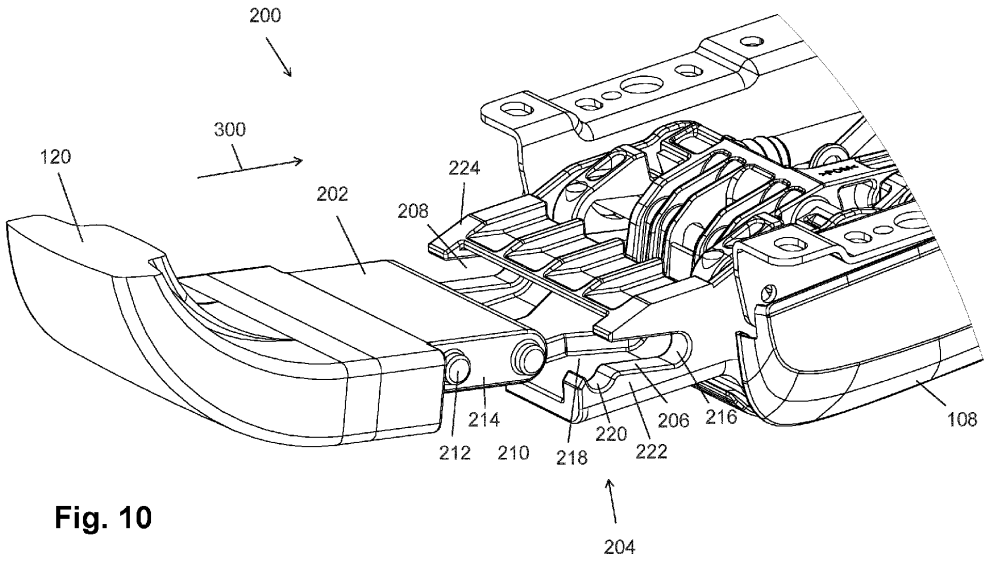


Fig. 10

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## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a coupling system for coupling chair parts, for example a backrest, an armrest, a footrest and a chair seat support structure. In particular, the present invention relates to a system for coupling a part of a chair, for example a backrest or an armrest, to a chair seat support structure of the chair. The present invention relates furthermore to a chair comprising the coupling system, and to a method of coupling parts of a chair using the coupling system.

### BACKGROUND OF THE INVENTION

**[0002]** A chair, for example an office-type chair, may comprise a plurality of chair parts, for example a chair seat, a backrest and two armrests, and a chair base assembly, which are coupled to each other, for example via a chair seat support structure. The chair base assembly and the chair seat support structure may support a height adjustment of the chair seat, an adjustment of an inclination of the chair seat and the backrest as well as an arrangement of the chair seat with respect to the backrest. These chair adjustments allow users to change their sitting position on the chair as desired, such that fatigue may be minimized during long sitting periods.

**[0003]** For more cost-effective packaging and shipping, the chair may be shipped or sold in an at least partially disassembled state. For example, the backrest and/or the armrests may be separated from the chair seat support structure during shipping. After shipping and prior to use, the backrest and/or the armrests must be attached to the chair seat support structure. Typically, the backrest and/or the armrests and the chair seat support structure are connected by screws or bolts, e.g. three or more screws for each of the backrest and the armrests, so tools are required to attach the screws or bolts and at least some manual skills are required to assemble the chair. However, the tools, e.g. an Allen key or a screwdriver, incur additional costs and there may be damage to the screws, bolts, backrest, armrests or support structure due to improper assembly, or reliable attachment of the backrest and/or armrests to the support structure of the chair may not be achieved. Therefore, these mounting methods require a certain level of skill from the end user and there is a risk/safety hazard if assembly is not done correctly.

**[0004]** Furthermore, a chair may need to be stowed after being used, at least temporarily. For space efficient stowing, the backrest and/or the armrests may be detached from the chair seat support structure which again requires tools to remove the screws or bolts and at least some manual skills from the end user.

### BRIEF SUMMARY OF THE INVENTION

**[0005]** There is a need in the art for a chair which address some of the above drawbacks. In particular, there is a need in the art for a structure or arrangement which allows a simple and reliable attachment and detachment of a component like a backrest or an armrest to and from a support structure of the chair to ensure a "foolproof" and safe assembly and disassembly.

**[0006]** According to the present invention, these needs are met by a coupling system for coupling a chair part of a chair to a chair seat support structure of the chair, and a method of coupling a chair part of a chair to a chair seat support structure of the chair as defined in the independent claims. The dependent claims define embodiments.

**[0007]** According to the present invention, a coupling system for coupling a chair part of a chair to a chair seat support structure of the chair is provided. The chair part may comprise a backrest, an armrest or a footrest. The coupling system comprises a receiving support and an insert terminal. The receiving support is to be provided at one of a connecting member of the chair part and the chair seat support structure. The insert terminal is to be provided at the other one of the connecting member of the chair part and the chair seat support structure. For example, the connecting member of a backrest may be an arm-like element with one end coupled to the backrest and the other end provided to be coupled to the chair seat support structure. Likewise, the connecting member of an armrest may be an arm-like element with one end coupled to the armrest and the other end provided to be coupled to the chair. For example, the receiving support is to be provided at a connecting member of the chair part, and the insert terminal is to be provided at the chair seat support structure. In other examples, the receiving support is to be provided at the chair seat support structure, and the insert terminal is to be provided at a connecting member of the chair part.

**[0008]** A use position of the chair may be defined as a position in which each chair part is coupled to the chair seat support structure via a corresponding coupling system and the chair is placed on a substantially horizontal, flat surface, e.g. on the ground.

**[0009]** The insert terminal comprises a first pin and a second pin. In the use position of the chair, the first pin and the second pin extend horizontally from a vertical surface of the insert terminal. In the use position of the chair, the first pin and the second pin may extend horizontally in a same direction from a same vertical surface of the insert terminal. The receiving support provides a longitudinal support guide with a stop at a first end of the longitudinal support guide, and a pin insertion opening and a recess at a second end of the longitudinal support guide. A distance between the stop and the recess is essentially the same as a distance between the first pin and the second pin such that the second pin can be inserted in the recess when the first pin abuts the stop. The distance may be in a range of a few centimeters, e.g. in

a range of 5 to 15 centimeters, e.g. 7 centimeters.

**[0010]** For example, the receiving support is provided at the chair seat support structure, and the insert terminal is provided at a backrest. For example, for mounting the backrest, the first pin may be inserted, from the back of the chair, in the pin insertion opening of the longitudinal support guide while the backrest is slightly tilted in the forward direction. The backrest may be moved, along with the insert terminal, in the forward direction such that the first pin slides along the longitudinal support guide of the receiving support until the first pin reaches the stop. At that point the backrest can be rotated to its normal position.

**[0011]** A normal position of the backrest may be a position in which a surface of the backrest, against which a user sitting on the chair may lean its back, is upright or slightly tilted backwards, for example in a range of zero to ten degrees. The arrangement in which the backrest is slightly tilted in the forward direction may be a position in which the surface of the backrest is tilted a few degrees in the forward direction with respect to the normal position, for example the backrest may be tilted from the normal position in the forward direction by 5 to 10 degrees.

**[0012]** The recess at the second end of the longitudinal support guide allows the second pin to be housed in this recess, determining its fixed and stable position.

**[0013]** If the backrest is rotated in the normal position without having inserted the insert terminal up to the correct final sliding position, i.e. until the first pin abuts at the stop, the second pin does not engage in the pin insertion opening and the recess and consequently the backrest continues to rotate without stabilizing, making it clear to a user immediately that assembly is incorrect.

**[0014]** As a result, a simple and intuitive but error-proof backrest coupling system is achieved that can be reliably operated by a user or customer without requiring any tools or specific manual skills.

**[0015]** In further examples, the receiving support is provided at the chair seat support structure or the chair seat, and the insert terminal is provided at an armrest, for example a left armrest. The first pin may be inserted, from the left of the chair, in the pin insertion opening of the longitudinal support guide while the armrest is slightly tilted in the right direction. The armrest may be moved, along with the insert terminal, in the right direction such that the first pin slides along the longitudinal support guide of the receiving support until the first pin reaches the stop. At that point the armrest can be rotated to its normal (not-tilted) position.

**[0016]** A normal position of the armrest may be a position in which a surface of the armrest, on which a user sitting on the chair may lay its underarm, is essentially horizontally aligned. The arrangement in which the armrest is slightly tilted in the right direction may be a position in which the surface of the armrest is downward-tilted a few degrees in the right direction with respect to the normal position, for example the armrest may be tilted from the normal position in the right direction by 5 to 10 degrees.

**[0017]** The recess at the second end of the longitudinal support guide allows the second pin to be housed in this recess, determining its fixed and stable position.

**[0018]** If the armrest is rotated in the normal position without having inserted the insert terminal up to the correct final sliding position, i.e. until the first pin abuts at the stop, the second pin does not engage in the pin insertion opening and the recess and consequently the armrest continues to rotate without stabilizing, making it clear to a user immediately that assembly is incorrect.

**[0019]** As a result, a simple and intuitive but error-proof armrest coupling system is achieved that can be reliably operated by a user or customer without requiring any tools or specific manual skills. It is clear to the person skilled in the art that a right armrest can be attached in an appropriate manner to a right side of the chair seat support structure by means of a corresponding coupling system.

**[0020]** According to an embodiment, the longitudinal support guide is formed in a vertical wall section of the receiving support. In particular, the longitudinal support guide may be formed as a single longitudinal slot in the vertical wall section of the receiving support. In the use position, i.e. when the insert terminal is inserted in the receiving support, the vertical surface of the insert terminal from which the first and second pins extend, may be arranged parallel and adjacent to the vertical wall section of the receiving support. The vertical surface of the insert terminal may contact the vertical wall section of the receiving support.

**[0021]** In various examples, the insert terminal comprises a third pin and a fourth pin. In the use position of the chair, the third pin and the fourth pin extend horizontally from a further vertical surface of the insert terminal. The further vertical surface is opposed to the vertical surface. In other words, the vertical surface and the further vertical surface may be arranged spaced apart and parallel to each other. The third pin and the fourth pin extend from the further vertical surface in a direction opposite to a direction in which the first pin and the second pin extend from the vertical surface. The receiving support provides a further longitudinal support guide with a stop at a first end of the further longitudinal support guide, a pin insertion opening at a second end of the further longitudinal support guide, and a recess near the second end. A distance between the stop and the recess is essentially the same as a distance between the third pin and the fourth pin such that the fourth pin is insertable in the recess when the third pin abuts the stop. The distance between the first pin and the second pin may be the same as the distance between the third pin and the fourth pin.

**[0022]** For example, the further longitudinal support guide may be formed in a further vertical wall section of the receiving support, which is opposed to the vertical wall section. The further longitudinal support guide may be formed as a single longitudinal slot in the further vertical wall section of the receiving support.

**[0023]** The further longitudinal support guide may have essentially the same shape as the longitudinal support guide and may be spaced apart and parallel to the longitudinal support guide. In particular, in a direction of projection perpendicular to the vertical surface, the longitudinal support guide may be aligned with the further longitudinal support guide.

**[0024]** By providing at each side of the insert terminal a pair of pins which engage with corresponding slots at each side of the receiving support, a reliable and robust connection between the insert terminal and the receiving support and thus between the chair part and the chair seat support structure can be achieved. Having identical and aligned longitudinal support guides at each side of the coupling system simplifies coupling of the chair part at the chair seat support structure.

**[0025]** According to an embodiment, in the use position of the chair, the longitudinal support guide extends from the second end to the first end in a descending direction. For example, when the coupling system is used for coupling a backrest, the longitudinal support guide may extend in a rear-to-front descending direction with the first end at the front and the second end at the rear. When the coupling system is used for mounting a left armrest, the longitudinal support guide may extend in a left-to-right descending direction with the first end on the right and the second end on the left. When the coupling system is used for mounting a right armrest, the longitudinal support guide may extend in a right-to-left descending direction with the first end on the left and the second end on the right. As will be explained in more detail below, the terms "left", "right", "rear" and "front" are defined with respect to the chair in its use position. For example, a "rear" location is closer to the backrest than a "front" position. The term "descending" is defined with respect to ground on which the chair is arranged in its use position. i.e., the first end is closer to ground than the second end.

**[0026]** Furthermore, in the use position of the chair, the recess may extend downward from a lower edge of the longitudinal support guide. The same may apply for the recess in the further longitudinal support guide.

**[0027]** For example, the insert terminal may be provided at the chair part. The receiving support may be provided at the chair seat support structure. In case of a coupling system for a backrest, the first and third pins may be arranged at a front end of the corresponding vertical surfaces of the insert terminal, and the second and fourth pins may be arranged at a rear end of the corresponding vertical surfaces of the insert terminal. For example, while the backrest is slightly tilted in the forward direction, the first and third pins may be inserted in the longitudinal support guide and the further longitudinal support guide, respectively, and the first and third pins may be moved along the longitudinal support guides into contact with the corresponding stops. While entering this stop position, the second and fourth pins may enter the pin insertion openings of the longitudinal support guides. When the first and third pins abut at the corresponding stops, the second and fourth pins may have entered their corresponding longitudinal support guides and may be arranged above the corresponding recesses in the longitudinal support guides. In this arrangement, the backrest can be rotated to its normal position, i.e. the backrest may be rotated in the rearward direction. Rotating the backrest to its normal position moves the second and fourth pins down into the corresponding recesses of the longitudinal support guides. In the use position of the chair, the backrest is then held in the assembled position by gravity from the four pins.

**[0028]** According to an embodiment, in the use position of the chair, a lower edge of recess has essentially a same height as a lower edge of the first end of the longitudinal support guide. The height is defined with respect to ground on which the chair is arranged in its use position. For example, when the backrest is in its upright position, the first to fourth pins may have essentially the same height with respect to ground. When the backrest is slightly tilted in the forward direction, the second and fourth pins (i.e. the rear pins) are arranged slightly higher than the first and third pins (i.e. the front pins). When the armrest is in its normal not-tilted position, the first to fourth pins may have essentially the same height with respect to ground. When the left armrest is slightly tilted in the right direction or the right armrest is slightly tilted in the left direction, the second and fourth pins (i.e. the left pins at the left armrest and the right pins at the right armrest, respectively) are arranged slightly higher than the first and third pins (i.e. the right pins at the left armrest and the left pins at the right armrest, respectively). For a user it may be very intuitive to have the pins levelled in a same height in the installed arrangement such that this arrangement of the pins and the configuration of the longitudinal support guides and recesses contributes to an intuitive handling of the chair part during installation.

**[0029]** According to an embodiment, the receiving support is to be provided at the chair seat support structure as a separate element, i.e. the receiving support and the chair seat support structure are separate elements. The receiving support may be mounted at the chair seat support structure, for example at a back support of the chair seat support structure which is coupled to a backrest tilt mechanism within the chair seat support structure. For accomplishing this, the receiving support provides a mounting structure for coupling the receiving support to the back support of the chair seat support structure. For example, the receiving support may be provided with threaded holes for mounting the receiving support with screws at the chair seat support structure, for example at the back support. In this way, the coupling system can be used in combination with existing chair seat support structures.

**[0030]** According to an embodiment, the insert terminal is to be provided at the connecting member of the chair part as a separate element. In other words, the insert terminal and the connecting member of the chair part are separate elements, and the insert terminal can be mount-

ed at the connecting member of the chair part. For this, the insert terminal provides a mounting structure with which the insert terminal can be coupled to the connecting member. For example, the insert terminal may be provided with threaded holes for mounting the insert terminal with screws at the connecting member of the chair part. In this way, the coupling system can be used in combination with existing chair parts.

**[0031]** In various examples, at least one of the insert terminal and the receiving support are integrally formed with at least one of the chair seat support structure and the connecting member of the chair part. For example, the insert terminal is provided at the connecting member of the chair part and is integrally formed with the connecting member. In this case, at least the connecting member is part of the coupling system. Further, the receiving support may be integrally formed with the chair seat support structure, for example the back support of the tilt mechanism of the chair seat support structure. The receiving support may be integrally formed at a left or right side of the chair seat support structure for mounting armrests. The receiving support may be integrally formed at a left or right side of a lower side of the chair seat for mounting armrests.

