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This invention relates to a drive for adjusting parts of furniture that can be moved relative to one another, in particular armchairs, according to the preamble of claim 1.

Generic drives are used for adjusting parts of furniture that can be moved relative to one another. For the pieces of furniture that have these parts that can be moved relative to one another, the matter can be, for example, of seating or lounge furniture, for example of beds, armchairs, sofas or slatted frames. For example, the drives are used to adjust the lying position of a bed or the relative position of the seat and of the back of an armchair relative to one another. For example, they are also used for adjusting the angle of inclination of the bearing surface of a lectern or of a table. This being, in most cases, generic drives have a housing in which a slider and a spindle capable of being driven by an electric motor are placed. This being, the slider is connected to the spindle in such a manner that it can be linearly displaced by the spindle in a longitudinal direction. On the other hand, the spindle is driven by an electric motor. In a known embodiment of generic drives, the electric motor drives a spindle nut, wherein the spindle is non-rotatably connected with the slider so that a linear displacement of the slider is caused by a rotation of the spindle nut relative to the spindle. In another embodiment of generic drives, the electric motor drives the spindle to rotate, wherein, a spindle nut that is non-rotatably connected to the slider is provided on the slider so that a linear displacement of the slider is caused by a rotation of the spindle nut relative to the spindle. Generic drives usually have a housing in which the slider, the spindle and the electric motor are placed.

Furthermore, generic drives have an output element that is also placed in the housing, i.e. at least in sections in the housing. For generic drives, the arrangement comprising the slider, the spindle and the output element in the housing is defined in such a way that the components of the arrangement take positions defined relative to one another. This being, the slider and the output element are placed and designed in such a way that a rotation of the output element about an axis of rotation is caused by a linear displacement of the slider in the longitudinal direction, wherein the axis of rotation of generic drives is usually perpendicular to

the longitudinal direction. To this end, the slider and the output element are connected with each other by an operative connection. In an embodiment of a generic drive, the output element is designed as a lever that has a first lever arm that bears on a front side of the slider as well as a second lever arm that is connected with a part of furniture to be moved. This being, the output element is rotatably mounted about an axis of rotation so that a corresponding motion of the first lever arm is caused in the longitudinal direction by a motion of the slider so that the second lever arm is pivoted about the axis of rotation due to the rotatable mounting of the output element. Generic drives allow a relative motion of parts of furniture that can be moved relative to one another, in particular an angular displacement of such parts of furniture that can be moved relative to one another. However, there are various problems with these generic drives. For example, due to their design comprising a slider and a rotatably mounted lever, generic drives need substantial installation space. The fact that generally a substantial force has to be exerted onto the parts of furniture that are movable relative to one another, for what reason the housing, the slider and the lever have to be designed appropriately robust and an electric motor with a sufficiently high torque has to be provided also contributes to this requirement. For example, generic drives can often be mounted only with difficulty since a connection of the lever of the drive with a part of furniture to be moved can often only be achieved in a complicated process.

A generic drive is disclosed in the DE 202007005130 U1. For this drive, the operative connection that connects the slider with the output element has an interlocking toothing between the slider and the output element, wherein the output element extends with an output section in a transverse direction above the interlocking toothing and wherein the interlocking toothing is provided at a lower end section of the slider in the transverse direction.

The aim of this invention is to make available a new drive for adjusting parts of furniture that are movable relative to one another.

