(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 4 223 685 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.08.2023 Bulletin 2023/32

(21) Application number: **22154983.5**

(22) Date of filing: **03.02.2022**

(51) International Patent Classification (IPC):
B66B 9/08 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B66B 9/08

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **TK Home Solutions B.V.**
2921 LN Krimpen aan den IJssel (NL)

(72) Inventors:
- **REBEL, Matt**
  3089 TE Rotterdam (NL)
- **VERHULST, Laurens**
  3524 CJ Utrecht (NL)
- **VAN LOON, Tim**
  3344 RL Hendrik-Ido-Ambacht (NL)
- **HEIJINS, Wim**
  2961 AL Kinderdijk (NL)

(74) Representative: **Michalski Hüttermann & Partner Patentanwälte mbB**
Kaistraße 16A
40221 Düsseldorf (DE)

(54) TORQUE LIMITER FOR A STAIRLIFT

(57) The present disclosure refers to a soft-lock system (1) for drive means of a movable part, especially a footrest (101), of a stairlift, the system (1) comprising:
drive means for applying a torque to a shaft (3), to move a movable part, especially a footrest (101), between a vertical orientation and a horizontal orientation;
a shaft (3) for rotatably connecting the movable part, especially the footrest (101), to a base of a stairlift chair (100),
wherein the shaft (3) comprises a radially protruding pin (9);
a connecting element (8) for transferring the torque from the shaft (3) to the movable part, especially the footrest (101),
wherein the connecting element (8) comprises a groove (12) for receiving the pin (9); and mechanical means for applying a force to the pin (9) to keep the pin (9) within the groove (12),
to provide a fixed linkage between the drive means and the connecting element (8); and when the force to the pin (9) exceeds a threshold, the groove (12), the pin (9) and the means for applying the force are configured to release the pin (9) from the groove (12) to decouple the linkage between the connecting element (8) and the drive means.

The present disclosure also refers to a chair damping system (40) for damping a movable part of a stairlift.

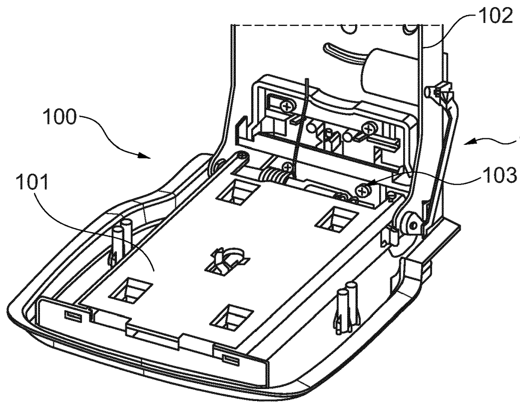


Fig. 1

EP 4 223 685 A1

Description

TECHNICAL FIELD

[0001] The present disclosure refers to a soft-lock system for drive means of a movable part of a stairlift.

[0002] The present disclosure also refers to a stairlift component damping system for damping movable parts of a stairlift.

BACKGROUND

[0003] Stairlifts provide persons with limited mobility the opportunity despite health restrictions to live at their familiar surroundings. As a means of transport, a stair lift transports people with limited mobility from a first position to another position, such as from one floor to the next or over differences in height.

[0004] Stairlifts may be installed indoors or outdoors around the house or in the garden, moving along rails that follow the course of the stairs. The transported persons usually sit comfortably on a seat of the lift and control the lift, for example by means of a control lever to go up or down.

[0005] In known stairlifts, movable parts, such as the footrest, are manually folded up, corresponding to a vertical position, or down, corresponding to a horizontal position, to rest the feet. This is time-consuming and can be a hurdle for people with limited mobility to use the stairlift at all.

[0006] With motorized solutions for folding and unfolding movable parts, the motor can be accidentally triggered if movable parts, for example a seat of the chair, are not yet completely folded down, and yet a switch of a circuit for controlling the motor for moving a stairlift chair component is inadvertently and unintentionally closed. A loose contact can also occur in the switch of the circuit. Also, the motor of the motorised part is sometimes insufficiently protected against overload, for example, when the user motorises the footrest as a movable part into a position of use and, while the footrest is moving, already climbs onto it.

SUMMARY

[0007] In view of the above-mentioned problems and disadvantages, the present disclosure aims to improve the current implementations. Especially, it should be ensured accurate control of the motor, only for scenarios in which the stairlift chair is actually used.

[0008] In particular, incorrect triggering of the powered footrest switch should be avoided. Furthermore, in particular, the motor of the motorized part should be better protected against overstressing. Also, the motor of the motorized part should be sufficiently protected against overload, for example, when the user moves the footrest as a movable part into a position of use and, while the footrest is moving, already climbs onto it. When the user climbs onto the footrest, the footrest must mechanically hold the user and at the same time the motor should be decoupled from the footrest.

[0009] The object to provide improvals and, also, particularly, to provide the particular objects, is achieved by the independent claims. Advantageous implementation forms are given in the dependent claims. The claimed subject matter is not limited to implementation forms that solve only the noted disadvantages.

[0010] According to an aspect of the disclosure, it is provided a soft-lock system for drive means of a movable part of a stairlift. According to a special aspect of the disclosure, it is provided a soft-lock system for drive means of a movable part of a stairlift chair.

[0011] The system comprises:

- drive means for applying a torque to a shaft, to move a movable part between a vertical orientation and a horizontal orientation;
- a shaft for rotatably connecting the movable part to a base of a stairlift, wherein the shaft comprises a connector;
- a connecting element for transferring the torque from the shaft to the movable part, wherein the connecting element comprises a counter connector being connectable to the connector of the shaft; and
- mechanical means for applying a force to the connector, to keep the connector connected to the counter connector, to provide a fixed linkage between the drive means and the connecting element; and

when the force to the connector exceeds a threshold, the counter connector, the connector, and the means for applying the force are configured to release the connector from the counter connector, to decouple the linkage between the connecting element and the drive means.

[0012] The connector may be a radially protruding pin. Alternatively, the counter connector may be the radially protruding pin. The connector may be a groove. Alternatively, the counter connector may be the groove. In the following, for the sake of comprehensibility, a possible embodiment is described, in which the shaft has the pin and in which the connecting element has the groove.

[0013] According to an exemplary disclosure, the soft-lock system comprises:

- drive means for applying a torque to a shaft, to move a movable part between a vertical orientation and a horizontal orientation;
- a shaft for rotatably connecting the movable part to a base of a stairlift component, wherein the shaft comprises a radially protruding pin;
- a connecting element for transferring the torque from the shaft to the movable part, wherein the connecting element comprises a groove for receiving the pin; and
- mechanical means for applying a force to the pin to keep the pin within the groove, to provide a fixed

linkage between the drive means and the connecting element; and

when the force to the pin exceeds a threshold, the groove, the pin, and the means for applying the force are configured to release the pin from the groove to decouple the linkage between the connecting element and the drive means.

[0014] The movable part of the stairlift may be a stairlift chair. Thus, according to an exemplary disclosure, the soft-lock system comprises:

- drive means for applying a torque to a shaft, to move a movable part between a vertical orientation and a horizontal orientation;
- a shaft for rotatably connecting the movable part to a base of a stairlift chair, wherein the shaft comprises a radially protruding pin;
- a connecting element for transferring the torque from the shaft to the movable part, wherein the connecting element comprises a groove for receiving the pin; and
- mechanical means for applying a force to the pin to keep the pin within the groove, to provide a fixed linkage between the drive means and the connecting element; and

when the force to the pin exceeds a threshold, the groove, the pin, and the means for applying the force are configured to release the pin from the groove to decouple the linkage between the connecting element and the drive means.

[0015] According to a further exemplary an aspect of the disclosure, it is provided a soft-lock system for drive means of a footrest of a stairlift chair. The system comprises:

- drive means for applying a torque to a shaft to move a footrest between a vertical orientation and a horizontal orientation;
- a shaft rotatably connecting the footrest to a base of a stairlift chair, the shaft comprises a radially protruding pin;
- a connecting element for transferring the torque from the shaft to the footrest, wherein the connecting element comprises a groove for receiving the pin; and
- mechanical means for applying a force to the pin to keep the pin within the groove, to provide a fixed linkage between the drive means and the connecting element; and

when the force to the pin exceeds a threshold, the groove, the pin, and the means for applying a force are configured to release the pin from the groove to decouple the linkage between the connecting element and the drive means.

[0016] According to another aspect of the disclosure, it is provided a stairlift component damping system for damping movable parts of a stairlift. The damping system comprises:

- at least one support portion with a connecting part for connecting the support portion to a base portion;
- the base portion with at least one contact section for receiving the connecting part of the at least one support portion, wherein the support portion is pivotally mounted with respect to the base portion; and
- a damping element for damping a pivoting movement of the support portion when the connecting part of the support portion is about to engage with the contact section of the base portion.

[0017] According to an exemplary other aspect of the disclosure, it is provided a chair damping system for damping movable parts of a stairlift. The damping system comprises:

- at least one support portion with a connecting part for connecting the support portion to a base portion;
- the base portion with at least one contact section for receiving the connecting part of the at least one support portion, wherein the support portion is pivotally mounted with respect to the base portion; and
- a damping element for damping a pivoting movement of the support portion when the connecting part of the support portion is about to engage with the contact section of the base portion.