**[0032]** According to an embodiment, the coupling system comprises a locking device. The locking device is configured to lock a movement of the insert terminal with respect to the receiving support once the first pin abuts the stop and the second pin is inserted in the recess. For example, the locking device may comprise a spring biased retaining tooth at the insert terminal and a matching ratchet edge at the receiving support. The retaining tooth may have a slanted surface which slides along a corresponding (slanted) surface of the ratchet edge, when the chair part is moved from the slightly tilted position to its normal position. During this movement, the spring biased retaining tooth may be urged and moved against the spring bias such that the bias is increased. When the chair part reaches its normal position, the retaining tooth may snap into a recess at an end of the ratchet edge such that the chair part is locked in this position and cannot be moved back in the slightly tilted position. In this way, a reliable fixture of the chair part with respect to the chair seat support structure can be achieved. The retaining tooth may be provided with a means for manually moving the retaining tooth against the spring bias such that the retaining tooth is unlocked from the recess at the end of the ratchet edge, and the chair part can be tilted, for example rotated in the forward direction in case of a coupling system for a backrest. The backrest can then be moved in the backward direction to be detached from the chair seat support structure.

**[0033]** According to an aspect of the present invention, a method of coupling a chair part of a chair to a chair seat support structure of the chair is provided. The chair is provided with the above described coupling system. According to the method, the chair part is arranged with respect to the chair seat support structure such that the first pin is inserted in the pin insertion opening. The chair part is moved with respect to the chair seat support structure until the first pin abuts the stop and the second pin is inserted in the pin insertion opening. The chair part is pivoted around the first pin such that the second pin is inserted in the recess. When the coupling system comprises the above-described locking device, the retaining tooth automatically engages with the ratchet edge such that the insert terminal is locked in the receiving support and consequently the chair part is fixedly mounted at the chair seat support structure.

**[0034]** According to another aspect of the present invention, a chair is provided. The chair comprises a chair base assembly, a chair seat, a chair seat support structure and further chair parts. The chair parts may comprise a backrest, a left armrest, a right armrest and/or a footrest. The chair seat support structure may comprise a tilt mechanism which enables a movement of the chair seat and/or the backrest with respect to the chair base assembly. The tilt mechanism may enable a coordinated movement between the chair seat and the backrest. The chair base assembly is attached to a base of the chair seat support structure, the chair seat is attached to a seat support of the chair seat support structure, and at least one of the chair parts is attached to the chair seat support structure via the above described coupling system. For example, the backrest is attached to a back support of the chair seat support structure via the above described coupling system. Additionally or as an alternative, each of the left and right armrests may be coupled to the chair seat support structure via a corresponding one of the above described coupling system. In detail, the receiving support of the coupling system is provided at one of a connecting member of the chair part and the chair seat support structure, and the insert terminal of the coupling system is provided at the other one of the connecting member of the chair part and the chair seat support structure.

**[0035]** The coupling system may be utilized for various applications in which a chair part is to be mounted at a chair. For example, the coupling system may be utilized in an office chair, a living room chair or a workshop chair.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0036]** Embodiments of the invention will be described with reference to the accompanying drawings.

Fig. 1 is a schematic isometric view of a chair having one or more coupling systems according to an embodiment.

Fig. 2 is a schematic isometric rear view of the chair of Fig. 1 in an assembled state.

Figs. 3-6 are a schematic side views of the chair of Fig. 1 illustrating different arrangements from a disassembled state in Fig. 3 to an assembled state in

Fig. 6.

Fig. 7 is a schematic isometric view of a coupling system for a backrest according to an embodiment in a disassembled state.

Fig. 8 is a schematic isometric view of the coupling system of Fig. 7 in an assembled state.

Fig. 9 is a schematic isometric view of a coupling system for a backrest according to another embodiment in an assembled state.

Figs. 10-13 are schematic isometric views of the coupling system of Fig. 9 illustrating in more detail different arrangements from a disassembled state in Fig. 10 to an assembled state in Fig. 13.

Figs. 14-17 are schematic isometric views of the coupling system of Fig. 9 illustrating in more detail a locking device in different arrangements from a disassembled state in Fig. 14 to an assembled state in Fig. 17.

Fig. 18 is a schematic isometric partial bottom view of the chair of Fig. 1 showing a coupling system according to an embodiment for mounting a left armrest in an assembled state.

Figs. 19-21 are schematic isometric views of the coupling system of Fig. 18 illustrating in more detail different arrangements from a disassembled state in Fig. 19 to an assembled state in Fig. 21.

## DETAILED DESCRIPTION OF EMBODIMENTS

**[0037]** Exemplary embodiments of the invention will be described with reference to the drawings. While some embodiments will be described in the context of specific fields of application, such as in the context of an office type chair, the embodiments are not limited to this field of application. The features of the various embodiments may be combined with each other unless specifically noted otherwise. Same reference signs in the various drawings refer to similar or identical components.

**[0038]** Figs. 1 and 2 show a chair 100 which includes one or more coupling systems 200 of an embodiment. The chair 100 is illustrated to be an office-type chair having a chair base assembly 102 and a superstructure. The superstructure includes a chair seat 104, a backrest 106 and a chair seat support structure 108 to interconnect the chair base assembly 102, the seat 104 and the backrest 106. The chair seat support structure 108 may include a tilt mechanism for effecting a coordinated motion of the backrest 106 and the chair seat 104. The base assembly 102 includes a pedestal column 110, a number of support legs 112 extending radially from the column 110 and a corresponding number of casters 114 supported on the outer ends of the support legs 112. Additionally, a gas cylinder or any other lifting mechanism 116 may be supported by the column 110 to enable the height of the seat 104, and thus of the chair superstructure, to be adjusted by a user. The chair 100 can be equipped with armrests 306, 506. Details on mounting the armrests at the chair 100 will be described in more details in connection with Figs. 18 to 21.

**[0039]** For efficient packaging, stowing and/or transportation of the chair 100, the backrest 106 and the armrests 306, 506 may be separated from the superstructure of the chair 100. In detail, as illustrated in Fig. 3, the backrest 106 may be separated from the chair seat support structure 108. For accomplishing this, the chair 100 is provided with the coupling system 200. As shown in Fig. 3, the backrest 106 is detachable from the chair seat support structure 108 such that the backrest 106 can be packaged, stowed and/or transported separately from the remaining components of the chair 100. However, the remaining components of the chair may also be separable, at least in part, from one another for packing, stowing, and/or transporting.

**[0040]** It is to be understood that the terms "front", "rear", "left", "right", "top" and "bottom", as used herein, each have a particular meaning that is defined in relation to a flat support surface beneath the chair, for example in relation to a floor or ground on which the chair rests and in relation to a user sitting in a usual seated position on the chair. For example, the term "front" refers to a side of the chair seat at which the knees of the user are arranged and the legs are suspending, whereas the term "rear" refers to a side of the chair seat where the back of the user and the backrest are arranged. The term "left" refers to the left hand side of the chair seat as seen from the user sitting on the chair, and the term "right" refers to the right hand side of the chair seat as seen from the user sitting on the chair. The term "bottom" refers to the side facing to the flat support surface beneath the chair, and the term "top" refers to the side facing away from the flat support surface beneath the chair. It may be assumed that the resulting directions front-rear, left-right and top-bottom represent the axes of a three dimensional Cartesian coordinate system, usually named X-axis, Y-axis and Z-axis, respectively, which are orthogonal to each other. The front-rear and the left-right directions may extend in the plane of the flat support surface and the top-bottom direction may extend in a direction perpendicular to the flat support surface.

**[0041]** It is to be understood that the terms "vertical", "horizontal", "forward", "rearward" and "lateral(ly)" as used herein, also each have a particular meaning that is defined in relation to the flat support surface or ground beneath the chair and in relation to the user of the chair. For example, the term "forward" refers to a direction moving away from the backrest and in front of a chair user along an axis which extends parallel to such a flat support surface, while the term "rearward" refers to a direction opposite to the forward direction. The term "horizontal"

refers to a direction that is substantially parallel to the ground, and the term "vertical" refers to a direction that is substantially perpendicular to the ground. The term "lateral" refers to a generally horizontal direction perpendicular to both the forward and rearward direction and extending parallel to the aforementioned flat support surface. For example, terms like "to the left" and "to the right" are lateral directions as seen from a user sitting on the chair.

**[0042]** Tilting or inclining in the forward direction, for example tilting the backrest such that the top of the backrest moves forward to a greater extent than the bottom of the backrest may be considered as a rotation around an axis of rotation which extends in the left-right direction. Tilting or inclining in the rearward direction may be considered as an opposite motion to the tilting or inclining in the forward direction. For example tilting the backrest in the rearward direction may mean that an upper section of the backrest moves to the rear with respect to the lower section of the backrest.

**[0043]** Tilting or inclining to the right, for example tilting the armrest 306 such that the top of the armrest 306 moves to the right to a greater extent than the bottom of the armrest 306 may be considered as a rotation around an axis of rotation which extends in the front-rear direction. Tilting or inclining to the left may be considered as an opposite motion to the tilting or inclining to the right. For example tilting the armrest 306 to the left may mean that an upper section of the armrest 306 moves to the left with respect to the lower section of the armrest 306.

**[0044]** Furthermore, it is to be understood that the backrest, in particular when being tilted, does not extend exactly and only in the top-bottom and left-right directions. However, it is clear to a person skilled in the art that also in this tilted condition, the backrest essentially extends in the top-bottom and the left-right directions.

**[0045]** Commonly, the backrest and/or the armrests of the chair are fixed with screws, e.g. each by three or more screws. In addition to the fixing screws, a tool is required, e.g. an Allen key or a screwdriver.

**[0046]** The coupling system 200 simplifies the assembly of the chair 100 by a customer or end user. Assembly of the chair 100 does not require the end user or customer to attach a chair part, e.g. the backrest 106, to the chair seat support structure 108 with screws. Consequently, no tools are required to mount the chair part.

**[0047]** In the following, the coupling system 200 will be described in Figs. 1 to 17 in connection with mounting the backrest 206. However, the coupling system 200 is not limited to mounting the backrest 206, but can be used for mounting other types of chair parts, for example an armrest 306 as described in connection with Figs. 18 to 21 or a footrest.

**[0048]** As illustrated for example in Fig. 3 to 6, the coupling system 200 comprises an insert terminal 202 and a matching receiving support 204. The insert terminal 202 can be inserted into an opening in the receiving support 204 as will be described below in connection with Figs. 3-6.

**[0049]** As shown in Fig. 3, the insert terminal 202 may be provided at a connecting member 120 of the back support 106. A first end of the connecting member 120 is connected to the backrest 106 and a second end of the connecting member 120 is to be connected to the chair seat support structure 108. Therefore, the second end of the connecting member 120 is provided with the insert terminal 202. The receiving support 204 may be provided at the chair seat support structure 108. However, this is only an example and in other examples, the insert terminal 202 may be provided at the chair seat support structure 108 and the receiving support 204 may be provided at the second end of the connecting member 120.

**[0050]** As illustrated, the insert terminal 202 is equipped with a pair of lateral pins, a front pin and a rear pin. These pins can slide along a longitudinal support guide of the receiving support 204. The longitudinal support guide extends in a rear-to-front descending direction, i.e. the rear end of the longitudinal support guide is on a higher level with respect to ground than the front end of the longitudinal support guide.

**[0051]** For mounting the backrest 106, the user holds the backrest 106 in an upright position. This upright position may be considered as a position in which the backrest 106 is slightly tilted in the forward to direction compared to a normal position of the backrest 106. The normal position is illustrated for example in Figs.1, 2 and 6. In this normal position, the backrest 106 is slightly tilted in the rearward direction as it is common for a chair in an unloaded condition.

**[0052]** Starting from the disassembled state shown in Fig. 3, the backrest 106 is moved in the forward direction as indicated by arrow 300 such that the front pin is inserted in the longitudinal support guide. See Fig. 4. The longitudinal support guide guides the front pin until it reaches the end of travel of the longitudinal support guide. See Fig. 5. Just before reaching the end of travel, the rear pin also enters the longitudinal support guide. At that position, the backrest 106 can be rotated rearward to its normal position which represents the assembled state. See Fig. 6. The particular shape of the longitudinal support guide with a recess extending downward from a lower edge of the longitudinal support guide at the rear end of the longitudinal support guide allows the rear pin to be accommodated in this recess, determining its fixed and stable position.

**[0053]** If the user rotates the backrest in the normal position without having inserted the backrest 106 up to the correct final sliding position, it happens that the rear pin does not engage in the recess and consequently the backrest 106 continues to rotate without stabilizing, making it clear to the user immediately that assembly is incorrect. Thus, a simple and intuitive to use but error-proof coupling system is provided.

**[0054]** The coupling system 200 facilitates a quick attachment of the backrest 106 to the chair seat support

structure 108 by an end user without the necessity for tools or screws or bolts. This coupling system 200 allows chairs to be shipped and sold in a "knock-down" kit form in smaller more cost efficient packaging.

**[0055]** Figs. 7 to 9 show the receiving support 204 and the insert terminal 202 of the coupling system 200 in more detail.

**[0056]** The chair seat support structure 108 comprises a back support 118 for connecting the backrest 106. The back support 118 may be coupled to a tilt mechanism of the chair seat support structure 108 which provides a coordinated movement of the chair seat 104 and the backrest 106. For example, the tilt mechanism may coordinate inclinations of the chair seat 104 and the backrest 106.

**[0057]** As illustrated in Fig. 7, the back support 118 may have a U-shape and may be made of plastics or metal. The receiving support 204 may be a molded plastic part which can be fixed at the back support 118 in the factory. The receiving support 204 may be fixed at the back support 118 by screws, for example three or more screws which are inserted from the lower side of the back support 118.

**[0058]** This allows the coupling system 200 to be applied to a variety of chair seat support structures.

**[0059]** The receiving support 204 may provide an opening into which the insert terminal 202 can be inserted, at least partially. At a vertical surface at the right side of the receiving support 204, for example a vertical wall section extending in the up/down and front/rear directions, a first longitudinal support guide 206 is provided. At a vertical surface at the left side of the receiving support 204, for example a further vertical wall section extending in the up/down and front/rear directions, a second longitudinal support guide 208 is provided. Each of the longitudinal support guides 206, 208 has an open end at the rear end acting as a pin insertion opening and a stop at the front end. In the claims, the rear end is designated as the first end, and the front end is designated as the second end. Furthermore, each of the longitudinal support guides 206, 208 has a recess at the rear end which extends in the downward direction. Generally, the arrangement and design of the first longitudinal support guide 206 and the arrangement and design of the second longitudinal support guide 208 may be mirror-symmetrical with respect to a mirror plane extending vertically from front to rear centrally through the receiving support 204.

**[0060]** The insert terminal 202 is provided with a first pin 210 and a second pin 212, which both extend laterally in a horizontal right direction from a vertical surface at the right side of the insert terminal 202. Furthermore, although not visible in Fig. 7, the insert terminal 202 is provided with a third pin and a fourth pin, which both extend laterally in a horizontal left direction from a vertical surface at the left side of the insert terminal 202. In some implementations, the insert terminal 202 may be integrally formed with the connecting member 120 of the backrest 106. In other implementations, the insert terminal 202 and the connecting member 120 of the backrest 106 may be separate parts which are connected to each other via gluing, screws or bolts in the factory.

**[0061]** A distance in between the first pin 210 and the second pin 212 may be essentially the same as the distance between the stop at the front end of the receiving support 204 and the recess at the rear end of the receiving support 204. A distance between the first pin 210 and the second pin 212 may be essentially the same as a distance between the third pin and the fourth pin. Generally, the design and arrangement of the first and second pins 210, 212 and the design and arrangement of the third and fourth pins may be mirror-symmetrical with respect to a mirror plane extending vertically from front to rear centrally through the insert terminal 202.

**[0062]** Fig. 8 shows the assembled state. The receiving support 204 is fixed at the back support 118. When the backrest 106 is mounted at the chair seat support structure 108 as described above in connection with Figs. 3 to 6, i.e. the insert terminal 202 is inserted into the receiving support 204, the first 210 and third pins abut at corresponding stops of the corresponding longitudinal support guides 206, 208, and the second 212 and fourth pins engage with the corresponding recesses of the corresponding longitudinal support guides 206, 208.

**[0063]** Fig. 9 shows another example of the coupling system 200. In this example, the receiving support is formed integrally with the back support, i.e. the receiving support 204 is a part of the tilt mechanism of the chair seat support structure 108 and there is no separate back support as the back support 118 in Fig. 7. Functionality and structure of the receiving support 204 of Fig. 9 are essentially the same as the functionality and structure of the receiving support 204 of Fig. 7, i.e. the receiving support 204 provides the first and second longitudinal support guides 206, 208 for receiving the first and second pins 210, 212 and the third and fourth pins, respectively.