As a solution to said aim of the invention, the invention proposes a drive with the characteristics of claim 1. The drive according to the invention comprises a housing in which an arrangement is placed that comprises a slider that is linearly guided in a longitudinal direction and an output element connected with the slider by an operative connection. The arrangement is designed in such a way to cause a rotation of the output element around an axis of rotation during a linear displacement of the slider. The housing can, for example, have a guiding rail extending linearly in the longitudinal direction in which the slider is guided. The drive according to the invention can, for example, comprise an electric motor and a spindle, wherein the spindle extends in the longitudinal direction and is connected with the slider for displacing the slider linearly along the longitudinal direction. According to the invention, the operative connection comprises an interlocking toothing between the slider and the output element. This being, the output element extends with an output section in a transverse direction above the interlocking toothing, wherein the interlocking toothing is provided at a lower end section of the slider in the transverse direction. The transverse direction is in particular perpendicular to the axis of rotation and/or perpendicular to the longitudinal direction. The output section can be designed to be coupled to a transmission shaft with which a rotation of the output element can be transferred to a movable part of furniture. In any case, the output element extends in sections with reference to the transverse direction above the interlocking toothing. This being, the interlocking toothing is provided at a lower end section of the slider with respect to this transverse direction, i.e. on a section of the slider along the transverse direction that originates from the lower end of the slider in the transverse direction and that extends over at most half, in particular over at most a third, in particular over at most a quarter of the maximal extension of the slider in the transverse direction. This being, the slider can be designed in one part or in several parts. For example, the slider can have a drive section that is connected with the spindle for ensuring the capability of the slider to be driven by the spindle, i.e. the ability of the slider to be moved in the longitudinal direction by the spindle, wherein the slider has a toothing section that is designed for making available the interlocking toothing with the output element. This being, the toothing section and the drive section can be placed following one another in the longitudinal direction and, for example,

be produced respectively separately and then be fixed with each other in a fixed position for implementing the slider. The interlocking toothing between the slider and the output element can, for example, be ensured in that the output element has at least one projection that engages in at least one recess of the slider. The toothing can self-evidently also be implemented in that the slider has at least one projection that engages in at least one recess of the output element. For example, the output element can be designed in the manner of a toothed wheel, wherein the slider has a toothing section that is designed in the manner of a rack.

The drive according to the invention brings various advantages. On the one hand, the interlocking toothing between the slider and the output element ensures that the operative connection between the slider and the output element is designed bidirectional. During a positive as well as a negative movement of the slider along the longitudinal direction, a transmission of force from the slider to the output element is respectively made possible so that a relative movement of two parts of furniture can be carried out in a positive and in a negative direction respectively under a force load. Moreover, the interlocking toothing makes possible to construct the drive according to the invention as compact as possible. Furthermore, the relative arrangement of the slider and of the output element with respect to each other, for which the output element extends with an output section in the transverse direction above the toothing and the toothing is provided at a lower end section of the slider in the transverse direction, ensures that a lever arm as big as possible is made available between the toothing and the axis of rotation by keeping an installation space as small as possible so that a high torque force can be applied with the drive according to the invention to the parts of furniture to be moved to each other in a simple way.

In an embodiment, several first toothing elements are placed on the output element, wherein several second toothing elements that are spaced from each other in the longitudinal direction are placed on the lower end section of the slider. Particularly preferably, the first toothing elements are also spaced from each other in the longitudinal direction. In said advantageous embodiment, at least one of the first toothing elements engages into at least one of the second toothing elements

for making available the operative connection. For example, the first toothing elements and the second toothing elements can be designed as an arrangement with projections and recesses corresponding to each other that engage into one another for making available the interlocking toothing. For example, each of the first toothing elements can be designed as a projection and each of the second toothing elements as a recess. For example, each of the first toothing elements can be designed as a recess and each of the second toothing elements as a projection. The operative connection and thus the interlocking toothing between the slider and the output element is always ensured by the combined action of at least one first toothing element with at least one second toothing element.

Particularly preferably, the first toothing elements are placed in an arcuate arrangement. A reliable operative connection between the slider and the output element can thus be achieved over a wide position range of the slider along the longitudinal direction and over a wide angular position range of the output element about the axis of rotation. Particularly preferably, the axis of rotation is situated in the center of the arc of circle of the arcuate arrangement. Particularly preferably, the second toothing elements are placed in a linear arrangement, in particular in a linear arrangement along the longitudinal direction.

It can suitably be provided that the output element has an arc-shaped section extending around a swivel central point with radially directed projections and gaps between these projections for configuring the first toothing elements, wherein this arrangement can be designed in the manner of a toothed wheel segment. This being, second toothing elements that are placed in the longitudinal direction on the slider and that extend respectively transversely to its longitudinal extension can be provided, wherein first and second toothing elements are arranged and placed for making available an operative connection between the slider and the output element for meshing with each other. This being, the slider can placed in such a manner that it extends at a distance from the swivel central point of the output element.