[0018] The definition of "when the support portion is about to engage with the contact section of the base portion" means, for example, that a proximity sensor may detect that the support portion approaches the base portion. Accordingly, it must be possible to determine, for example on the basis of a detection by a sensor, that the connecting part of the support portion will engage with the contact section of the base portion when the movement of the connecting part of the support portion/the movement of the support portion is continued towards the base portion. When the support portion/the connecting part of the support portion has engaged with the base portion, the support portion has stopped moving.

[0019] The invention provides a reliable safety mechanism that is independent of a power supply in order to retract and extend the footrest more reliably. The safety mechanism comprises mechanical means, which makes these safety means independent of a power supply. The safety mechanism is suitable for operation of the footrest by an electric motor. The safety mechanism reduces wear and tear on the electric motor. The safety mechanism intervenes on the one hand to protect the electric motor from wear accelerating overload and on the other hand to avoid unnecessary activation of the electric motor or to interrupt an activation of the electric motor.

[0020] The systems of the safety mechanism of the invention interact to ensure accurate control of the motor, only for scenarios in which the stairlift chair is actually used. The safety mechanism according to the invention thus also increases user comfort and user experience. Especially, motorized movable parts support the disabled user of a stairlift. For example, motorizing a swivel movement on top of the rail, armrests and footrest is useful.

[0021] The safety mechanism provides that the footrest can be motorized while enhancing the user experience. The footrest has to be unfolded before boarding and folded after unboarding to prevent stumbling.

[0022] A motorized element within a stairlift has to fulfil several requirements from the applicable standard EN 81-40:2020-12. Especially, the systems allow that the motorized movement of movable parts have a limited force to prevent entrapment while the systems are robust enough to deal with obstruction. Furthermore, the systems can be applied in the stairlift chair which provides limited space and has to be offered for a low cost-price, both circumstances usually making it difficult to find an acceptable solution.

[0023] The functioning of the soft-lock system is described in other words, and with the aid of a more detailed embodiment which should not be understood to limit the scope of the disclosure, in the following: An available energy source within the stairlift is electricity so that an electric motor may be chosen as the drive means for powering the footrest. To initiate the movement, a switch may be located beneath a cushion of the seat of the stairlift. The cushion will be unfolded by the user while boarding and folded while unboarding.

[0024] The soft-lock is integrated in the rotary part of the footrest, wherein the rotary part comprises the shaft. The soft-lock decouples the motor from the footrest when the forces become too high. A balancing spring may be integrated to balance the force between folding and unfolding.

[0025] The soft-lock is a combination of a pin on the motor-side and a groove on the footrest-side, or vice versa, that means a pin on footrest-side and groove on motor side Due to the means for applying a force to the pin, e. g. a spring, the pin is normally located in the groove and the pin provides a fixed linkage between the motor and the footrest. If the forces in this linkage are higher than the forces applied by the spring, the pin will leave the groove and the motor is decoupled from the connecting means.

[0026] The soft-lock system is very compact, cheap, and robust. Furthermore, the soft-lock system provides a solution, which cannot be disturbed by electrical interference, to detect too high forces, which would require intelligent electronics in accordance with IEC 61508 -1:2010 (2010-04) to fulfil the functional safety aspects.

[0027] For the energizing of the drive means, which may be the electric motor, a simple and effective circuit may be selected.

[0028] The functioning of the damping system is described via an example in the following. For example, the movable part of the chair is a seat. This movable part rotates around an imaginary axis in a back of the seat. When horizontal, the movable part activates a switch which initiates the rotation of a footrest powered by the drive means. The damping element slows down and damps the movement of the seat. The dampers of the damping system may be called folding seat dampers. For example, two symmetric foam dampers may be provided at the base portion of the damping system. During assembly of the damping system, the dampers may be pressed into the seat with a slight bias. The dampers may be configured to be activated by protruding reaction arms of the folding seat.

[0029] The damping system is easy and cheap to implement and avoids incorrect triggering of the powered movable part switch, especially the footrest switch. Moreover, it has been noticed that further disadvantages, which appeared without the damping element systems, can be avoided by using the damping system: Previously, releasing the movable part of the chair when in up fold position, created unwanted noise, vibration. It also devaluated the quality impression of the stairlift.

[0030] A stair lift is a mechanical device for lifting people, typically those with disabilities, up and down stairs. For sufficiently wide stairs, a rail is mounted to the treads of the stairs. A chair or lifting platform is attached to the rail. A person gets onto the chair or platform and is lifted up or down the stairs by the chair which moves along the rail.

[0031] The movable part may be a seat element, a footrest, or an armrest, for example. The movable part can be a foldable part of the chair. Generally, the movable part may be any part of the chair/stairlift which is rotatable about an axis with a limited angle, that means rotatable about an axis with an angle which is smaller than 360 degrees. Such rotations may be swivel rotations. In other words, the movable part may be a swivable part. Especially, the soft-lock system or the damping system are adapted to swivel-rotations. The rotations refer to rotations of the chair or components of the chair or components of the stairlift. The rotations may be about a vertical axis or about a horizontal axis. For example, the rotations may be chair rotations about a horizontal axis or armrest rotations, wherein the arm rest may rotate about a horizontal axis, or it may rotate about a vertical axis. Furthermore, the soft-lock mechanism and the damping system should prevent other unforeseen similar rotations as the previously described rotations. Especially for a seat-rotation or comparable rotations squeeze forces are limited.

[0032] "swiveling" means moving back and forth or up and down, i. e. pivoting. In other words, it is a movement about a single axis of rotation, the movement being defined by the single axis of rotation, i.e. guided about that axis of rotation. When pivoting, the movement is first guided in one direction around the axis of rotation through a defined angle smaller than 360 degrees and then guided in the opposite direction through the defined angle smaller than 360 degrees. In particular, the path of the movement around the axis of rotation has the same arc angle in each case, i.e. the paths of movement around the axis of rotation are the same and are only performed in opposite directions.

[0033] The support portion of the stairlift may be any component of the stairlift, which is swivable/pivotable with respect to a fixed component of the stairlift, wherein the fixed component is the base portion.

[0034] For example, the pin may be connected to the connecting element and the groove may be part of the shaft. According to an accordingly modified embodiment, the shaft has a groove on opposite sides over an arc angle of 180 degrees, wherein, during the linkage between the connecting element and the drive means, the pin is adapted to extend in a radially inward direction on both sides of the connecting element and to be received by the groove on both sides of the shaft.

[0035] Alternatively, the pin may be connected to the shaft and the groove may be part of the connecting element. According to an accordingly modified embodiment, the connecting element has a groove on opposite sides, that means with an angular distance, over an arc angle of 180 degrees, wherein, during the linkage between the connecting element and the drive means, the pin is adapted to extend on both sides of the shaft and to be received by the groove on both sides of the shaft.

[0036] This can favor a linkage that can withstand more forces and reduce the likelihood of the pin tilting. This improves the durability.

[0037] According to a modified embodiment, the shaft is operatively connected to the drive means via three interconnected lever arms, of which an intermediate lever arm comprises a bent end portion, wherein particularly the bent end portion is located in a region of the intermediate lever arm, in which the intermediate lever arm is connected to one of the other lever arms.

[0038] A further modified embodiment provides that the shaft is operatively connected to the drive means via a plurality of interconnected lever arms. The number and design of the lever arms can be used to advantageously adjust the installation position of the drive means on the chair according to the structural characteristics of the chair. Optionally, the shaft may be operatively connected to the drive means via three interconnected lever arms, of which an intermediate lever arm comprises a bent end portion which surrounds a shaft of the drive means along an arc angle in a range of 70 degrees to 100 degrees.

[0039] Very preferably, the intermediate lever arm, which is the second lever arm, has the bent end portion at the end region where the intermediate lever arm is connected to the third lever arm. Such embodiment has the advantage that it can be prevented finger-squeezing between the lever arm and the drive-unit.

[0040] According to a modified embodiment, a notch is adapted to receive the pin, wherein the notch is open towards the groove, the notch being part of the means for applying the force or part of a collar, the collar being arranged between the pin and the means for applying the force. Optionally, the collar is mounted on the shaft between the pin and the means for applying the force. When using a collar, the functionality of the components can be split: the spring is then solely intended and set up to apply a force. The collar then transmits this force evenly to the pin and to the connecting element. The likelihood of the spring slipping can be reduced. The use of a collar also has the advantage that more standard parts can be used, which makes maintenance less expensive. If the spring is designed with a notch for the pin, the number of components can be reduced. For example, during maintenance, the error rate for omitting components/mounting components incorrectly is reduced, because the notch on the spring indicates the orientation in which the spring is to be mounted on the shaft, similar to a plug connection.

[0041] According to a modified embodiment, edges of the groove enclose a triangle with two legs of equal lengths, wherein each of the legs is provided by the edges of the groove.

[0042] Optionally, the edges may be joined at a right angle and, respectively, abut an edge of the connecting element at an angle of 130 degrees to 140 degrees, including respectively 130 degrees and 140 degrees, most preferably at an angle of 135 degrees. A right angle between the two legs, compared to a more acute angle, provides a small threshold for the pin to slide out of the groove. Alternatively, an obtuse angle between the two legs could be chosen. Of course, this also changes the angle at which the legs meet the edge of the connecting element.