**[0064]** Figs. 10 to 13 show the features and functionality of the coupling system 200 in more detail.

**[0065]** The insert terminal 202 is provided at the connecting member 120 of the backrest 106. The insert terminal 202 may be integrally formed with the connecting member 120, or may be designed as a separate element which is mounted at the connecting member 120, for example by means of screws or adhesives. The receiving support 204 is provided at the chair seat support structure 108 as part of the tilt mechanism of the chair seat support structure 108. However, as described above in connection with Figs. 7 and 8, the receiving support 204 may be a separate component which is mounted in the factory at a back support of the chair seat support structure 108.

**[0066]** Furthermore, in other examples, the insert terminal 202 may be provided at the chair seat support structure 108, either as an integral part of the tilt mechanism or as a separate part coupled to the back support, and the receiving support 204 may be provided at the connecting member 120 of the backrest 106, either integrally formed with the connecting member 120 or as a separate

part coupled to the connecting member 120 in the factory.

**[0067]** The insert terminal 202 is provided with a first (front) pin 210 and a second (rear) pin 212 at a vertical surface 214 at the right side of the insert terminal 202. Although not shown in Figs. 10 to 13, the insert terminal 202 is provided with a third (front) pin and a fourth (rear) pin at a vertical surface at the left side of the insert terminal 202. The first pin 210 and the second pin 212 extend in a horizontal direction to the right from the vertical surface 214. Likewise, the third and fourth pins extend in a horizontal direction to the left from the corresponding vertical surface at the left side.

**[0068]** The receiving support 204 has a rear opening into which the insert terminal 202 can be inserted. Furthermore, in left and right vertical wall sections 222 and 224 of the receiving support 204, each a corresponding longitudinal support guide 206 and 208, respectively, is provided. Each of the longitudinal support guides 206, 208 is formed as a corresponding slot in the corresponding wall sections 222, 224. Each of the longitudinal support guides 206, 208 extends from a rear end of the receiving support 204 in a slightly descending way to the front. At the front end of each of the longitudinal support guides 206 and 208 a stop is provided. In Fig. 10 only the stop 216 of the longitudinal support guide 206 at the right side is visible. At the rear end of each of the longitudinal support guides 206 and 208 a corresponding opening is provided for inserting the pins of the insert terminal 202 when inserting the insert terminal 202 into the receiving support 204. In Fig. 10, the pin insertion opening 218 of the longitudinal support guide 206 at the right side is visible. Furthermore, at the rear end of each of their longitudinal support guides 206, 208, a corresponding recess is provided which extends in the downward direction. In Fig. 10, the recess 220 of the longitudinal support guide 206 at the right side is visible only. A distance between the stop 216 and the recess 220 of the longitudinal support guide 206 corresponds essentially to the distance between the first and second pins 210 and 212 at the insert terminal 202. Likewise, a distance between the stop and the recess of the longitudinal support guide 208 corresponds essentially to the distance between the third and fourth pins at the insert terminal 202.

**[0069]** Coupling of the insert terminal 202 to the receiving support 204 will be described below with respect Figs. 10 to 13. The backrest 106 is moved from the rear to the front together with the insert terminal 202 as indicated by arrow 300 (see also Fig. 3). While moving the backrest 106 in the direction of arrow 300, the first pin 210 is aligned with the pin insertion opening 218 and likewise the third pin is aligned with the corresponding pin insertion opening of the longitudinal support guide 208. Thus, as shown in Fig. 11, the first pin 210 slides in the forward direction along the longitudinal support guide 206 and the third pin slides in the forward direction along the longitudinal support guide 208. The backrest 106 is moved further in the forward direction (arrow 300) until the first pin 210 abuts at the stop 216 and the third pin abuts at the corresponding stop of longitudinal support guide 208. This state is shown in Fig. 12. As can be seen from Fig. 12, the second pin 212 is now at the pin insertion opening 218. Although not visible in Fig. 12, the fourth pin is also at the pin insertion opening of the longitudinal support guide 208. In this state, the insert terminal 202 a can be rotated around an axis of rotation which extends through the centers of the first pin 210 and the third pin, i.e. the axis of rotation extends horizontally in the left/right direction. In particular, as shown in Fig. 13, the insert terminal 202 can be rotated as indicated by arrow 302 such that the second pin 212 enters the recess 220. Although not visible in Fig. 13, the fourth pin enters the corresponding recess in the longitudinal support guide 208 in the same way. In this manner, an assembled state with a correct intended position of the insert terminal 202 with respect to the receiving support 204 is achieved.

**[0070]** If the user rotates the backrest 106 without having inserted the insert terminal 202 up to the correct final sliding position at the stop 216, the second pin 212 and the fourth pin will not enter in the corresponding pin insertion openings and recesses, and consequently the backrest 106 continues to rotate in the downward direction without being reliably supported by the receiving support 204. This indicates to the user that the assembly operation has not been performed correctly.

**[0071]** Once the backrest 106 has been inserted correctly to the end of its travel and has been rotated in the normal position, a locking is performed by means of a locking device 250 as will be described below in connection with Figs. 14 to 17.

**[0072]** The locking device 250 comprises a retaining tooth 252 at the insert terminal 202 and a ratchet edge 256 at the receiving support 204. The retaining tooth or 252 may be provided at a lower rear end of the insert terminal 202 in a center in the left/right direction of the insert terminal 202. Likewise, the ratchet edge 256 may be provided at a lower rear end of the receiving support 204 in a center in the left/right direction of the receiving support 204. Below the ratchet edge 256, a recess 260 is provided which is dimensioned such that it can receive the retaining tooth the 252 at least partially. The retaining tooth 252 is biased in the forward direction by means of a spring 254. A limiting element 258, for example a screw inserted in the retaining tooth 252 from the bottom, may limit a traveling path of the retaining tooth 252 in the forward direction to avoid that the retaining tooth is ejected from the insert terminal 202 by the force from the spring 254.

**[0073]** When the insert terminal 202 is inserted in the receiving support 204, the retaining tooth 252 is urged by means of the spring 254 in the forward direction up to a position where it is stopped in the forward direction by the limiting element 258. In this position, the retaining tooth 252 protrudes from a surface 262 as shown in Fig. 14. Next, as shown in Fig. 15, the insert terminal 202 is moved in the forward direction into the opening of the

receiving supported 204 until the first pin 210 and the third pin abut against the corresponding stops of the longitudinal support guides 206, 208 as shown in Fig. 16. In this position, a front end 264 of the insert terminal 202 may also abut against a stop surface 266 of the receiving support 204, and an oblique surface of the retaining tooth 252 is a close to or in contact with the ratchet edge 256.

**[0074]** Next, the backrest 106 is pivoted in the rear direction around the axis of rotation which extends through the centers of the first pin 210 and the third pin. Together with the backrest 106, the connecting member 120 and the insert terminal 202 are rotated in the direction of arrow 302, i.e. in a downward direction. As a result, the oblique surface of the retaining tooth 252 is urged by the ratchet edge 256 in the backward direction against the bias provided by the spring 254. When the second pin 212 and the fourth pin are inserted in the corresponding recesses in the longitudinal support guides 206, 208, the retaining tooth 252 has passed the ratchet edge 256 and snaps into the recess at 260 in the forward direction driven by the spring 254. See Fig. 17. In this assembled state, the locking device 250 blocks a movement of the insert terminal 202 in the upward direction such that the backrest 106 is reliably hooked in this position and inadvertent disassembly of the backrest 106 is prevented.

**[0075]** For removing the backrest 106 from the chair seat support structure 108, the retaining tooth 252 has to be moved in the rearward direction such that it can pass the ratchet edge 256 when the insert terminal 202 is moved upwards. Moving the retaining tooth 252 in the rearward direction may be accomplished by inserting a screwdriver in the head of the limiting element 258 and moving the limiting element 258 in the rearward direction. As an alternative (not shown), the limiting element 258 may protrude from a lower surface of the insert terminal 202 such that a user can push the limiting element 258 with a finger in the rearward direction, thus releasing the locking of the insert terminal 202 in the receiving support 204. For moving the insert terminal 202 upwards, the user may push the backrest 106 in the forward direction such that a position as shown in Figs. 5, 12 and 16 is achieved. From this position, the backrest 106 can be completely separated from the chair seat support structure 108 by moving it in the rearward direction.

**[0076]** As shown in Figs. 1 and 18, the chair 100 may include further coupling systems for mounting armrests 306, 506. In Fig. 18, a coupling system 400 for mounting a left armrest 306 is visible. However, it is clear to the person skilled in the art that a corresponding further coupling system may be provided at the right of the chair 100 for mounting a right armrest 506. As illustrated, the coupling system 400 is coupled to a lower side of the chair seat 104 and this lower side of the chair seat 104 is coupled to the seat support structure 108. Therefore, the coupling system 400 is provided at the support structure 108 via the lower side of the chair seat 104. Although not shown, in further examples the coupling system 400 may be provided directly at the seat support structure 108.

**[0077]** For efficient packaging, stowing and/or transportation of the chair 100, the armrests 306, 506 may be separated from the superstructure of the chair 100. In detail, as illustrated in Fig. 19, the armrest 306 may be separated from the chair 100. For accomplishing this, the chair 100 is provided with the coupling system 400. As shown in Fig. 19, the armrest 306 is detachable from the chair 100 such that the armrest 306 can be packaged, stowed and/or transported separately from the remaining components of the chair 100. However, the remaining components of the chair 100 may also be separable, at least in part, from one another for packing, stowing, and/or transporting.

**[0078]** As illustrated for example in Fig. 18, the coupling system 400 comprises the insert terminal 202 and the matching receiving support 204 as described above in connection with the coupling system 200 for the backrest 106. The insert terminal 202 can be inserted into an opening in the receiving support 204 as will be described below in connection with Figs. 19-21.

**[0079]** Attachment of the armrest 306 at the chair 100 will be described below with reference to Figs 19-21 in more detail. Fig. 19-21 each show an isometric partial view of the chair 100 showing the armrest and the coupling system 400 on the right-hand side and an enlarged isometric view of the coupling system 400 at the left-hand side.

**[0080]** As shown in Fig. 19, the insert terminal 202 may be provided at a connecting member 320 of the armrest 306. A first (upper) end of the connecting member 320 is connected to the armrest 306 and a second (lower) end of the connecting member 320 is to be connected to the chair seat 104 or the chair seat support structure 108. Therefore, the second end of the connecting member 320 is provided with the insert terminal 202. The receiving support 204 may be provided at the chair seat 104 or the chair seat support structure 108. However, this is only an example and in other examples, the insert terminal 202 may be provided at the chair seat 104 or the chair seat support structure 108, and the receiving support 204 may be provided at the second end of the connecting member 320.

**[0081]** As illustrated, the insert terminal 202 is equipped with a pair of lateral pins, a right pin 210 and a left pin 212. These pins can slide along a longitudinal support guide 206 of the receiving support 204. For the left armrest 306, the longitudinal support guide 206 extends in a left-to-right descending direction, i.e. the left end of the longitudinal support guide 206 is on a higher level with respect to ground than the right end of the longitudinal support guide 206. For the right armrest 506, the whole arrangement is mirrored along the front-and rear axis. Consequently, for the right armrest 506, the longitudinal support guide extends in a right-to-left descending direction, i.e. the right end of the longitudinal support guide is on a higher level with respect to ground than the left end of the longitudinal support guide. In the following, mounting of the left armrest 306 will be de-

scribed in more detail. Mounting the right armrest 506 may be accomplished in essentially the same way, but with the directions "left" and "right" exchanged.

**[0082]** For mounting the left armrest 306, the user holds the armrest 306 in a position which is slightly tilted in the direction to the seat center compared to the "normal" or use position in which the armrest 306 is expected to be in a mounted state. The "normal" or use position is for example shown in Fig. 21. For example, in the slightly tilted position the left armrest 306 may be slightly tilted to the right as shown in Fig. 19.

**[0083]** Starting from the disassembled state shown in Fig. 19, the left armrest 306 is moved in the right direction as indicated by arrow 500 such that the right pin 210 is inserted in the longitudinal support guide 206. The longitudinal support guide 206 guides the right pin 210 until it reaches the end of travel of the longitudinal support guide 206. See Fig. 20. Just before reaching the end of travel, the left pin 212 also enters the longitudinal support guide 206. At that position, the armrest 306 can be pivoted away from the seat center to its normal position which represents the assembled state. See arrow 502 in Fig. 20. The particular shape of the longitudinal support guide 206 with a recess extending downward from a lower edge of the longitudinal support guide 206 at the left end of the longitudinal support guide 206 allows the left pin 212 to be accommodated in this recess, determining its fixed and stable position. See Fig. 21.

**[0084]** If the user rotates the armrest 306 in the normal position without having inserted the armrest 306 up to the correct final sliding position, it happens that the left pin 212 does not engage in the recess and consequently the armrest 306 continues to rotate without stabilizing, making it clear to the user immediately that assembly is incorrect. Thus, a simple and intuitive to use but error-proof coupling system is provided.

**[0085]** The coupling system 400 facilitates a quick attachment of the armrest 306 to the chair seat 104 or the chair seat support structure 108 by an end user without the necessity for tools or screws or bolts. This coupling system 400 allows chairs to be shipped and sold in a "knock-down" kit form in smaller more cost efficient packaging.

**[0086]** As further illustrated in Fig. 18, the receiving support 204 may be fixed at the chair seat 104 by screws, for example four screws. The receiving support 204 may be a molded plastic part or made of metal and can be fixed at the chair seat 104 in the factory. This allows the coupling system 400 to be applied to a variety of chairs.

**[0087]** Essentially, the coupling system 400 for the armrest 306 has similar or identical features as the coupling system 200 for the backrest 106 described above. For example, as described, the receiving support 204 may provide an opening into which the insert terminal 202 can be inserted, at least partially. At a vertical surface at the rear side of the receiving support 204, for example a vertical wall section extending in the up/down and left/right directions, the (first) longitudinal support guide 206 is provided. At a vertical surface at the front side of the receiving support 204, for example a further vertical wall section extending in the up/down and left/right directions, a second longitudinal support guide 208 is provided. Each of the longitudinal support guides 206, 208 has an open end at the left end acting as a pin insertion opening and a stop at the right end. In the claims, the left end is designated as the first end, and the right end is designated as the second end. Furthermore, each of the longitudinal support guides 206, 208 has a recess at the left end which extends in the downward direction. Generally, the arrangement and design of the first longitudinal support guide 206 and the arrangement and design of the second longitudinal support guide 208 may be mirror-symmetrical with respect to a mirror plane extending vertically from left to right centrally through the receiving support 204.

**[0088]** The insert terminal 202 is provided with the right (in the claims: first pin) pin 210 and the left (in the claims: second pin) pin 212, which both extend laterally in a horizontal rear direction from a vertical surface at the rear side of the insert terminal 202. Furthermore, although not visible in Figs. 18-21, the insert terminal 202 may be provided with a third pin and a fourth pin, which both extend laterally in a horizontal front direction from a vertical surface at the front side of the insert terminal 202. In some implementations, the insert terminal 202 may be integrally formed with the connecting member 320 of the armrest 306. In other implementations, the insert terminal 202 and the connecting member 320 of the armrest 306 may be separate parts which are connected to each other via gluing, screws or bolts in the factory.

**[0089]** A distance in between the right (first) pin 210 and the left (second) pin 212 may be essentially the same as the distance between the stop at the right end of the receiving support 204 and the recess at the left end of the receiving support 204. A distance between the right (first) pin 210 and the left (second) pin 212 may be essentially the same as a distance between the third pin and the fourth pin. Generally, the design and arrangement of the right (first) and left (second) pins 210, 212 and the design and arrangement of the third and fourth pins may be mirror-symmetrical with respect to a mirror plane extending vertically from left to right centrally through the insert terminal 202.

**[0090]** Fig. 21 shows the assembled state. The armrest 306 is mounted at the chair 100, i.e. the insert terminal 202 is inserted into the receiving support 204, the first 210 and third pins abut at corresponding stops of the corresponding longitudinal support guides 206, 208, and the second 212 and fourth pins engage with the corresponding recesses of the corresponding longitudinal support guides 206, 208.

**[0091]** Once the armrest 306 has been inserted correctly to the end of its travel and has been rotated in the normal position, a locking may performed by means of a locking device 250 as described above in connection with Figs. 14 to 17.