In an embodiment, the slider has an output section, wherein the second toothing elements are placed on the drive section along the direction of the axis of rotation laterally on the drive section. The second toothing elements are thus placed at a side end with respect to the direction of the axis of rotation of the drive section. In an embodiment, the drive section is placed in the longitudinal direction in an alignment with the spindle. In an embodiment, the second toothing elements are placed offset to the spindle with reference to the direction of the axis of rotation and are placed offset to the spindle with reference to the longitudinal direction. In an embodiment, the second toothing elements are designed as recesses provided laterally on the drive section. In an embodiment, the second toothing elements are designed as bar-shaped elements that protrude laterally from the drive section. Particularly preferably, the bar-shaped elements have a rounded, in particular an elliptic, in particular a spherical cross-section. Thus, an intermeshing of first and second toothing elements that is particularly wear-resistant and simultaneously positive fitting can be ensured. To this purpose, the first toothing elements are particularly preferably designed as teeth of a toothed wheel that have a bulge. The advantageous embodiments described with second toothing elements provided laterally on the drive section make possible a particularly simple implementation of a particularly robust and simultaneous compact drive.

In an embodiment, a first group of second toothing elements is placed on a first side of the drive section of the slider and a second group of second toothing elements is placed on a second side of the drive section. This being, with "laterally" or "side", reference is made to a side with reference to the direction of the axis of rotation. The output element has a first toothing portion with a first group of the first toothing elements and a second toothing portion with a second group of the first toothing elements. The drive section is placed between the two toothing portions of the output element, wherein the first group of the first toothing elements cooperates with the first group of the second toothing elements and wherein the second group of the first toothing elements cooperates with the second group of the second toothing elements. Particularly preferably, the first group of the first

toothing elements cooperates exclusively with the first group of the second toothing elements and the second group of the first toothing elements cooperates exclusively with the second group of the second toothing elements.

Due to the provision of the two different groups of first and second toothing elements and of the arrangement of the drive section of the slider between the toothing portions of the output element, a particularly even transmission of force from the slider to the output element can be achieved without an oblique stress of the slider. To this purpose, it is particular advantageous that the drive section of the slider is placed between the toothing portions with reference to the direction of the axis of rotation, wherein the drive section is, in an embodiment, offset to the toothing portions in the longitudinal direction. This being, it should be noted that the slider is designed so as to be driven by its drive section, i.e. to be displaced in the longitudinal direction, for example wherein a spindle is coupled to the drive section of the slider. For example, the slider can have a threaded bore hole in its drive section, this threaded bore hole corresponding to a spindle in a conventional manner to allow the slider being displaced by the spindle along the longitudinal direction. In an embodiment, both toothing portions of the output element are designed as a section of a toothed wheel or as a toothed wheel, wherein the drive section of the slider is placed between the toothed wheel sections. In an embodiment, the toothing portions overlap with the drive section in the transverse direction to make available a guideway for the drive section. This being, the toothing portions of the output element thus extend beyond a section in the transverse direction laterally besides the drive section of the slider. With a corresponding overlap between the toothing portions and the drive section, the stability of the drive can still be further improved by the provided guiding of the drive section of the slider and thus of the slider. To this purpose, an overlap of the drive section with the toothing portions along the longitudinal direction can particularly preferably be provided.

In an embodiment, the slider has a transmitting section that is designed in the manner of a perforated rail. The output element has a corresponding transmitting section that is designed in the manner of a toothed wheel. Due to the design of

the transmitting section of the slider as a perforated rail, a stable operative connection between the output element and the slider can be made available in a particularly simple and cost-effective manner. In an embodiment, the slider has a transmitting section and a drive section that are placed the one behind the other. In an embodiment, the slider is designed with several parts, wherein the transmitting section is designed as one of the several parts and is manufactured separately from the other parts. Particularly preferably, the transmitting section of the slider is designed in the manner of a U-profile, wherein the arrangement is designed comprising the slider and the output element in such a manner that the corresponding transmitting section of the output element is guided in the U-profile of the transmitting section. The stability of the drive can still be further improved by this lateral guideway between the output element and the slider.

In an embodiment, the output element has a passage that extends along the axis of rotation that has a cross-section that is appropriate for receiving a transmission shaft with a corresponding cross-section. Particularly preferably, the passage is provided in the output section of the output element.