[0043] The previously-mentioned two modified embodiments have the advantage that a threshold force at which the footrest/connecting element is decoupled from the drive means is the same, regardless of the direction (to move the movable part up/to move the movable part down) in which the shaft of the motor drives the shaft of the soft-lock system. Alternatively, the edges of the groove can have different pitches so that, depending on the direction of rotation of the motor, the threshold force at which the connecting element and the drive means are decoupled from each other is different. In other words, with different pitches, the angles between the edge of the connecting element and the edge of the groove would be different from an angle of 150 degrees.

[0044] According to a modified embodiment, the shaft comprises an elongated hole, which is adapted to receive the pin, and wherein the elongated hole defines a distance over which the shaft is movable with respect to the connecting element.

[0045] Alternatively, the connecting element comprises an elongated hole on opposite sides over an arc angle of 180 degrees, wherein the elongated hole is adapted to receive the pin on both sides of the shaft, and wherein the elongated hole defines a distance over which the connecting element is movable with respect to the shaft.

[0046] The elongated hole provides secure mechanical guidance of the shaft on the pin without jamming. The elongated hole is circumferentially enclosed by the material of the shaft, which also provides mechanical stability.

[0047] A further modified embodiment provides that the connecting element has a cavity for longitudinally and rotationally guiding the shaft along an axis of rotation of the shaft.

[0048] This favors a secure leadership of the shaft. Thus, the elongated hole, shaft, and cavity work together to advantage. The outer circumference of the shaft, in the area in which the shaft is received by the cavity, is preferably cylindrical. The cavity is correspondingly limited by a cylindrical inner wall of the connecting element.

[0049] According to a modified embodiment, the elongated hole defines the distance over which the shaft is movable within the cavity of the connecting element. In this way, a distance or a degree of movement can be easily and precisely adjusted, e.g. after the shaft has been manufactured. Optionally, the elongated hole may have a length, which corresponds to three times of a width of a cross-section of the pin.

[0050] According to a modified embodiment, the shaft, the means for applying a force and the connecting element extend in a space between the base of the chair and the movable part, especially the footrest. This favors, for example, a space-saving and safe positioning of the lever arms in the chair, which is important in view of the limited installation space available.

[0051] A further modified embodiment provides that the contact section comprises a recess and/or an insertion opening for receiving the connecting part of the support portion. This facilitates a secure and less wobbly connection between the movable part and the base of the chair.

[0052] According to a modified embodiment, the base portion comprises a switch of an electrical circuit, wherein the electrical circuit is configured to supply power to the drive means when the switch is closed, wherein the switch is configured to be closed only when the support portion has stopped moving or when the support portion is about to engage with the contact section of the base portion. Alternatively, the support portion may be a first part of the switch and the base portion may be a second part of the switch. The second alternative, that the support portion may be a first part of the switch and the base portion may be a second part of the switch, functions accordingly, i.e. the switch is configured to be closed only when the support portion has stopped moving. Both alternatives of the modified embodiment favor a safe control of a movable part only when the support portion, i.e. for example the seat, or the armrests are in a horizontal position.

[0053] According to a modified embodiment, the soft-lock-system comprises the chair damping system according to anyone of the previously described modified or optional embodiments.

[0054] These and other aspects of the disclosure will be apparent from and elucidated with reference to the implementation forms described hereinafter. Individual features disclosed in the implementation forms can constitute alone or in combination an aspect of the present disclosure. Features of the different implementation forms can be carried over from one implementation form to another implementation form.

BRIEF DESCRIPTION OF DRAWINGS

[0055] The above-described aspects and implementation forms of the present disclosure will be explained in the following description of specific embodiments in relation to the enclosed drawings, in which

- Fig. 1 shows a schematic drawing of an arrangement of a soft-lock system according to an embodiment,
- Fig. 2 shows a schematic drawing of the soft-lock system according to the embodiment,
- Fig. 3 shows a schematic drawing of a part of the soft-lock system according to the embodiment,
- Fig. 4 shows a schematic drawing in a cross-sectional view of the part of the soft-lock system according to the embodiment,
- Fig. 5 shows a schematic exploded view of components of the soft-lock system according to the embodiment;
- Fig. 6 schematically shows a cross-sectional view of the stairlift chair according to an embodiment,
- Fig. 7 schematically shows an electrical circuit according to an embodiment,
- Fig. 8 schematically shows a possible position of the switch of the electrical circuit according to an embodiment, and
- Fig. 9 schematically shows an arrangement with a damping element according to an embodiment.

DETAILED DESCRIPTION

[0056] With reference to the Figures, an arrangement of a soft-lock system according to an embodiment of the invention is described. It should be noted that the illustrations of Figures are only schematic representations. The components shown may, for example, have further components, such as a casing. The present components shown are those components which are necessary for the embodiment.

[0057] Figure 1 shows a possible positioning of the soft-lock system 1 on the chair 100 of the stairlift. The soft-lock system 1 is shown with further details in Figure 2. According to Figure 1, the soft-lock system 1 is located at a footrest 101 of the chair 100 and in a connection part 102, wherein the connection part 102 connects the footrest 101 with a drive and a seat (not shown in Figures 1 and 2), wherein the connection part 102 supports the seat.

[0058] The soft-lock system 1 has a motor M which is operatively connected to a shaft 3 via transmission elements. The shaft 3 rotatably connects the footrest 101 with the connection part 102. The motor M is an electric motor.

[0059] For this purpose, the shaft 3 is connected at both ends to the footrest 101 and the connection part 102. The footrest 101 and the connection part 102 enclose an intermediate area 103 in which further functional components of the soft-lock system 1 are located.

[0060] The other functional components of the soft-lock system 1 comprise, and in the present embodiment include a spiral spring 4, the windings 5 of which are wound around the shaft 3. the spiral spring 4 acts as a balancing spring being integrated to balance the force between folding and unfolding of the footrest 101.

[0061] End sections 6 of the spring 4, which run in a straight line on both sides, are connected to the windings 5. A first of these end sections 6 applies a spring force to the connection part 102 and a second of these end sections 6 applies a spring force to the footrest 101. The spring 4 is in a relaxed state when the footrest 101 is in a vertical orientation, i.e. in a folded state. The spring 4 is in a tensioned state when the footrest 101 is in a horizontal orientation, i.e. in a state of use.

[0062] A further spring is provided, which is referred to as soft-lock-spring 7 for the purpose of differentiation. This soft-lock-spring 7 interacts with other functional components of the soft-lock system 1. The soft-lock spring 7 is firmly connected to the shaft 3. These components are described further with reference to Figures 3 and 4. These components comprise a connecting element 8 which is immovably connected to the footrest 101. Further, these components comprise a pin 9 (not shown in Figures 1 and 2, for which see Figures 3 and 4), the pin 9 being connected to the shaft 3. For example, the pin 9 can be formed integrally with the shaft 3. In the present embodiment, the pin 9 is movably connected to the shaft 3.

[0063] The transmission elements comprise several lever arms 10a, 10b, 10c. Here, a first lever arm 10a is connected to a motor shaft 11 of the motor M. A second lever arm 10b is rotatably connected to the first lever arm 10a. A third lever arm 10c is immovably connected to the shaft 3 and rotatably connected to the second lever arm 10b. The second lever arm 10b is longer than the first lever arm 10a and the third lever arm 10c. For example, the second lever arm 10b can be four to five times longer than the first lever arm 10a and/or the second lever arm 10b.

[0064] In particular, the second lever arm 10b is bent at its end region where it is connected to the first lever arm 10a. In particular, the bent end portion 10b1 of the second lever arm 10b surrounds the motor shaft 11 along an arc angle in a range of 70 degrees to 100 degrees, including 70 or 100 degrees, respectively.

[0065] With reference to Figures 3 and 4, the soft-lock system 1 should be further described. The soft-lock system 1 has a decoupling mechanism, which decouples the motor M from the footrest 101 when forces acting on the motor M become too high.

[0066] Referring to Figure 3, the connecting element 8 has a groove 12.

[0067] The soft-lock is a combination of a pin 9 on a motor-side and the groove 12 on the footrest-side. Due to spring 7 the pin 9 is normally located in the groove 12 and provides a fixed linkage between motor M and footrest 101. If the forces in this linkage are higher than the forces applied by spring 7, the pin 9 will leave the groove 12 and the motor M is decoupled from the connecting element 8.

[0068] The groove 12 interacts with the pin 9. The pin 9 is therefore enclosed in the groove 12. The groove 12 is preferably formed by a triangular notch which is arranged on an edge 13 of the connecting element 8 facing the soft lock spring 7. The triangular notch is formed as an isosceles triangle. The edges 12a respectively forming two legs of equal length of the isosceles triangle form the groove 12, a third side of the triangle opposite the two legs of equal length runs along an imaginary line which is formed by the edge 13 of the connecting element 8 running circumferentially around the shaft 3. In other words, edges 12a of the groove 12 enclose a triangle with two legs of equal lengths. Each of the legs is provided by the edges 12a of the groove 12.

[0069] The edges 12a are joined at a right angle and, respectively, abut the edge 13 of the connecting element 8 at an angle of 130 to 140 degrees, preferably of 145 degrees.

[0070] However, the groove 12 can also be designed with other edge geometries at its edges.