**[0092]** While exemplary embodiments have been described in the context of office-type chairs, the coupling system 200 and the chair 100 according to embodiments of the invention are not limited to this particular application. Rather, embodiments of the invention may be employed to mount a chair part at a wide variety of chairs, for example living room chairs.

## Claims

1. A coupling system for coupling a chair part (106) of a chair (100) to a chair seat support structure (108) of the chair (100), comprising:

   a receiving support (204) to be provided at one of a connecting member (120) of the chair part (106) and the chair seat support structure (108), an insert terminal (202) to be provided at the other one of the connecting member (120) of the chair part (106) and the chair seat support structure (108),
   wherein the insert terminal (202) comprises a first pin (210) and a second pin (212),
   wherein, in a use position of the chair (100) with the chair part (106) coupled to the chair seat support structure (108) via the coupling system (200), the first pin (210) and the second pin (212) extend horizontally from a vertical surface (214) of the insert terminal (202),
   wherein the receiving support (204) provides a longitudinal support guide (206) with a stop (216) at a first end of the longitudinal support guide (206), and a pin insertion opening (218) and a recess (220) at a second end of the longitudinal support guide (206), wherein a distance between the stop (216) and the recess (220) is essentially the same as a distance between the first pin (210) and the second pin (212) such that the second pin (212) is insertable in the recess (220) when the first pin (210) abuts the stop (216).

2. The coupling system of claim 1, wherein the longitudinal support guide (206) is formed in a vertical wall section (222) of the receiving support (204).

3. The coupling system of claim 2, wherein the longitudinal support guide (206) is formed as a single longitudinal slot in the vertical wall section (222) of the receiving support (204).

4. The coupling system of claim 3, wherein the insert terminal (202) comprises a third pin and a fourth pin,

   wherein, in the use position of the chair (100), the third pin and the fourth pin extend horizontally from a further vertical surface of the insert terminal (202), the further vertical surface being opposed to the vertical surface (214), and the third pin and the fourth pin extend from the further vertical surface in a direction opposite to a direction in which the first pin (210) and the second pin (212) extend from the vertical surface (214),
   wherein the receiving support (204) provides a further longitudinal support guide (208) with a stop at a first end of the further longitudinal support guide (208), a pin insertion opening at a second end of the further longitudinal support guide (208), and a recess near the second end, wherein a distance between the stop and the recess is essentially the same as a distance between the third pin and the fourth pin such that the fourth pin is insertable in the recess when the third pin abuts the stop.

5. The coupling system of claim 4, wherein the further longitudinal support guide (208) is formed in a further vertical wall section (224) of the receiving support (204), the further vertical wall section (224) being opposed to the vertical wall section (222).

6. The coupling system of claim 5, wherein the further longitudinal support guide (208) is formed as a single longitudinal slot in the further vertical wall section (224) of the receiving support (204).

7. The coupling system of any one of claims 4-6, wherein the further longitudinal support guide (208) has substantially the same shape as the longitudinal support guide (206) and is spaced apart and parallel to the longitudinal support guide (206).

8. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), the longitudinal support guide (206) extends from the second end to the first end in a descending direction.

9. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), the recess (220) extends downward from a lower edge of the longitudinal support guide (206).

10. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), a lower edge of recess (220) has essentially a same height as a lower edge of the first end of the longitudinal support guide (206).

11. The coupling system of any one of the preceding claims, wherein the receiving support (204) is configured such that it is to be provided at the chair seat

support structure (108) as a separate element, and provides a mounting structure for coupling the receiving support to a back support (118) of the chair seat support structure (108).

**12.** The coupling system of any one of the preceding claims, wherein the insert terminal (202) is to be provided at the connecting member (120) of the chair part (106) as a separate element, and provides a mounting structure for coupling the insert terminal (202) to the connecting member (120).

**13.** The coupling system of any one of claims 1-11, further comprising the connecting member (120) of the chair part (106), wherein the insert terminal (202) is provided at the connecting member (120) and is integrally formed with the connecting member.

**14.** The coupling system of any one of the preceding claims, wherein the coupling system (200) comprises a locking device (250), wherein the locking device (250) is configured to lock a movement of the insert terminal (202) with respect to the receiving support (204) once the first pin (210) abuts the stop (216) and the second pin (212) is inserted in the recess (220).

**15.** The coupling system of claim 14, wherein the locking device (250) comprises a spring biased retaining tooth (252) at the insert terminal (202), and a matching ratchet edge (256) at the receiving support (204).

**16.** A method of coupling a chair part (106) of a chair (100) to a chair seat support structure (108) of the chair (100), wherein the chair (100) is provided with the coupling system (200) of any one of the preceding claims, the method comprising:
arranging the chair part (106) with respect to the chair seat support structure (108) such that the first pin (210) is inserted in the pin insertion opening (218),

- moving (300) the chair part (106) with respect to the chair seat support structure (108) until the first pin (210) abuts the stop (216) and the second pin (212) is inserted in the pin insertion opening (218), and
- pivoting (302) the chair part (106) around the first pin (210) such that the second pin (212) is inserted in the recess (220).

**17.** A chair, comprising

a chair base assembly (102),
a chair seat (104),
a chair seat support structure (108) coupling the chair seat (104) to the chair base assembly (102),
a backrest (106) and/or an armrest (306, 506) provided with a connecting member (120, 320), and
a coupling system (200) according to any one of claims 1-15,
wherein the receiving support (204) of the coupling system (200) is provided at one of the connecting member (120) and the chair seat support structure (108), and the insert terminal (202) of the coupling system (200) is provided at the other one of the connecting member (120) and the chair seat support structure (108).

**Amended claims in accordance with Rule 137(2) EPC.**

**1.** A coupling system for coupling a chair part (106) of a chair (100) to a chair seat support structure (108) of the chair (100), comprising:

a receiving support (204) to be provided at one of a connecting member (120) of the chair part (106) and the chair seat support structure (108),
an insert terminal (202) to be provided at the other one of the connecting member (120) of the chair part (106) and the chair seat support structure (108),
wherein the insert terminal (202) comprises a first pin (210) and a second pin (212),
wherein, in a use position of the chair (100) with the chair part (106) coupled to the chair seat support structure (108) via the coupling system (200), the first pin (210) and the second pin (212) extend horizontally from a vertical surface (214) of the insert terminal (202),
wherein the receiving support (204) provides a longitudinal support guide (206) with a stop (216) at a first end of the longitudinal support guide (206), and a pin insertion opening (218) and a recess (220) at a second end of the longitudinal support guide (206),

**characterized in that**

the pin insertion opening (218) is configured to allow insertion of the first pin (210) and of the second pin (212), and
**in that** a distance between the stop (216) and the recess (220) is essentially the same as a distance between the first pin (210) and the second pin (212) such that the second pin (212) is insertable in the recess (220) when the first pin (210) abuts the stop (216).

**2.** The coupling system of claim 1, wherein the longitudinal support guide (206) is formed in a vertical wall section (222) of the receiving support (204).

3. The coupling system of claim 2, wherein the longitudinal support guide (206) is formed as a single longitudinal slot in the vertical wall section (222) of the receiving support (204).

4. The coupling system of claim 3, wherein the insert terminal (202) comprises a third pin and a fourth pin,

wherein, in the use position of the chair (100), the third pin and the fourth pin extend horizontally from a further vertical surface of the insert terminal (202), the further vertical surface being opposed to the vertical surface (214), and the third pin and the fourth pin extend from the further vertical surface in a direction opposite to a direction in which the first pin (210) and the second pin (212) extend from the vertical surface (214),
wherein the receiving support (204) provides a further longitudinal support guide (208) with a stop at a first end of the further longitudinal support guide (208), a pin insertion opening at a second end of the further longitudinal support guide (208), and a recess near the second end, wherein a distance between the stop and the recess is essentially the same as a distance between the third pin and the fourth pin such that the fourth pin is insertable in the recess when the third pin abuts the stop.

5. The coupling system of claim 4, wherein the further longitudinal support guide (208) is formed in a further vertical wall section (224) of the receiving support (204), the further vertical wall section (224) being opposed to the vertical wall section (222).

6. The coupling system of claim 5, wherein the further longitudinal support guide (208) is formed as a single longitudinal slot in the further vertical wall section (224) of the receiving support (204).

7. The coupling system of any one of claims 4-6, wherein the further longitudinal support guide (208) has substantially the same shape as the longitudinal support guide (206) and is spaced apart and parallel to the longitudinal support guide (206).

8. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), the longitudinal support guide (206) extends from the second end to the first end in a descending direction.

9. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), the recess (220) extends downward from a lower edge of the longitudinal support guide (206).

10. The coupling system of any one of the preceding claims, wherein the coupling system is configured such that, in the use position of the chair (100), a lower edge of recess (220) has essentially a same height as a lower edge of the first end of the longitudinal support guide (206).

11. The coupling system of any one of the preceding claims, wherein the receiving support (204) is configured such that it is to be provided at the chair seat support structure (108) as a separate element, and provides a mounting structure for coupling the receiving support to a back support (118) of the chair seat support structure (108).

12. The coupling system of any one of the preceding claims, wherein the insert terminal (202) is to be provided at the connecting member (120) of the chair part (106) as a separate element, and provides a mounting structure for coupling the insert terminal (202) to the connecting member (120).

13. The coupling system of any one of claims 1-11, further comprising the connecting member (120) of the chair part (106), wherein the insert terminal (202) is provided at the connecting member (120) and is integrally formed with the connecting member.

14. The coupling system of any one of the preceding claims, wherein the coupling system (200) comprises a locking device (250), wherein the locking device (250) is configured to lock a movement of the insert terminal (202) with respect to the receiving support (204) once the first pin (210) abuts the stop (216) and the second pin (212) is inserted in the recess (220).

15. The coupling system of claim 14, wherein the locking device (250) comprises a spring biased retaining tooth (252) at the insert terminal (202), and a matching ratchet edge (256) at the receiving support (204).

16. A method of coupling a chair part (106) of a chair (100) to a chair seat support structure (108) of the chair (100), wherein the chair (100) is provided with the coupling system (200) of any one of the preceding claims, the method comprising:
arranging the chair part (106) with respect to the chair seat support structure (108) such that the first pin (210) is inserted in the pin insertion opening (218),

- moving (300) the chair part (106) with respect to the chair seat support structure (108) until the first pin (210) abuts the stop (216) and the second pin (212) is inserted in the pin insertion opening (218), and
- pivoting (302) the chair part (106) around the first pin (210) such that the second pin (212) is

inserted in the recess (220).

**17.** A chair, comprising

a chair base assembly (102),
a chair seat (104),
a chair seat support structure (108) coupling the chair seat (104) to the chair base assembly (102),
a backrest (106) and/or an armrest (306, 506) provided with a connecting member (120, 320), and
a coupling system (200) according to any one of claims 1-15,
wherein the receiving support (204) of the coupling system (200) is provided at one of the connecting member (120) and the chair seat support structure (108), and the insert terminal (202) of the coupling system (200) is provided at the other one of the connecting member (120) and the chair seat support structure (108).