The drive according to the invention can comprise a transmission shaft placed in the passage. Particularly preferably, the cross-section of the passage and the corresponding cross-section of the transmission shaft are designed relative to one another so that a fixing of the transmission shaft in the passage that is torsion-proof with respect to a rotation about the axis of rotation is made available by the cross-sections corresponding to one another. A rotation of the output element can be transmitted by the transmission shaft to a movable part of furniture, the transmission shaft being connected to the part of furniture. For example, the transmission shaft can be designed as an axis of rotation of the part of furniture. Particularly preferably, the cross-section of the passage has a section with two sides parallel to each other. The cross-section of the passage can, for example, be designed at least in sections as a polygon, in particular as a square or a rectangle or a trapezoid. Due to the provision of a section with two sides parallel to each other and/or due to the configuration of the cross-section designed at least in sections as a polygon, a torsion-proof securing of the transmission shaft with

respect to the output element can be ensured in a particularly efficient and easy manner.

In an embodiment, the transmission shaft is designed in the manner of a tube with a round cross-section on which a driver is fixed in a fixed position. In an embodiment, the transmission shaft is designed in the manner of a bar with a round cross-section on which a driver is fixed in a fixed position. For a design as a tube, because of the hollow space provided, a light weight and a low moment of inertia can be ensured, whereas a bar manufactured from full material can be designed particularly robust. The driver can, for example, be welded, riveted or screwed to the tube or the bar. The cross-section of the passage corresponds with the common cross-section of the tube or of the bar and the driver. The corresponding cross-section of the transmission shaft is thus configured by the arrangement of the tube and of the driver fixed thereon or by the arrangement of the bar and of the driver fixed thereon. For the described embodiment, the transmission shaft can particularly advantageously act as an axis of rotation for a part of furniture and a torsion-proof securing between the output element and the transmission shaft can be made available particularly simply.

In an embodiment, the passage has an opening at its upper end in the transverse direction for ensuring the introduction of the transmission shaft into the passage perpendicularly to the axis of rotation, in particular along the transverse direction. This embodiment allows for a particularly easy mounting of the drive according to the invention to a piece of furniture in which the transmission shaft acts as an axis of rotation of a part of furniture. As for the embodiment described, the drive can easily be slid onto the transmission shaft perpendicularly to the axis of rotation, the transmission shaft sliding into the opening of the output element and thus into the passage of the output element.

Particularly preferably, a driver element that extends perpendicularly to the direction of rotation is placed in a section along the axis of rotation in the passage, wherein the driver element is placed relative to the opening in such a manner that

the driver element is engageable with a corresponding driver element of the transmission shaft while introducing the transmission shaft into the passage. For example, the driver element of the output element can be designed as a pin provided in the passage, pin that is placed on the side of the passage that is facing the opening, wherein the corresponding driver element of the transmission shaft is designed as a hole in the transmission shaft into which the pin can be introduced during the introduction of the transmission shaft into the passage. Alternatively, the driver element of the output element can, for example, be designed as a hole provided on the side of the passage that is facing the opening, for example as a pin welded or screwed to the transmission shaft. A particularly easy mounting of the drive to a piece of furniture and a particularly easy torsion-proof securing of the transmission shaft with the output element can be ensured by the described embodiments.

According to the invention, an arcuate groove that engages into an arcuate projection that is provided on the housing is placed laterally on the output element. Optionally, according to the invention, an arcuate projection that engages into an arcuate groove that is provided on the housing is provided laterally on the output element. Particularly preferably, the axis of rotation is placed in the center of the arcs of circle that the groove and the projection describe. Due to the embodiment described, a particularly good guiding of the output element in the housing can be ensured during the rotation of the output element about the axis of rotation. Furthermore, the invention relates to a piece of furniture, in particular seating or lounge furniture, in particular to an armchair, that comprises at least to parts of furniture movable to one another as well as a drive according to the invention. This being, the housing of the drive is in a fixed position with a first part of furniture and the output element of the drive is connected in a fixed position with a second part of furniture of the piece of furniture, wherein a relative movement of the two parts of furniture relative to one another can be carried out by the drive. An embodiment of the piece of furniture provides that the housing of the drive always remains in a fixed position while the output element with the second part of furniture twists relative to the first part of furniture and to the housing. An embodiment provides that the output element and the second part of furniture always keep

their position while the housing and the first part of furniture can be displaced by the drive relative to the fixed second part of furniture or to the output element. A further embodiment provides that both parts of furniture and thus the housing and the output element change their position during a displacement of the two parts of furniture movable to each other.