[0071] The pin 9 is round on its surface cooperating with the groove 12. In the top view of groove 12 and pin 9, in which the groove 12 is formed as an isosceles triangle, the pin 9 has a circular cross-section. The geometry and size of groove 12 and pin 9 are adapted to each other so that groove 12 at least partially encloses the pin 9 in a locked state. In the locked state, the motor M can transmit the torque to the connecting element 8 via the pin 9. In particular, the groove encloses the pin 9 along an arc angle in a range of 90 to 140 degrees.

[0072] The soft-lock spring 7 has a collar 14 at its end facing the connecting part 8. The collar 14 may have a notch, which is not depicted. The pin 9 may be partially enclosed in the notch of the collar. The soft-lock spring 7 may exert a force on the pin 9 via the notch of the collar.

[0073] The pin 9 is normally, that means in the locked state, located in the groove 12 and the pin 9 acts as a fixed linkage between the motor M and the footrest 101. The soft-lock spring 7 and pin 9 and groove 12 are configured, if the forces in this linkage are higher than the spring 7, the pin 9 will leave the groove 12 and the motor M is decoupled from the connecting part 8.

[0074] Figure 4 shows a cross-sectional view of the soft-lock system 1. The cross-sectional view shows a cross-section of the soft-lock system 1 along the axis of rotation of the shaft 3.

[0075] Here the shaft 3 is positively connected to the soft-lock spring 7. A protrusion 16 pointing radially inwards, i.e. towards the shaft 3, is connected to a circumferential slot 17 of the shaft 3.

[0076] The shaft 3 is movable in a cavity 18 of the connecting element 8 along the axis of rotation of the shaft 3. An elongated hole 19 formed in the shaft 3 defines a distance over which the shaft 3 can be moved in the cavity 18 of the connecting element 8. Here, the pin 9 is guided movably along the path within the elongated hole 19. In this example, the elongated hole 19 has a length corresponding to a movement distance of the shaft 3 in the cavity 18, which corresponds to three times the width 3 of the circular cross-section of the pin 9 (from the perspective of Fig. 4).

[0077] At the same time, the elongated hole 19 limits a spring travel of the spring 7.

[0078] The connecting element 8 can be hollow along its entire longitudinal axis, which extends along the axis of rotation of the shaft 3. In the present embodiment, the shaft 3 extends over half the length of the cavity 18 in the connecting element 8. The connecting element 8 is designed with a cylindrical cavity 18, that means, a shape of the walls of the inner cavity 18 corresponds to an outer shape of the portion of the shaft 3, which is within the cavity 18. This allows the shaft 3 to rotate in the cavity 18 around the axis of rotation of the shaft 3 when the shaft 3 is uncoupled from the connecting element 8.

[0079] Furthermore, it can be seen from the cross-sectional view of Figure 4 that the connecting element 8 in the embodiment is shaped like a cup with a cup bottom and a cup opening. The shaft 3 is connected to the third lever arm 10c, via an extension which faces away from the cup bottom. Furthermore, the end of the shaft 3, which faces away from the shaft extension, is received by the connecting element 8, namely by the cup opening of the connecting element 8. On a side of the connecting element 8 opposite the cup bottom, the connecting element 8 has the cup opening. The collar 14 is placed on or adjacent to the cup opening of the connecting element 8. Other designs of the connecting element 8 are conceivable. However, it should be ensured that the shaft 3 is guided by the connecting element 8 for the purpose of movements along the axis of rotation and is held rotatably by the connecting element 8.

[0080] Finally, Figure 4 comprises exemplary scales which may be chosen for the components of the soft-lock system 1. In this context, the abbreviation "mK" refers to manufacturing tolerance classes, according to the standard ISO 2768-mK, that means ISO 2768-1-1991-06. In other words, the mK size means that it is a production tolerance to be an input in the tolerance calculation and the result is therefore the addition of these three measures. This resulting tolerance then forms the input of a calculation on the spring pressure and thus the soft-lock force variation due to these tolerances. The soft-lock force may again be below a set limit value.

[0081] Fig. 5 shows a schematic exploded view of components of the soft-lock system 1 according to the embodiment.

[0082] The arrangement of lever arms differs from the arrangement of lever arms 10a, 10b, 10c of the embodiment example according to Figures 1 and 2. In particular, the second lever arm 10b is bent over another arc angle at another of its end region where it is connected to the third lever arm 10c. In particular, a bent end portion 10b2 of the second lever arm 10b is bent at an arc angle in a range of 80 degrees to 95 degrees, including 80 or 95 degrees, respectively.

[0083] As further can be seen in Figure 5, the connecting element 8 may have a groove 12 on opposite sides over an arc angle of 180 degrees. The pin 9 then extends on both sides of the shaft 3 and is accommodated by the groove 12 on both sides. This can favor a linkage that can withstand more forces and reduce the likelihood of the pin 9 tilting.

[0084] Fig. 6 schematically shows a cross-sectional view of the stairlift chair 100 according to an embodiment.

[0085] Figure 7 comprises many numbers from 1 to 12. These correspond to the respective pins. For the sake of clarity, only the numbers are shown. The numbers 1 to 12 used in Figure 7 therefore do not correspond to the reference signs 1 to 12 in the other Figures 1 to 6 and 8 and 9. Only the reference sign "M", corresponding to a motor, is used uniformly in all the Figures. It follows, of course, that the mechanical pin 9 described with reference to Figures 1 to 6, 8 and 9 does not correspond to pin 9 of the electrical circuit.

[0086] The Figure 7 shows an exemplary electrical circuit with which the soft-lock mechanism of the soft-lock system 1 can be controlled. The drive means for driving the footrest 101, which is the footrest motor M, is powered by 24V main board power. The direction of rotation of the motor M is determined by a switch. This switch is operated by the seat 22, especially by a cushion 21 of the seat 22 (see Figure 8), and this switch is also called seat switch in the following. When the seat 22, especially the cushion 21 of the seat 22, is in an up-right position the footrest motor M is powered until a mechanism in a chairleg of the chair 100 operates an upper limit switch. When the seat 22, especially the cushion 21 of the seat 22 is in the down position the footrest motor M is powered again, with inverse polarity, until a lower limit switch is operated by the mechanism.

[0087] The seat switch, connected to connector J7, energizes the relay-coil K2B.

[0088] If the seat 22, especially the cushion 21 (see Figure 8), is lowered relay switch K2A in a position of Figure 7 and +24V is connected to a pin 3 of relay. If the lower limit switch between pin 1 and 2 of the footrest limit switches J8 is closed the +24V will be connected to the pin 1 of a connection element J10 of the footrest motor M through either the upper limit switch or a diode D6 and the motor M will be running. At a certain point, the chairleg mechanism opens the lower limit switch and the power to the footrest motor M will be interrupted since the current is blocked by a diode D5 and there is no connection anymore between pin 1 and pin 2 of J8.

[0089] When the seat 22, especially the cushion 21, is in the upward position the coil of relay K2B is not powered and the +24V will be connected to pin 5 of relay. When the upper limit switch, between pin 3 and pin 4 of J8 is closed the +24V will be connected to pin 2 of J10 and the motor M will be powered through either the lower limit switch or D5. At a certain point, the chairleg mechanism opens the upper limit switch and the power to the footrest motor M will be interrupted since the current is blocked by D6 and there is no connection between pin 3 and pin 4 of J8. In Figure 8, a possible position of the electrical circuit switch/switches being opened or closed when the seat cushion 21 is in an up-right position/is lowered is indicated by a black cross.

[0090] Figure 9 shows an embodiment of a chair damping system 40. The chair damping system 40 can be part of the soft-lock system 1 but does not have to be. Both systems 1 and 40 together increase the safety of a stairlift for a user. The structure of the chair damping system 40 is described below with reference to Figure 9.

[0091] The chair damping system 40 can be implemented on the footrest 101, for example. An application on the seat surface, below the cushion 21, is also conceivable. In Figure 9, for the sake of clarity, neither a reference sign for a seat 22 nor for a footrest 101 nor corresponding reference signs are used to improve clarity and comprehensibility. The chair damping system 40 comprises a base portion 41 with at least one recess or at least one insertion opening 43 for respectively receiving a projection 44 and/or a latching means, which is formed on/connected to the end of a support portion 42.

[0092] In the present embodiment, the base portion 41 has a receiving area adjacent to the recesses or the insertion opening 43, in which a damping element 45 is received. For this purpose, the receiving area is designed in such a way that it at least partially surrounds the damping element 45.

[0093] The damping element 45 is designed to absorb forces that are applied via the projection 44 from the support portion 42 (for example as part of the footrest 101 or as part of the seat surface) to the base of the chair 100. The damping element 45 is made of a foam material, for example. The damping elements 45 are designed to slow down the movement of the support portion 42.

[0094] In an exemplary embodiment, the switch is closed when the support portion 42 rests on the damping element 45 via its projection 44. Alternatively or additionally, the damping element 45 could be designed to hold a movable part of the chair 100 in a horizontal position and such horizontal position of the movable part itself activates the switch which initiates a rotation of the footrest 101 (see also description about Figures 5 and 6). In the present embodiment, two projections 44, and correspondingly two insertion openings 43 and possibly also two support portions 42 are provided. It must be noted that in the present embodiment the number of damping elements 45 corresponds to the number of projections 44. The damping elements 45 are symmetric.