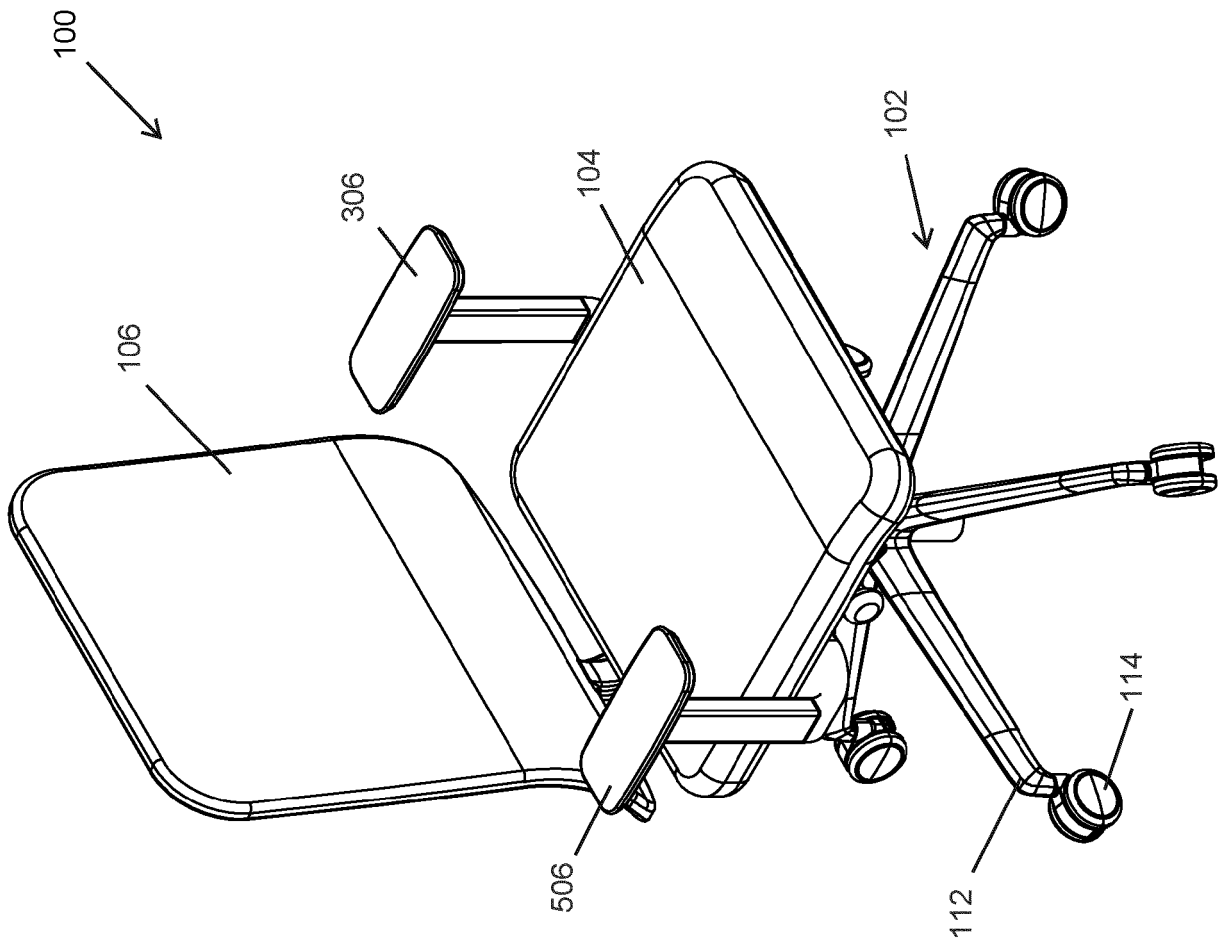


Fig. 1

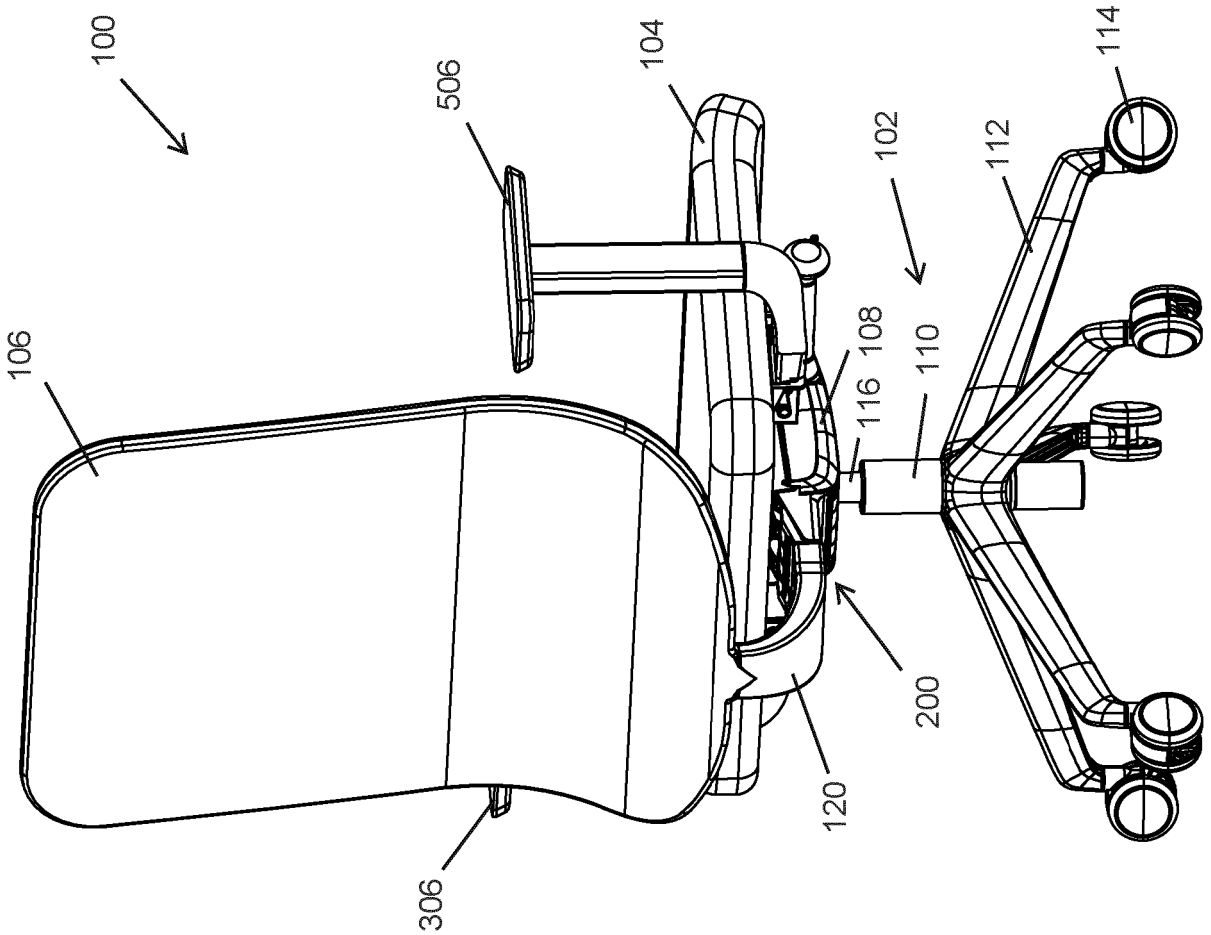


Fig. 2

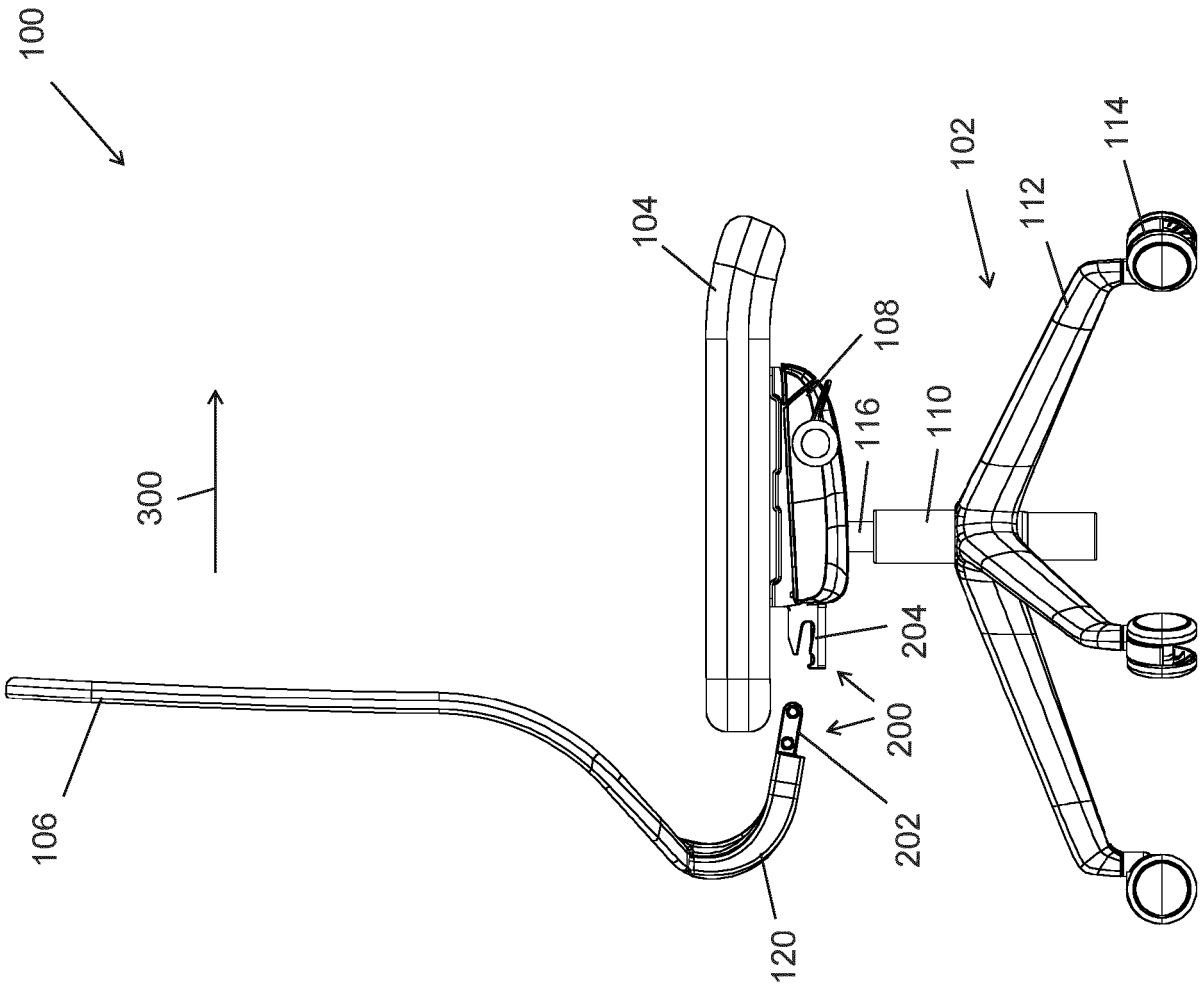


Fig. 3

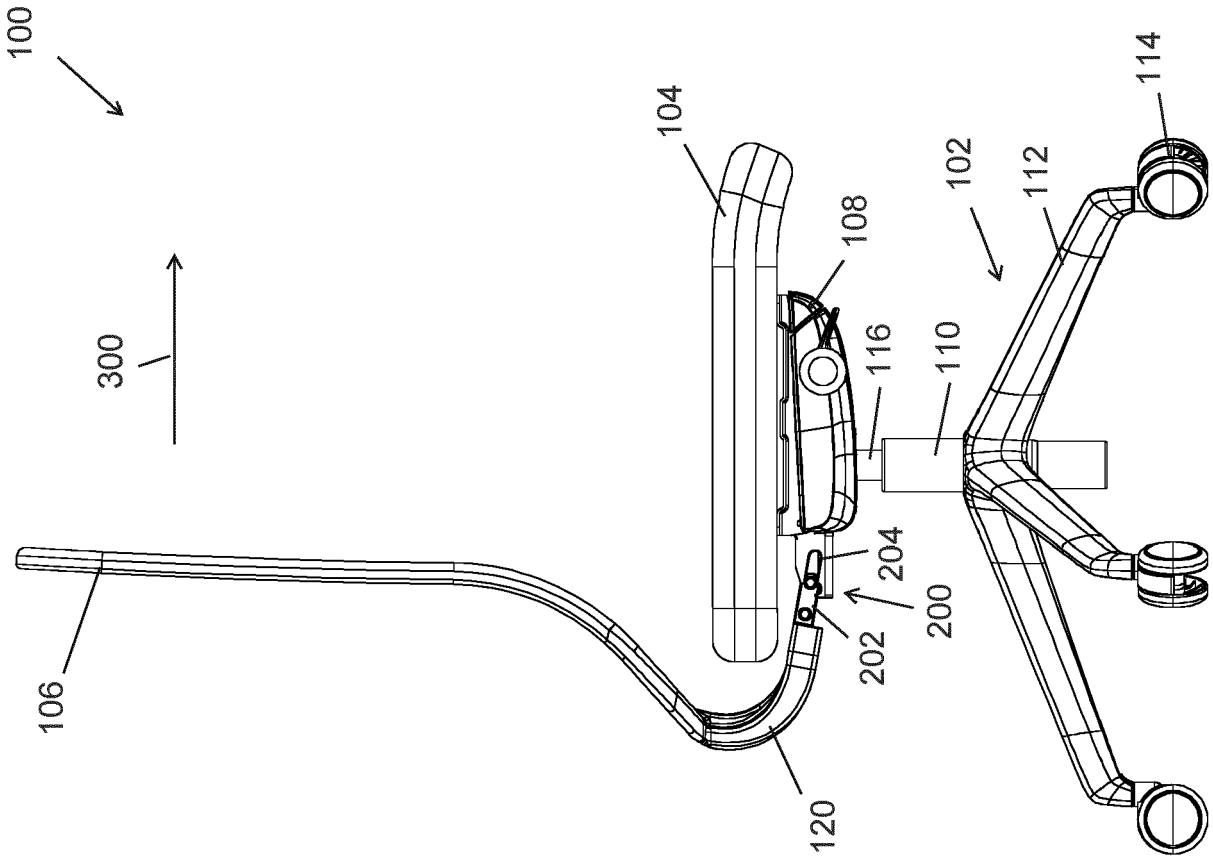


Fig. 4

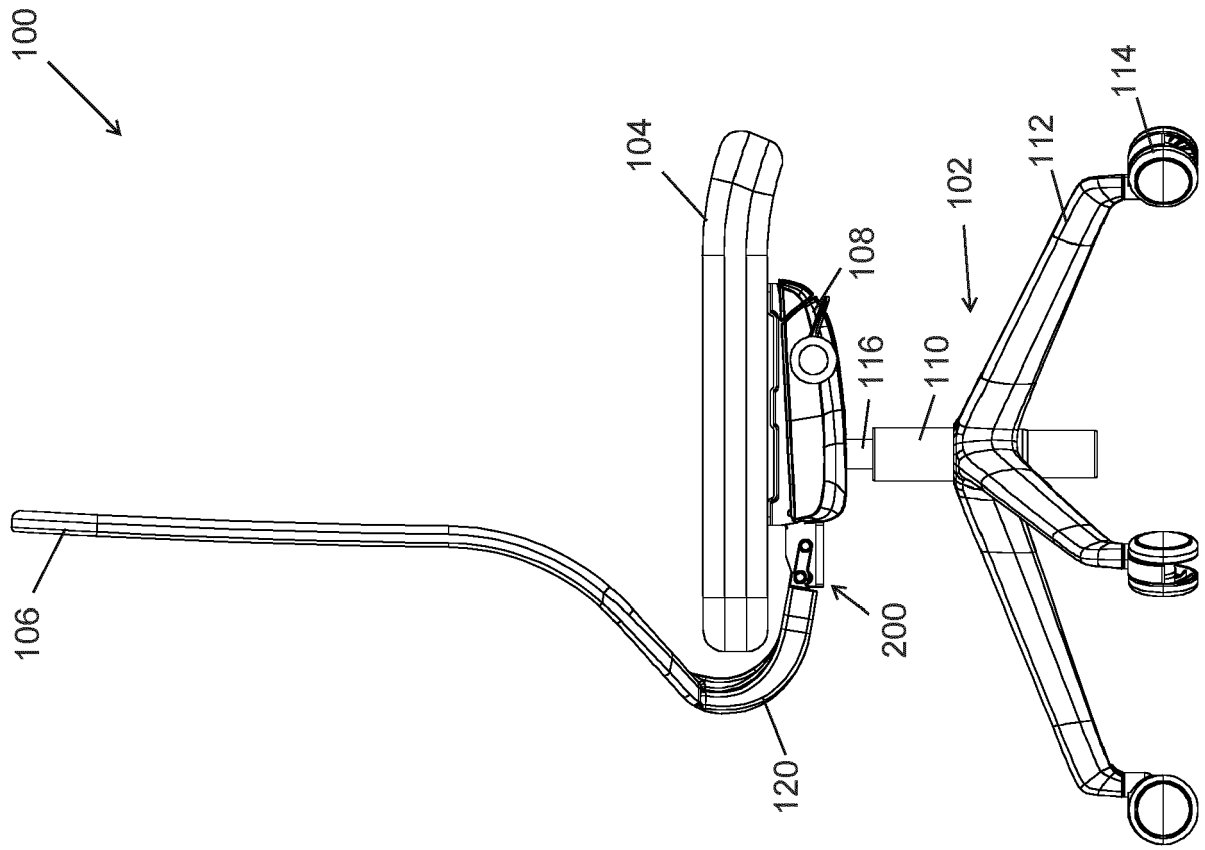


Fig. 5

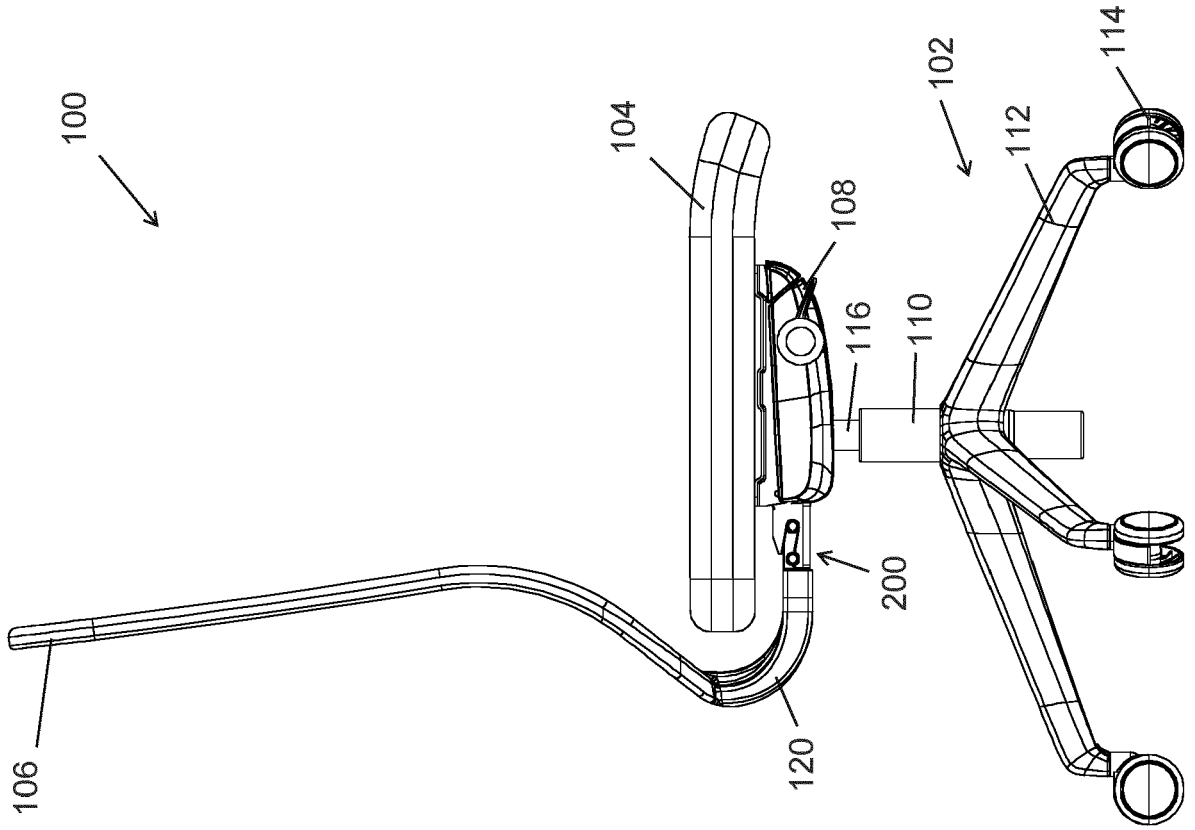


Fig. 6

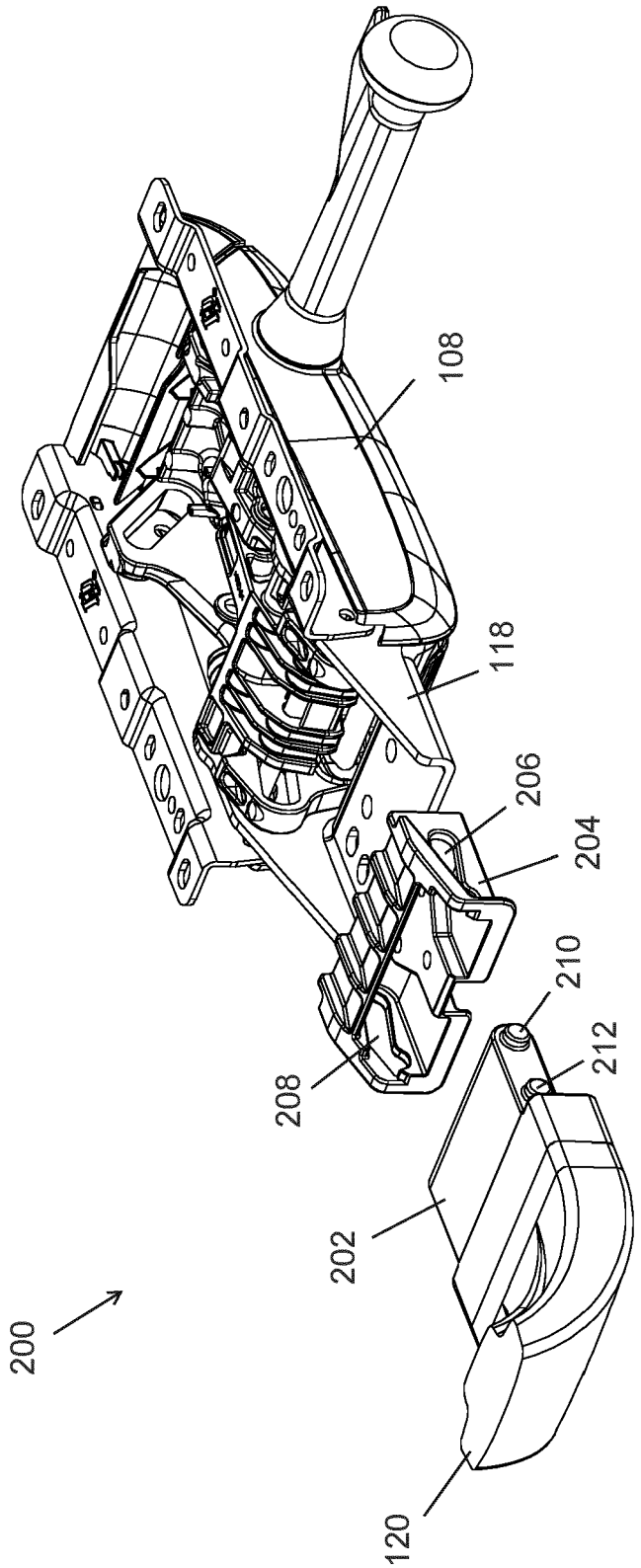


Fig. 7

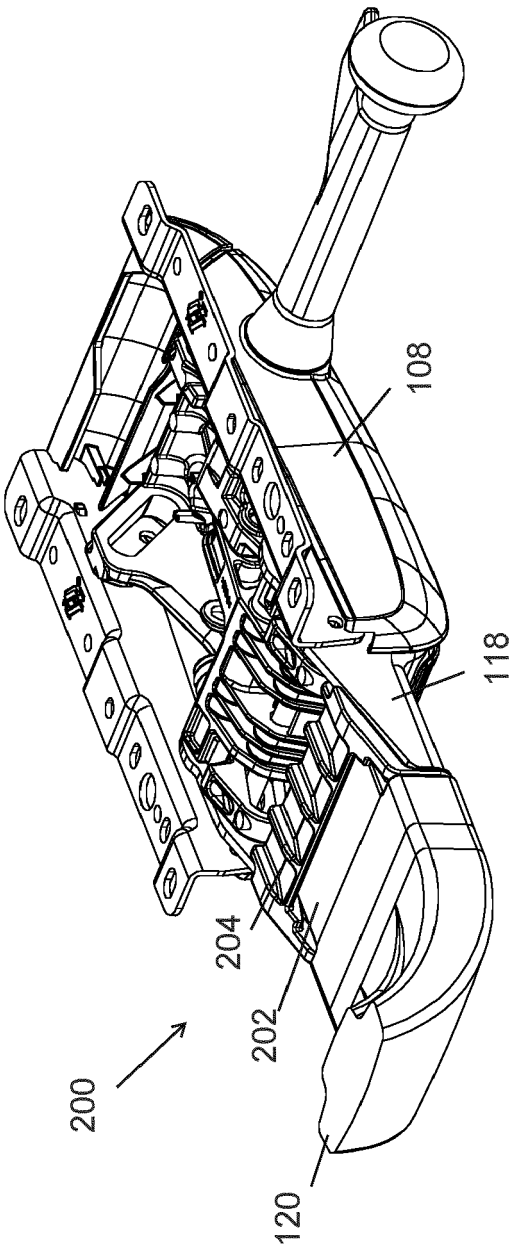


Fig. 8

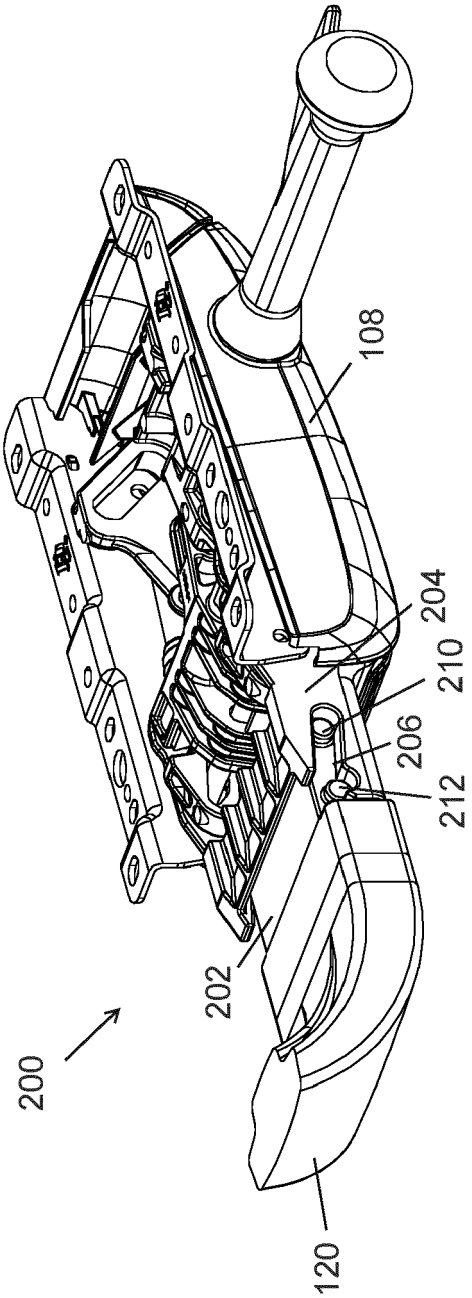


Fig. 9