[0095] In other words, for example, a movable part of the chair 100 of a stairlift, such as the seat 21 or the footrest 101, is damped by the chair damping system 40. Thereby, incorrect triggering of the electrical circuit for supplying electricity to the motor M for the footrest movement may be avoided. In other words, the switch of the electrical circuit can be configured to be closed only when the seat element stops moving and is horizontal, which would correspond to a maximum compression of the damping element(s) 45 by the projections 44.

[0096] The disclosure has been described in conjunction with various implementations herein. However, other variations to the disclosed implementation forms can be understood and effected by those skilled in the art in practicing the claimed disclosure, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

Reference signs list

[0097]

1	soft-lock system
3	shaft
4	spiral spring
5	winding
6	end section of winding
7	soft-lock spring
8	connecting element
9	pin
10a	first lever arm
10b	second lever arm/intermediate lever arm
10b1	bent end portion of the second lever arm (Figures 1, 2)
10b2	bent end portion of the second lever arm (Figure 5)
10c	third lever arm
11	motor shaft
12	groove
12a	edges formed by legs of equal length of the triangular groove
13	edge of the connecting element facing the soft-lock spring
14	collar
16	protrusion
17	slot
18	cavity of the connecting element
19	elongated hole of the connecting element
20	extension
21	cushion
22	seat
40	chair damping system
41	base portion
42	support portion
43	insertion opening

44 projection
45 damping element

100 chair of stairlift
101 footrest of chair
102 connection part
103 intermediate area

D5 diode
D6 diode
J7 connector in the electrical circuit
J8 footrest limit switches
J10 connection element of motor
K2A relay switches
K2B relay coil
M motor for driving the footrest/footrest motor

[0098] reference signs only for the electrical circuit of Figure 7:

1-12 pins of the electrical circuit

Claims

1. A soft-lock system (1) for drive means of a movable part of a stairlift, especially of a stairlift chair (100), the system (1) comprising:

   drive means for applying a torque to a shaft (3), to move a movable part between a vertical orientation and a horizontal orientation;
   a shaft (3) for rotatably connecting the movable part to a base of a stairlift,
   especially a stairlift chair (100),
   wherein the shaft (3) comprises a connector;
   a connecting element (8) for transferring the torque from the shaft (3) to the movable part,
   wherein the connecting element (8) comprises a counter connector being connectable to the connector of the shaft (3), and
   mechanical means for applying a force to the connector to keep the connector connected to the counter connector, to provide a fixed linkage between the drive means and the connecting element (8); and
   when the force to the connector exceeds a threshold, the counter connector, connector, and the means for applying the force are configured to release the connector from the counter connector, to decouple the linkage between the connecting element (8) and the drive means.

2. The soft-lock system (1) of claim 1, wherein the connector is a radially protruding pin (9) or wherein the counter connector is the radially protruding pin (9); and/or wherein the connector is a groove (12), or the counter connector is the groove (12).

3. The soft-lock system (1) of claim 2, wherein the shaft (3) or the connecting element (8) has the groove (12) on opposite sides over an arc angle of 180 degrees, wherein, during the linkage between the connecting element (8) and the drive means,

   and when the pin (9) is connected to the shaft (3) and the groove (12) is part of the connecting element (8), the pin (9) is adapted to extend on both sides of the shaft (3) and to be received by the groove (12) on both sides of the shaft (3); or
   and when the pin (9) is connected to the connecting element (8) and the groove (12) is part of the shaft (3), the pin (9) is adapted to extend in a radially inward direction on both sides of the connecting element (8) and to be received by the groove (12) on both sides of the shaft (3).

4. The soft-lock system (1) of anyone of claims 1 to 3, wherein a notch is adapted to receive the pin (9), wherein the notch is open towards the groove (12), the notch being part of the means for applying the force or part of a collar (14), the collar (14) being arranged between the pin (9) and the means for applying the force, in particular being mounted on the shaft (3) between the pin (9) and the means for applying the force.

5. The soft-lock system (1) of anyone of claims 1 to 4, wherein edges (12a) of the groove (12) enclose a triangle with two legs of equal lengths, wherein each of the legs is provided by the edges (12a) of the groove (12), and wherein particularly the edges (12a) are joined at a right angle and, respectively, abut an edge (13) of the connecting element (8) at an angle of 130 degrees to 140 degrees.

6. The soft-lock system (1) of anyone of claims 1 to 5, wherein the shaft (3) comprises an elongated hole (19), which is adapted to receive the pin (9), and wherein the elongated hole (19) defines a distance over which the shaft (3) is movable with respect to the connecting element (8); or
   wherein the connecting element (8) comprises an elongated hole (19) on opposite sides over an arc angle of 180 degrees, wherein the elongated hole (19) is adapted to receive the pin (9) on both sides of the shaft (3), and wherein the elongated hole (19) defines a distance over which the connecting element (8) is movable with respect to the shaft (3).

7. The soft-lock system (1) of anyone of claims 1 to 6, wherein the connecting element (8) has a cavity (18) for longitudinally and rotationally guiding the shaft (3) along an axis of rotation of the shaft (3).

8. The soft-lock system (1) of the preceding claim 6 or 7, wherein the elongated hole (19) defines the dis-

tance over which the shaft (3) is movable within the cavity (18) of the connecting element (8), wherein particularly the elongated hole (19) has a length, which corresponds to three times of a width of a cross-section of the pin (9).

9. The soft-lock system (1) of anyone of claims 1 to 8, wherein the shaft (3) is operatively connected to the drive means via three interconnected lever arms (12a, 12b, 12c), of which an intermediate lever arm comprises a bent end portion (12b1, 12b2), wherein particularly the bent end portion (12b1, 12b2) is located in a region of the intermediate lever arm, in which the intermediate lever arm is connected to one of the other lever arms (12a, 12c).

10. The soft-lock system (1) of anyone of claims 1 to 9, wherein the shaft (3), the means for applying a force and the connecting element (8) extend in a space between the base of the chair (100) and the movable part, especially the footrest (101).

11. A stairlift component damping system (40) for damping a movable part of a stairlift, the system (40) comprising:

at least one support portion (42) with a connecting part for connecting the support portion (42) to a base portion (41);
the base portion (41) with at least one contact section for receiving the connecting part of the at least one support portion (42),
wherein the support portion (42) is pivotally mounted with respect to the base portion (41); and
a damping element (45) for damping a pivoting movement of the support portion (42) when the connecting part of the support portion (42) is about to engage with the contact section of the base portion (41).

12. The stairlift component damping system (40) of the preceding claim, wherein the contact section comprises a recess and/or an insertion opening (43) for receiving the connecting part of the support portion (42).

13. The stairlift component damping system (40) of anyone of the preceding claims, wherein the base portion (41) comprises a switch of an electrical circuit, wherein the electrical circuit is configured to supply power to the drive means when the switch is closed, wherein the switch is configured to be closed only when the support portion (42) has stopped moving or when the support portion (42) is about to engage with the contact section of the base portion (41).

14. The soft-lock system (1) of anyone of claims 1 to 10, comprising the stairlift component damping system (40) according to anyone of the preceding claims.

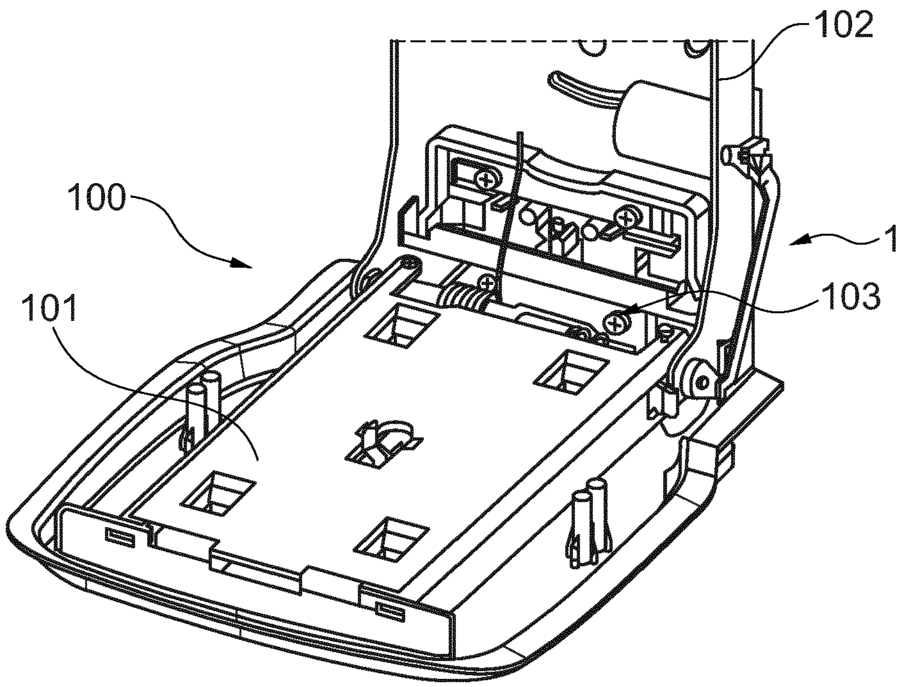


Fig. 1

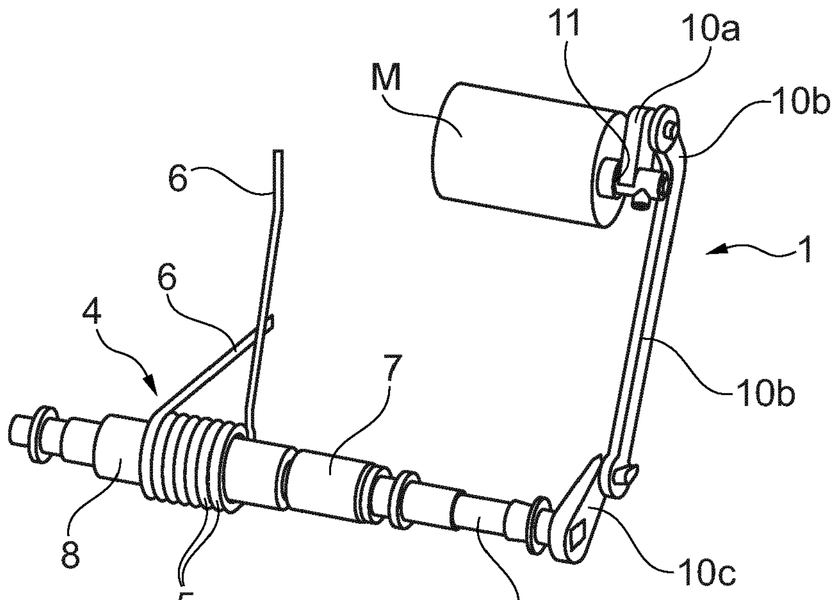


Fig. 2

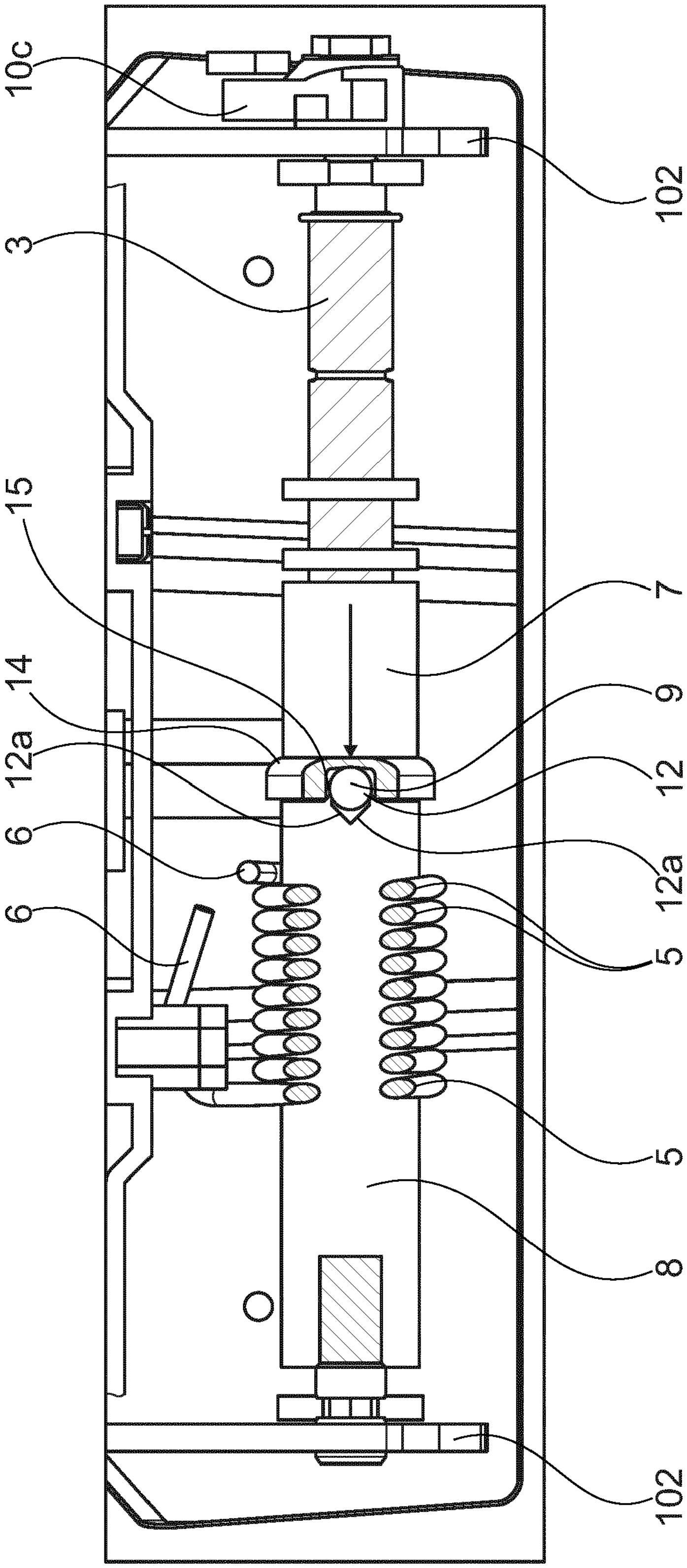


Fig. 3

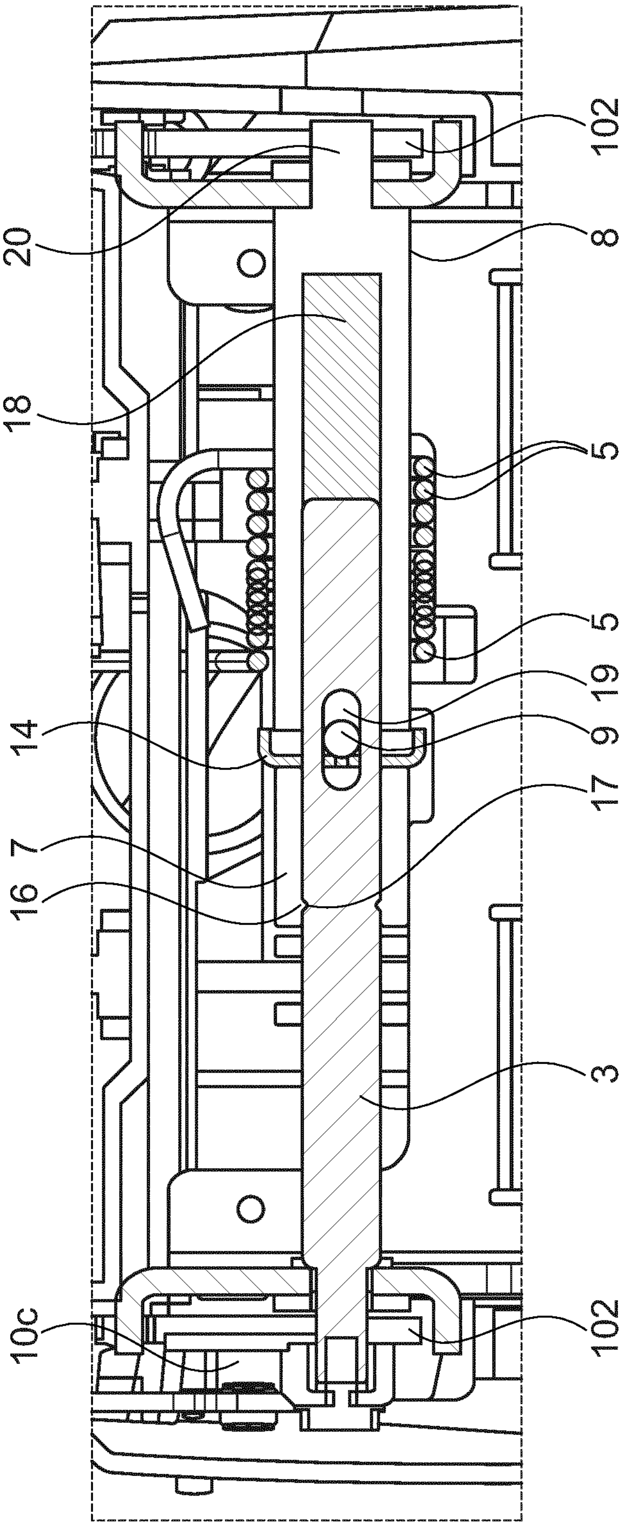


Fig. 4

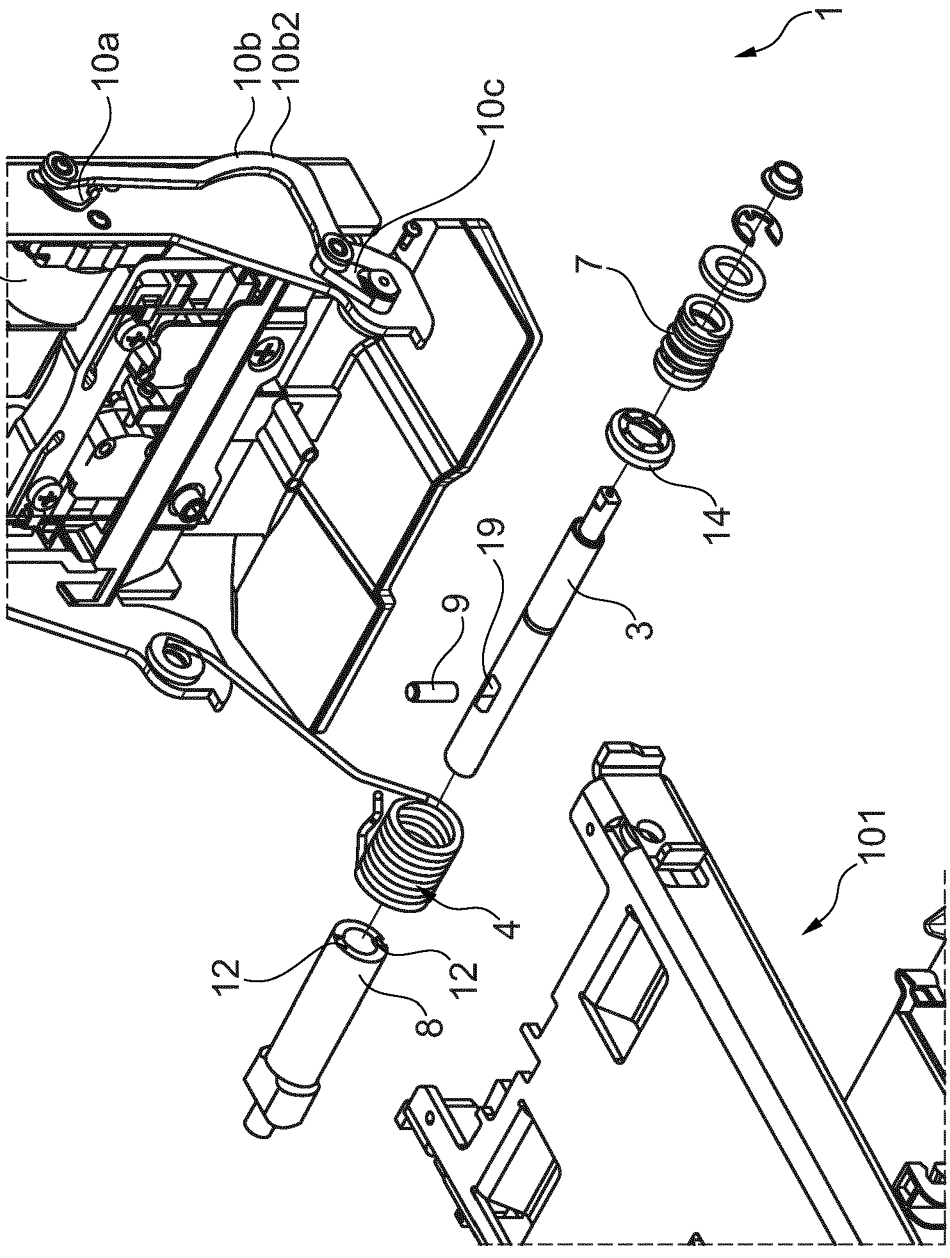