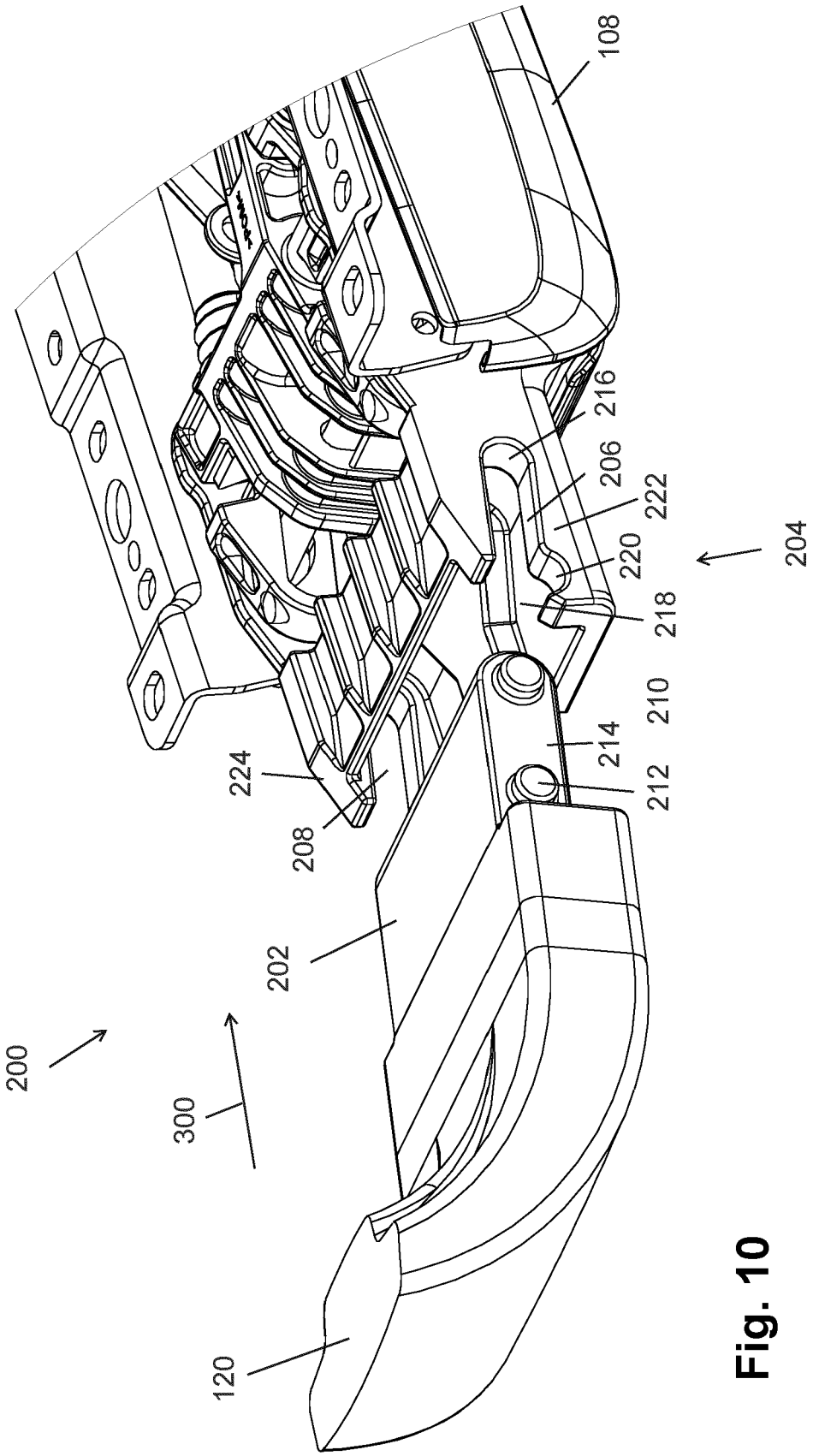


Fig. 10

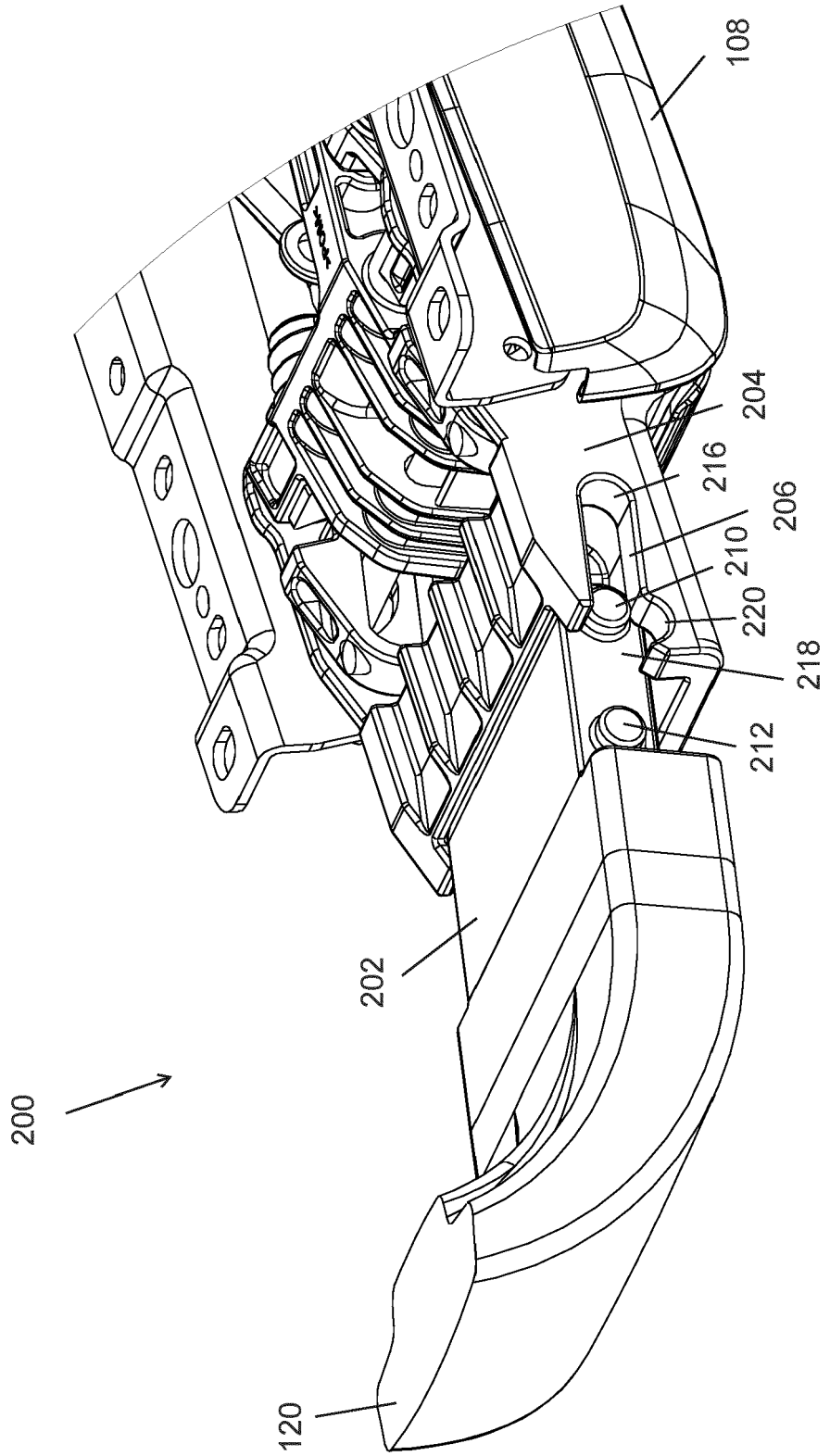


Fig. 11

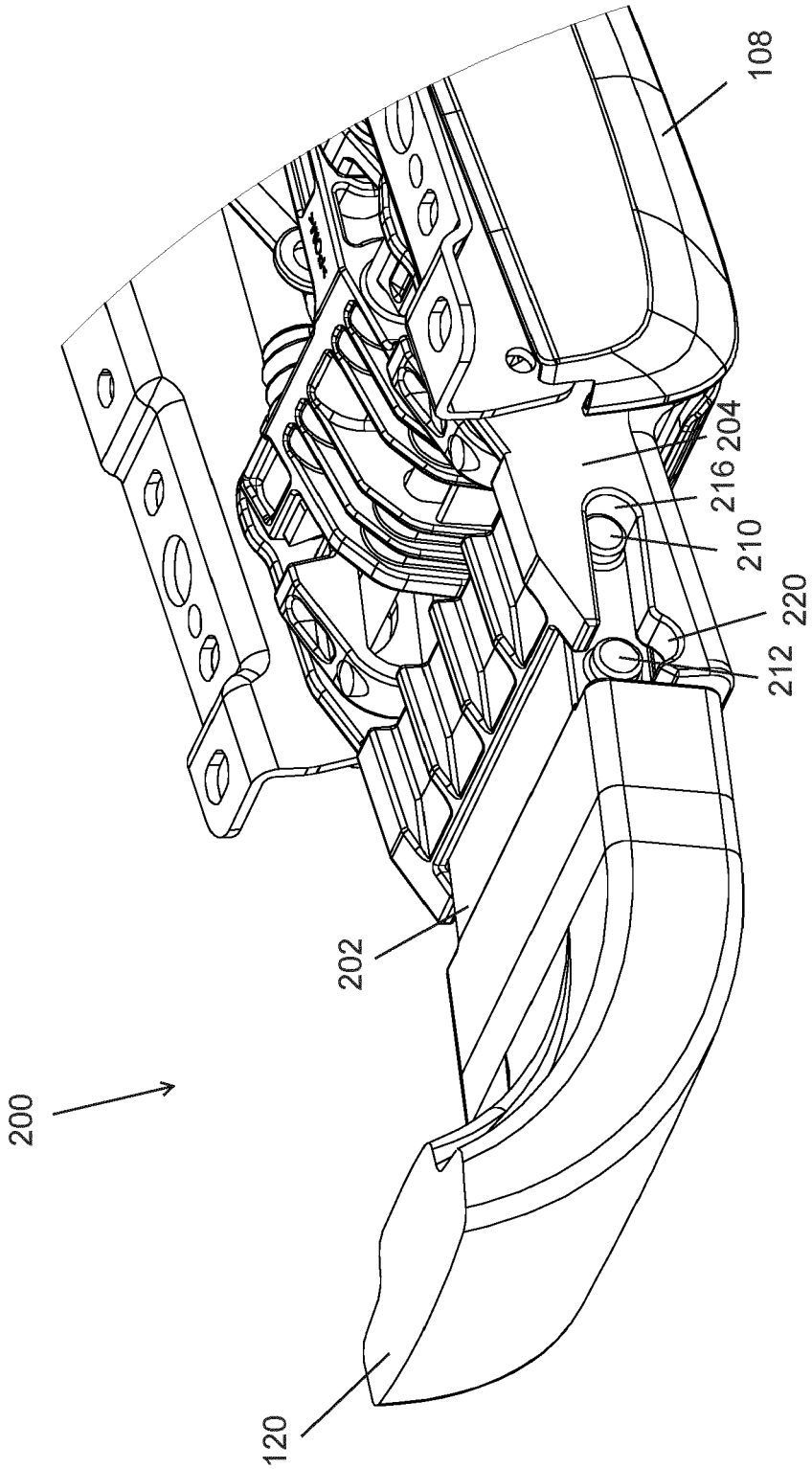


Fig. 12

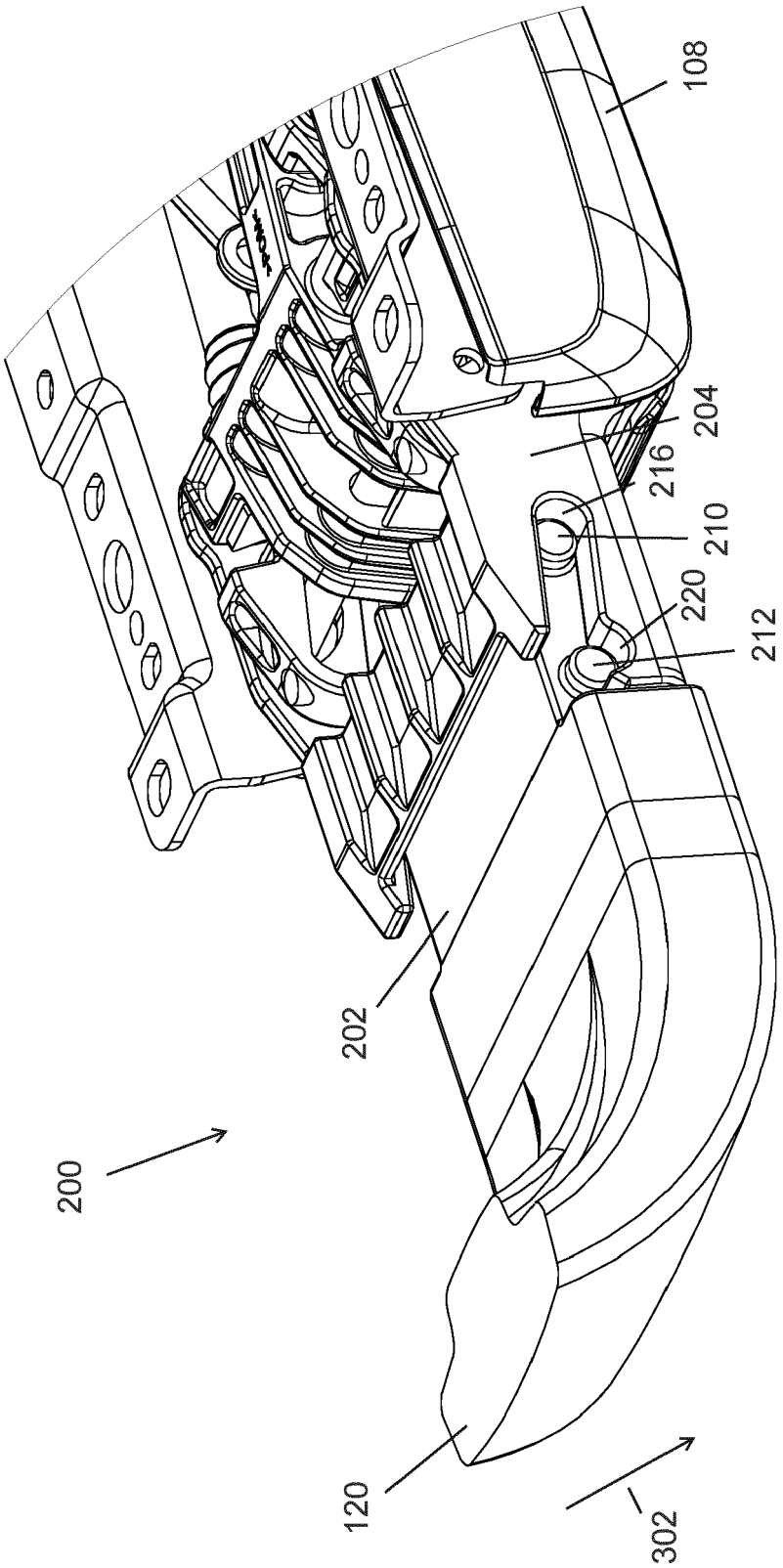


Fig. 13

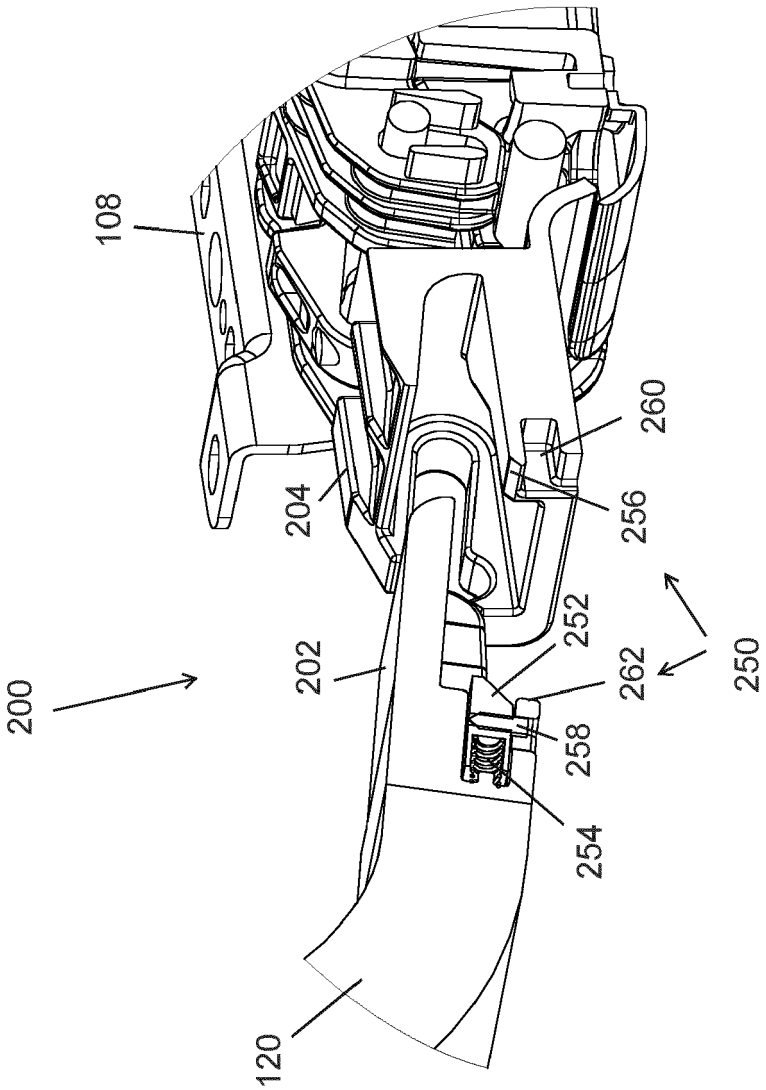


Fig. 14

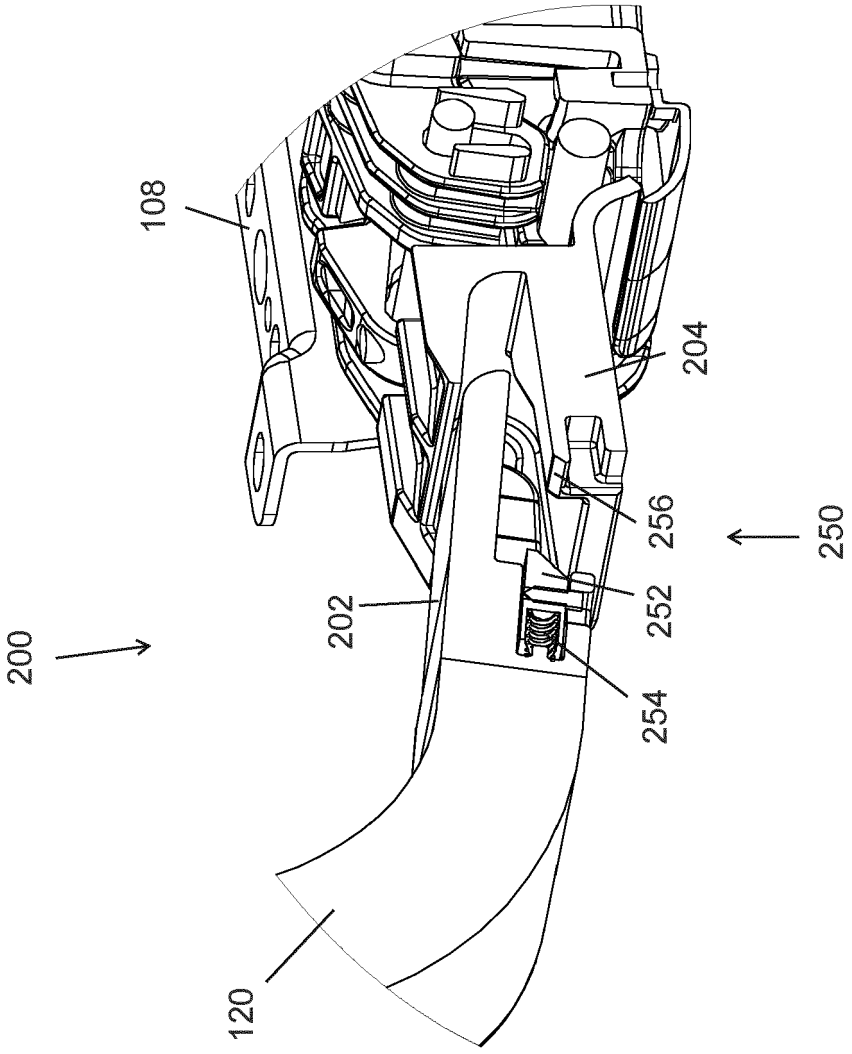


Fig. 15

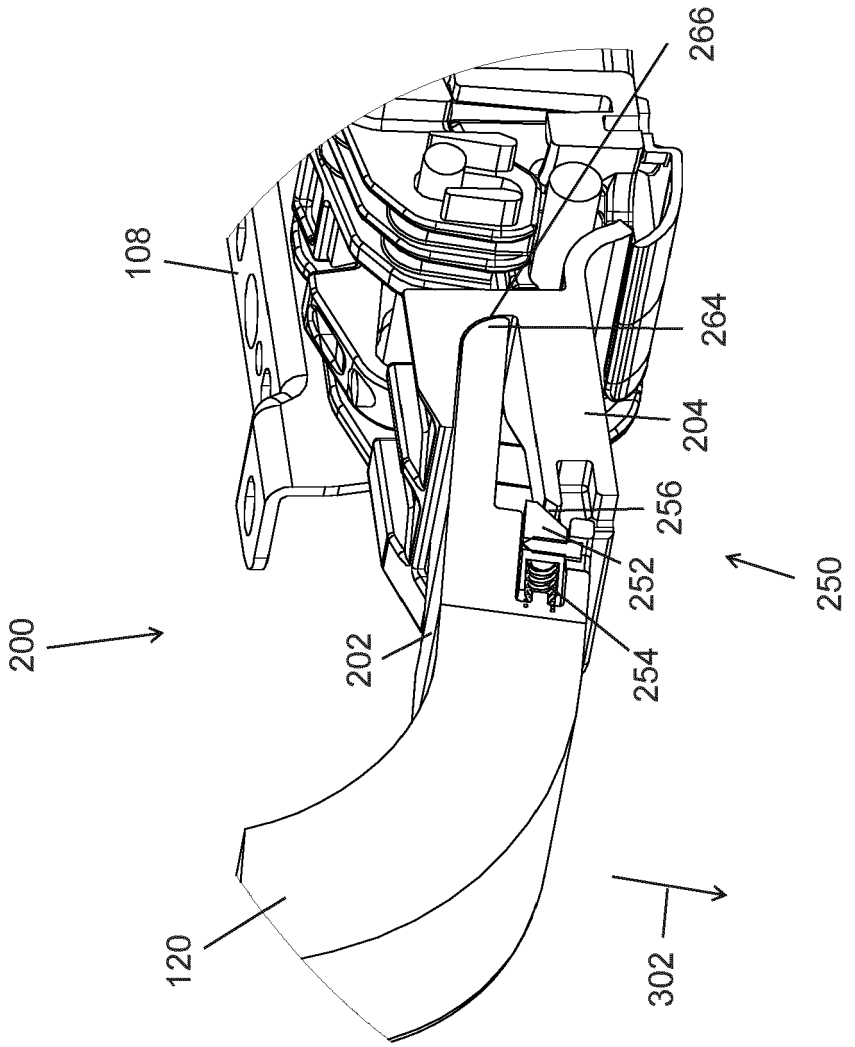


Fig. 16

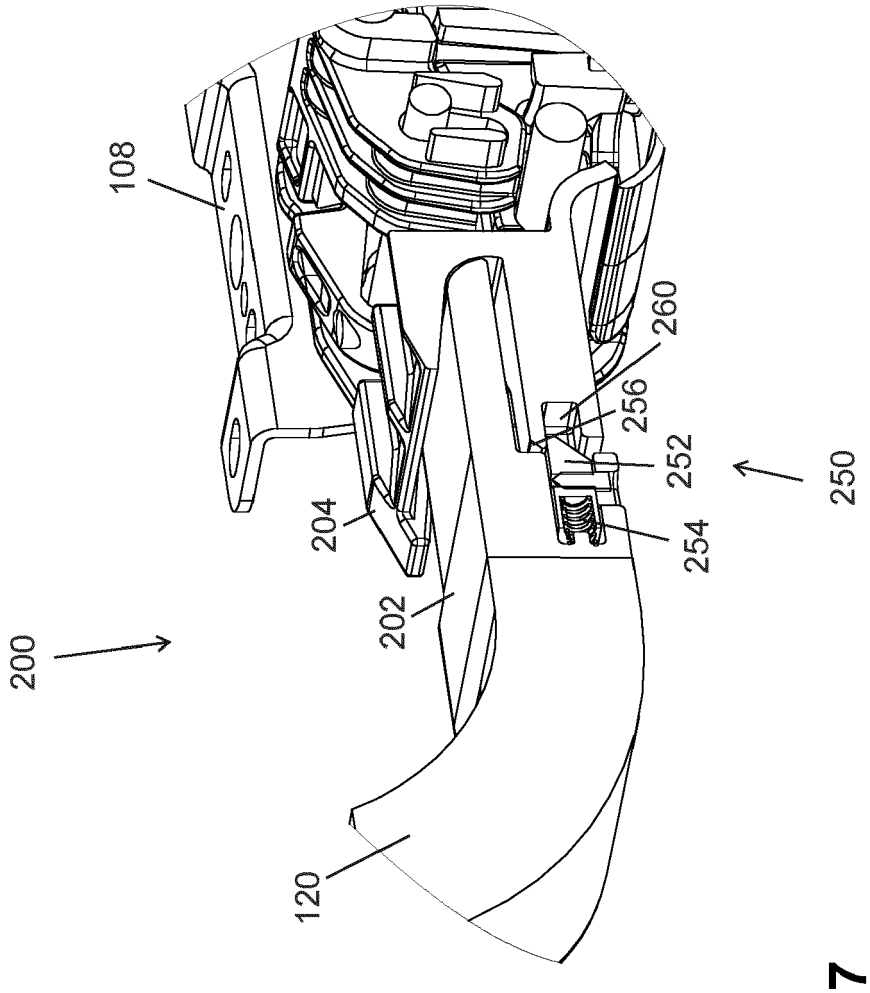


Fig. 17

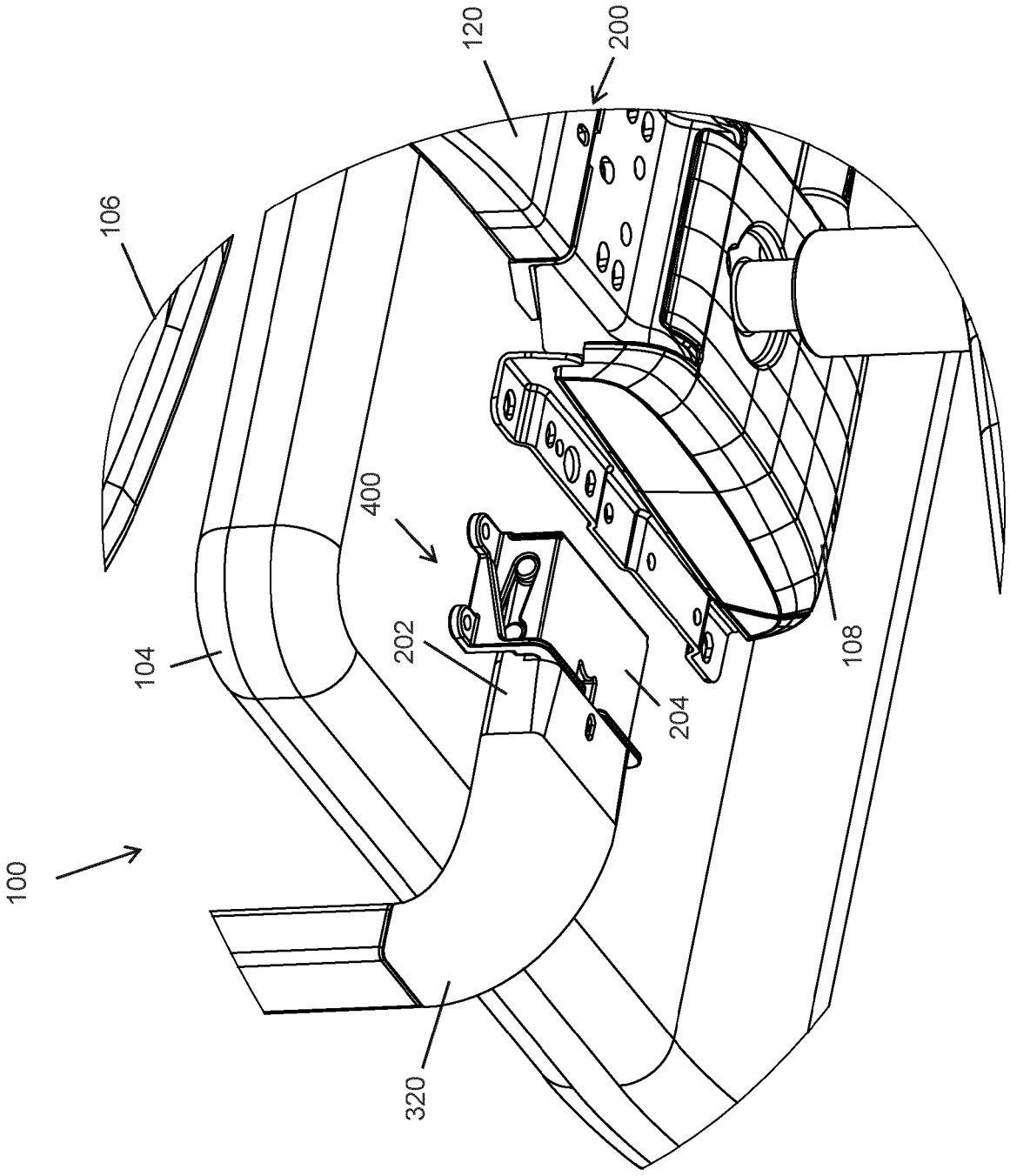


Fig. 18