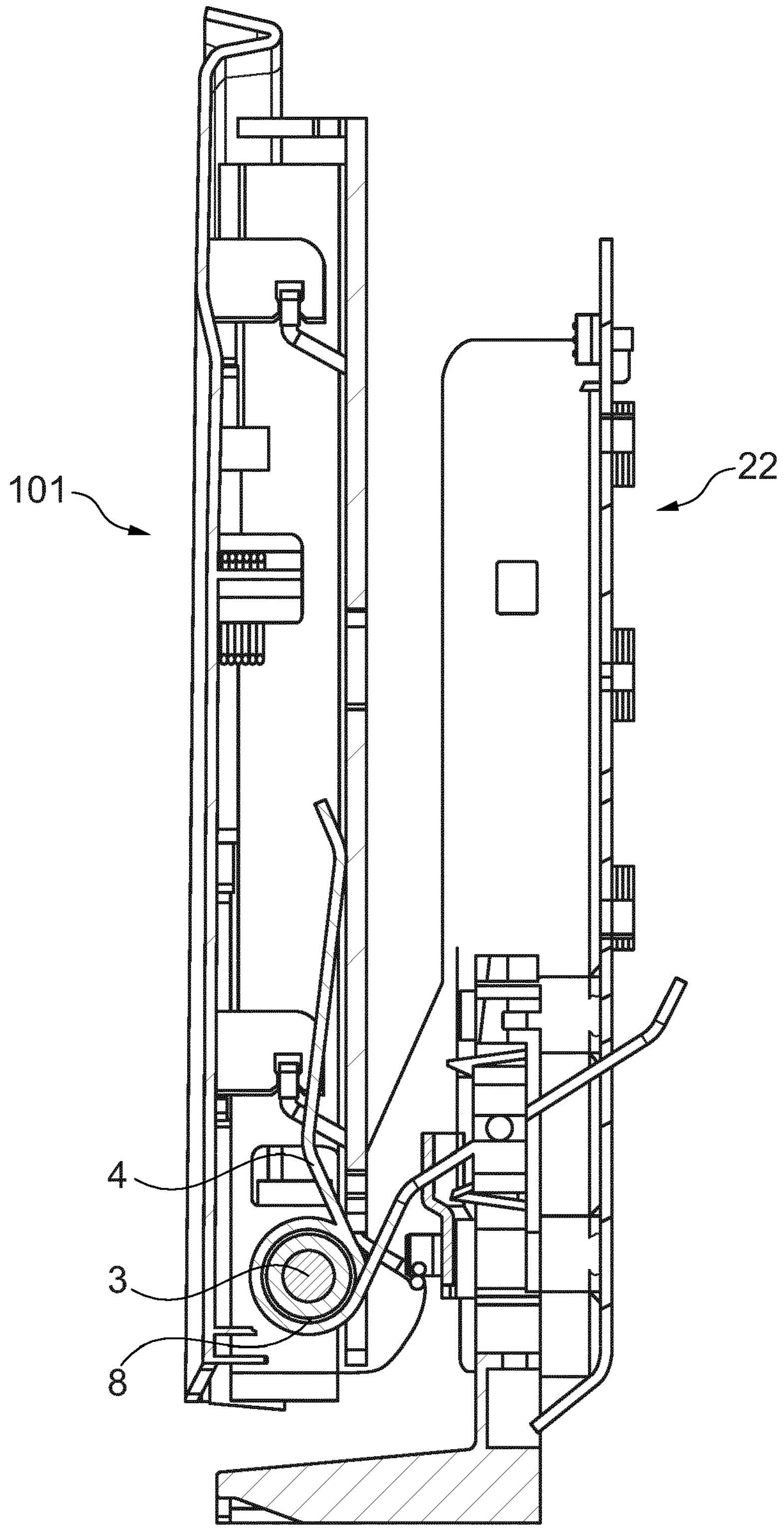


Fig. 5



Section A-A

Fig. 6

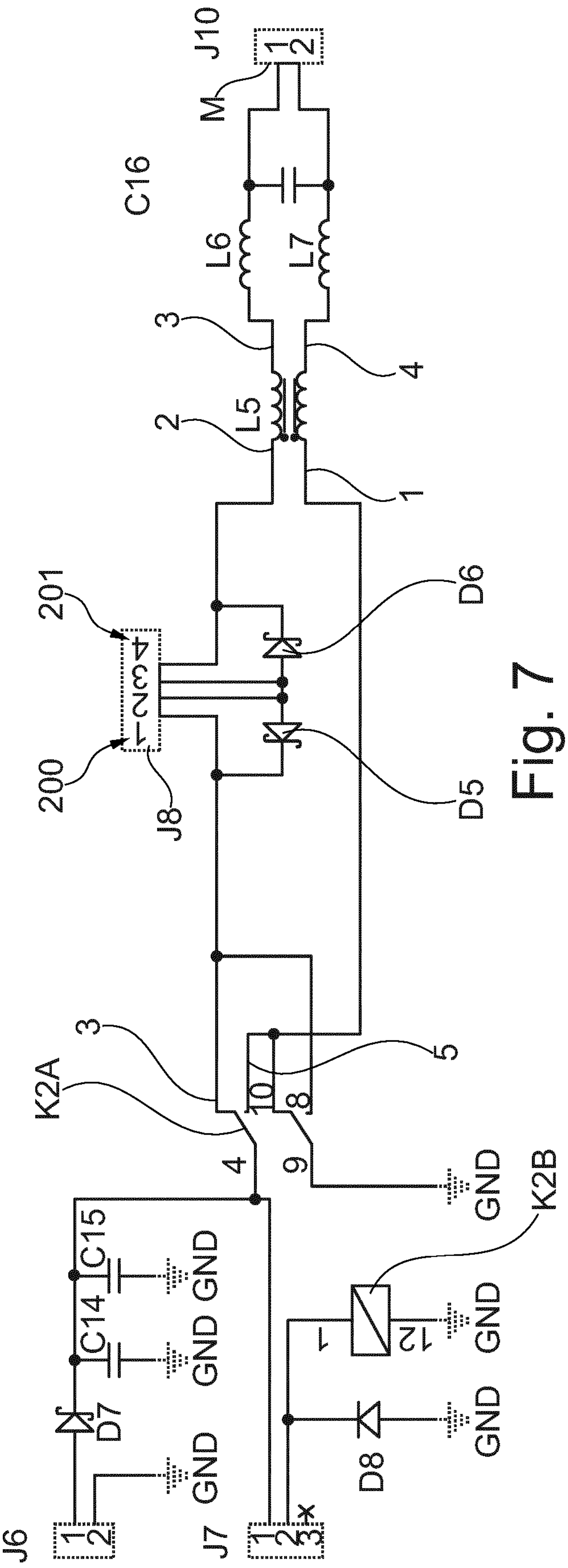

J10
1
2
M
C16
L6
L7
3
4
L5
2
1
201
200
1
2
3
4
J8
D6
D5
K2A
3
5
4
10
8
9
GND
K2B
C15
C14
GND
GND
D7
GND
1
12
GND
D8
GND
J6
1
2
J7
1
2
3

Fig. 7

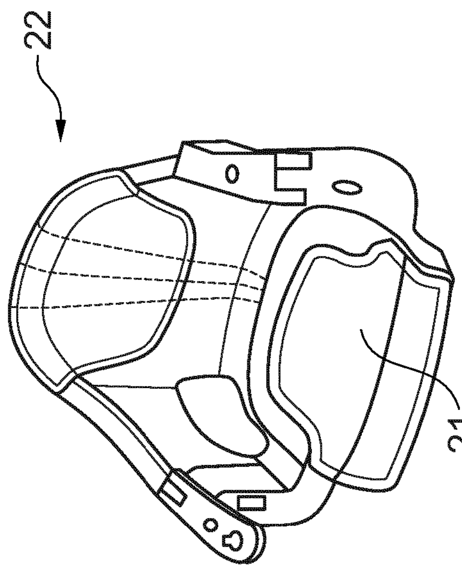

22
21

Fig. 8

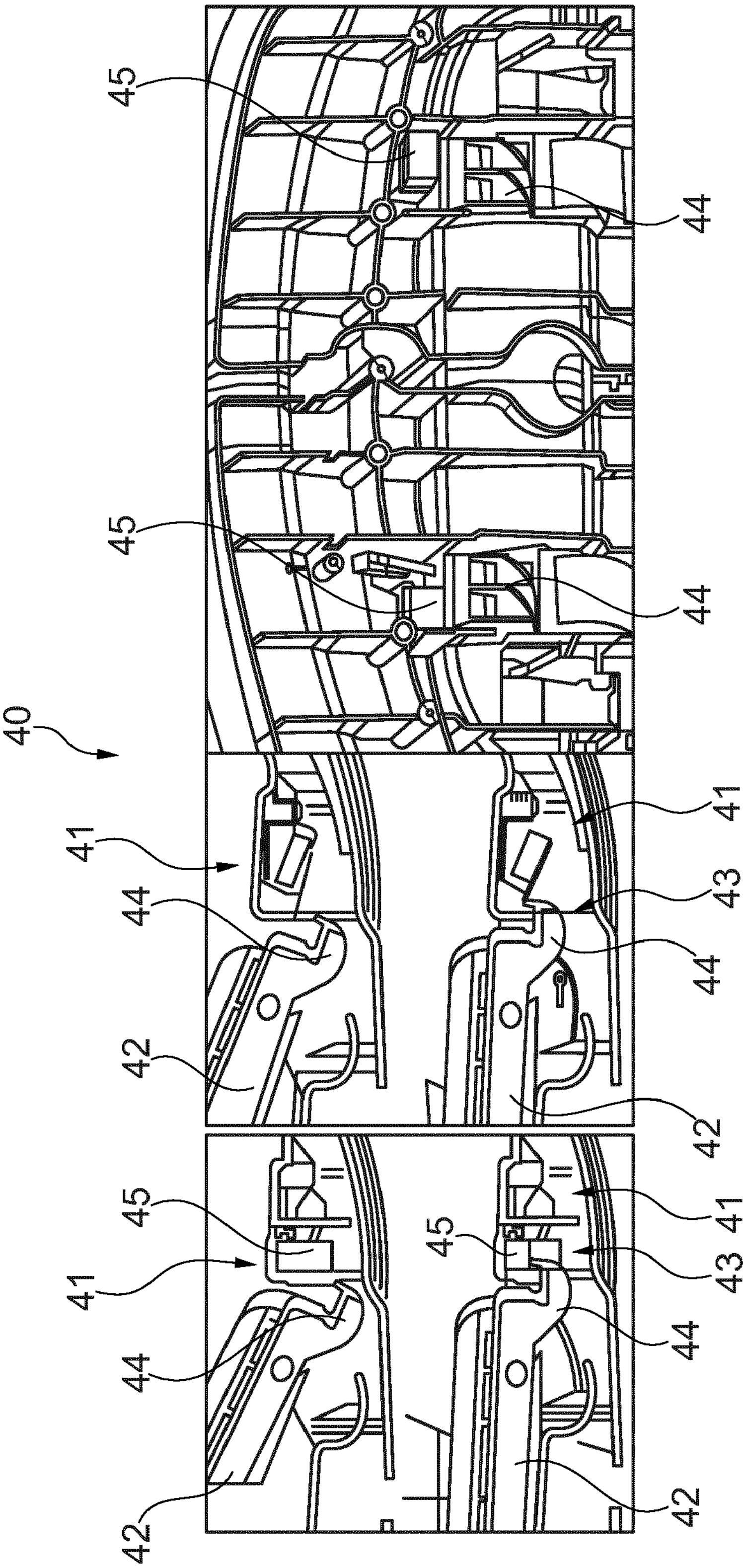


Fig. 9

Europäisches Patentamt
European Patent Office
Office européen des brevets

PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 22 15 4983

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 A	EP 0 626 046 B1 (RIGERT BERNHARD [CH]) 23 April 1997 (1997-04-23) * column 2, line 58 - column 4, line 44 * * figures 1 - 5 * -----	1-4,7, 10,14 5,6,8,9	INV. B66B9/08
X A	CN 206 615 896 U (CHANGXING YUEHUI TECH CO LTD) 7 November 2017 (2017-11-07) * abstract * * claims 1-10 * * figures 1, 3 * -----	1-4,7, 10,14 5,6,8,9	
X A	CH 691 773 A5 (RIGERT AG TREPPENLIFTE [CH]) 15 October 2001 (2001-10-15) * column 2, line 10 - column 4, line 29 * * figure 1 * -----	1-4,7, 10,14 5,6,8,9	
A	JP H07 315723 A (OKUBO MASAO; OKUBO KAZUKO; OKUBO MAKOTO; OKUBO HAJIME) 5 December 1995 (1995-12-05) * the whole document * -----	1-10,14	

TECHNICAL FIELDS SEARCHED (IPC)

B66B

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

1

Place of search	Date of completion of the search	Examiner
The Hague	18 October 2022	Dogantan, Umut H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04E07)

Europäisches Patentamt
European Patent Office
Office européen des brevets

INCOMPLETE SEARCH SHEET C

Application Number
EP 22 15 4983

Claim(s) completely searchable:
1-10, 14

Claim(s) not searched:
11-13

Reason for the limitation of the search:

Independent claims of the same category (Rule 43 (2) EPC)
1.1 The present application contains two independent claims of the same category, namely independent apparatus claim 1 and independent apparatus claim 11, which do not fall under one of the exceptions under Rule 43(2) EPC.
In response to the invitation under Rule 62a EPC sent on 04-08-2022, the applicant indicated in the reply dated 04-10-2022 that the search is to be carried out on the basis of independent apparatus claim 1.
1.1 In the response of the applicant dated 04-10-2022 further following arguments where raised:
The applicant is of the opinion that the soft-lock system according to independent device claim 1 and the stairlift component damping system according to independent device claim 11 provide interrelated products according to Rule 43(2) (a) EPC (see also Guidelines for Examination in the European Patent Office, March 2022 (GL), F-IV, 3.2). The applicants supports his opinion by the argument that the damping system of claim 11 is a sub-system of the soft-lock system of independent device claim 1. The description discloses on page 19, lines 20 to 22 that "Figure 9 shows an embodiment of a chair damping system 40. The chair damping system 40 can be part of the soft-lock system 1 but does not have to be. Both systems 1 and 40 together increase the safety of a stairlift for a user."

Considering figures 1, 2 and 9 of the application and the all the passages mentioned in the reply, it is not derivable how the device claims 1 and 11 can be considered interrelated products according to Rule 43(2)(a) EPC. The GL, F-IV, 3.2 mentions examples of a plurality of interrelated products, for example plug and socket or transmitter - receiver. It is obvious and generally known how these different objects of the aforementioned examples complement each other and work together in a unique way but still are separate devices.
The soft-lock system and the stairlift component damping system on the other hand are integrated in the claimed stairlift. Further dependent claim 14 discloses similarly that the soft-lock system comprises the stairlift component damping system.
It is therefore concluded that the request of the applicant is denied, since independent device claim 11 and further claims dependent on said claim do not fulfill the requirements of Rule 43(2) (a) EPC considering the reasoning given above.
1.1 Following the request of the applicant in his reply dated 04-10-2022, claims 1 to 10 and 14 will be searched.The applicant's attention is drawn to the fact that the application will be further prosecuted on the basis of subject-matter for which a search has been carried out and that the claims should be limited to that subject-matter at a later stage of the proceedings (Rule 62a(2) EPC).

* * * * *

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 15 4983

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-10-2022

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0626046	B1	23-04-1997	AT	152222 T	15-05-1997
			EP	0626046 A1	30-11-1994
			ES	2103561 T3	16-09-1997
			WO	9415119 A1	07-07-1994
CN 206615896	U	07-11-2017	NONE		
CH 691773	A5	15-10-2001	NONE		
JP H07315723	A	05-12-1995	NONE		

EPO FORM P0459

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