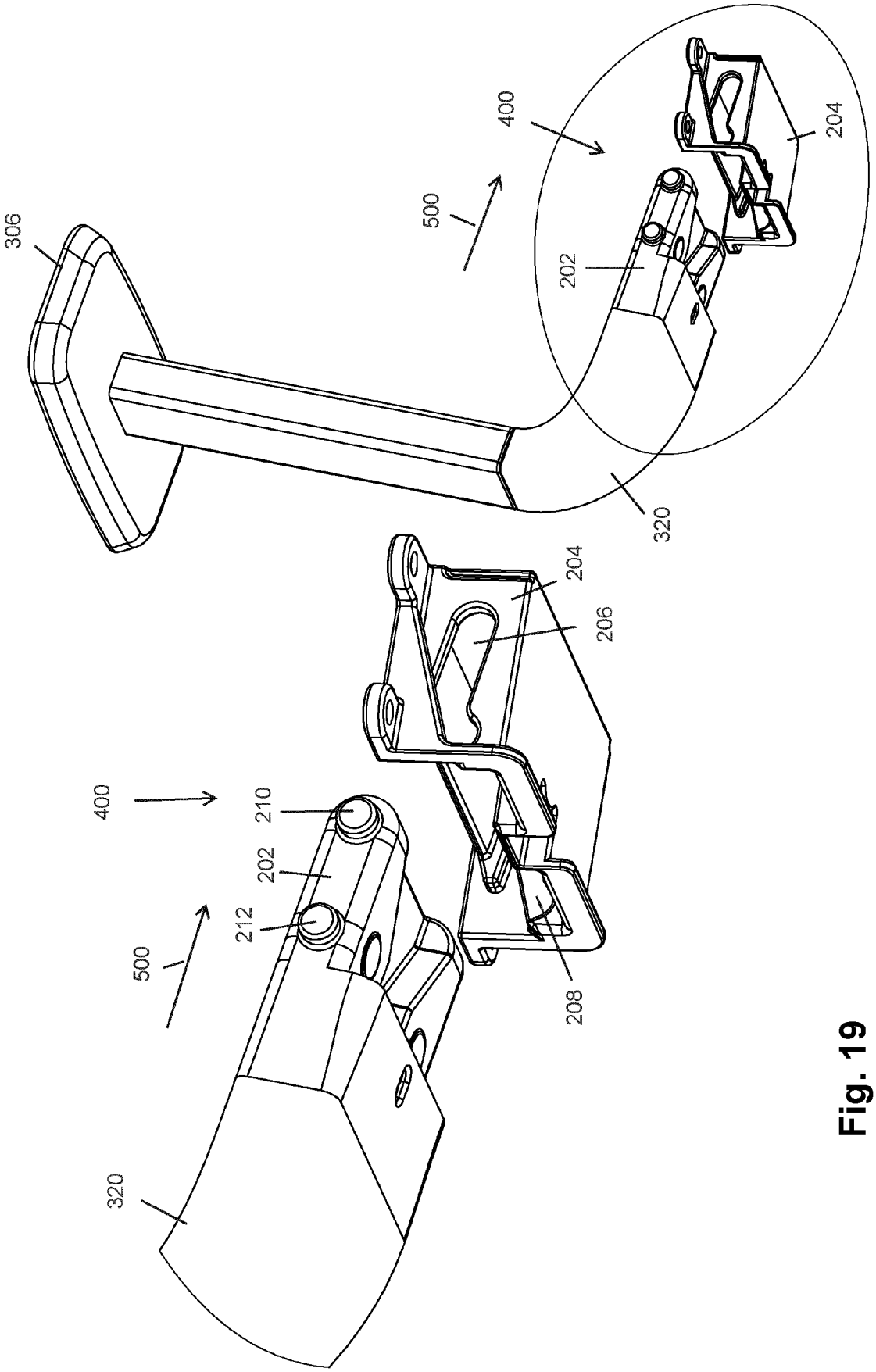


Fig. 19

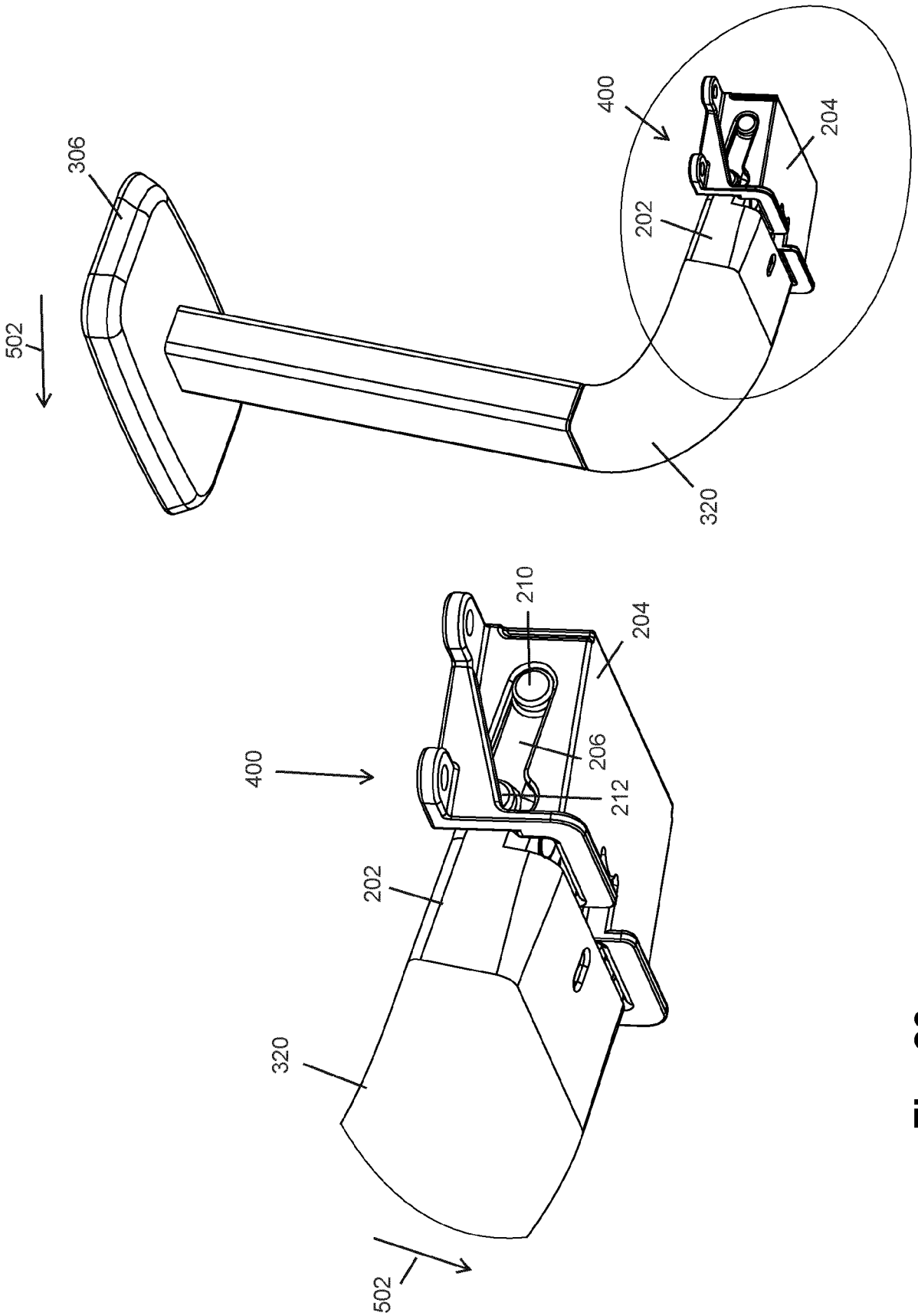


Fig. 20

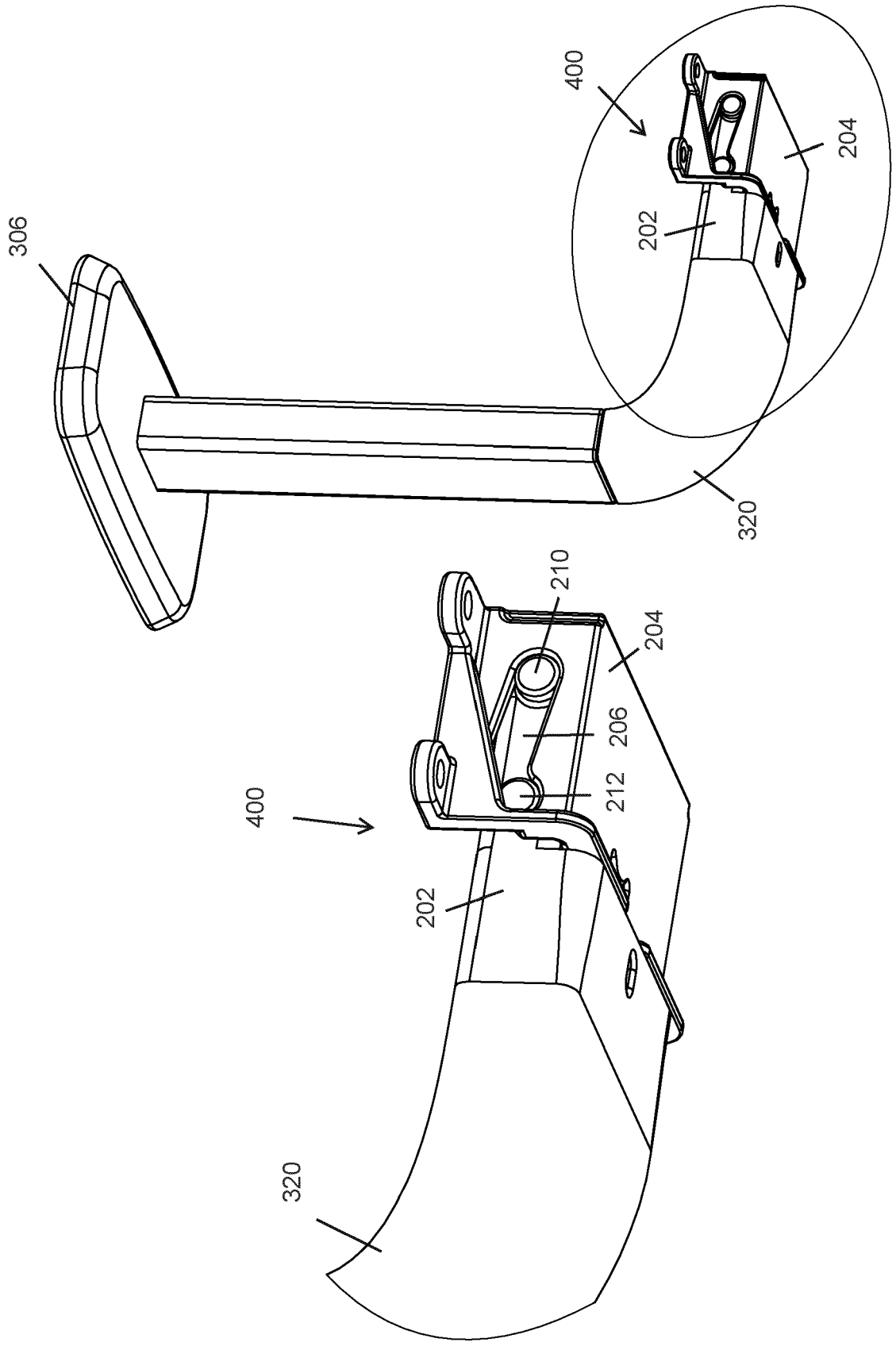


Fig. 21

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# EUROPEAN SEARCH REPORT

Application Number
EP 22 21 1584

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 2005/082889 A1 (TSAI SUNG-TSUN [TW]) 21 April 2005 (2005-04-21) | 1-3,8-17 | INV. A47C7/42 |
| A | * figures 1-5 * | 4-7 | A47C7/68 |
| A | US 2006/103226 A1 (WONG GEORGE T [US] ET AL) 18 May 2006 (2006-05-18) * figures 3-4 * | 1-17 | |

TECHNICAL FIELDS SEARCHED (IPC)

A47C

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 8 May 2023 | Melo Sousa, Filipe |

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# ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 1584

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08-05-2023

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