Moreover, the invention relates to a transmission shaft that can also be designated as a swivel shaft, in particular for a or for the further improvement according to the invention of an electromotive furniture drive as described above with a radially projecting driving lever that is fixedly and rigidly fixed to the swivel shaft and that can be actuated by means of an output element of an adjusting drive. This being, the swivel shaft can principally be designed with any cross-section.

It should be noted that such a swivel or transmission shaft, as specified below in detail, can be considered in all its described embodiments, on the one hand as a part of the furniture drive according to the invention and as a further improvement thereof according to the invention, on the other hand besides however respectively as an independent subject matter of the invention.

In particular in such embodiments for which the swivel shaft described above and hereinafter can be considered as a part of the furniture drive according to the invention and as an improvement thereof according to the invention, the driving lever can be, generally speaking, designed as a driver element radially protruding to the swivel shaft that is fixedly and rigidly fixed to the swivel shaft and that can be actuated by means of an output element of an adjusting drive. In this general understanding, driver elements radially extending to the swivel shaft such as bolts, screws, studs, projections etc. or also elements protruding radially from the swivel shaft such as a retaining part surrounding the swivel shaft can be considered as a driving lever in the sense of the invention for realizing a form fit between the swivel shaft and the output element. This form fit can be configured in that the driving lever engages radially into a corresponding recess of the output element. In an embodiment, the driving lever can be designed as a stud or the like

that engages, in the normal operating mode, into the recess of the output element. Furthermore, the stud can have form-fitting means that are designed, for example, as projections that at least counteract or entirely prevent the slipping out of the stud from the recess.

Swivels shafts that are provided for electromotive furniture drives often consist of square shafts or of round tubes. The mounting of the driving levers is difficult when they are in operative connection with an output element of the adjusting drive, for example with a slider that can be moved forward and retracted or of an output element as described above that is in operative connection with a slider guided linearly displaceable in a longitudinal direction and that forms an arrangement therewith that is placed in the housing of the drive. For this subject matter of the invention of a swivel shaft or of a furniture drive designed with this swivel shaft, the swivel shaft is designed as a round profile, wherein the driving lever is connected with a form fit to an attachment point of the swivel shaft. A "local form fit" to a hollow shaft with a round cross-section is created by this subject matter of the invention, wherein such a local form fit is created by means of an interlocking connection between the swivel shaft and the driving lever.

The local form fit can be achieved by various methods.

For a preferred embodiment of the invention, an additional auxiliary element is provided for the realization of the form-fit. This auxiliary element can be designed in such a manner that a bolt is welded to the swivel shaft in an approximately radial arrangement. In an embodiment, it can also be provided that an element such as a bolt element or a stud element placed in a radial arrangement to the swivel shaft that can be rigidly and fixedly connected with the swivel shaft in any manner constitutes the driving lever for the rigid connection of the swivel shaft and the output element. To this purpose, the driving lever can have a form fit with the output element.

The bolt can be provided with an outer toothing. Such a bolt then suitably engages with a form fit into a pocket of the driving lever so that an interlocking connection is created.

Alternatively, the round profile can have at least one cross hole, wherein a screw or a bolt that is connected with the driving lever can pass through the cross hole.

When the round profile is designed as a round tube, it can be combined with at least one reinforcing element that is placed inside the round tube for stiffening the cross hole.

A further alternative for achieving a local form fit consists in the local reshaping of the swivel shaft designed as a round tube in order to thus increase the stability of the connection. This measure can also be combined with an additional auxiliary element.

Should a cross hole be made in the deformed area of the round tube, it can be provided with inwards vaulted edges, wherein these vaulted edges are preferably provided at both ends of the cross hole.

A bolt can, for example, be welded into this cross hole provided with the vaulted edges.

For all of the above embodiments, the round tube can be locally flattened in the area of the attachment point of the driving lever. It can, for example, be ovally squeezed.

The flattened or squeezed area can then be provided with said cross hole in order to fix therein an additional auxiliary element.

A screw or a bolt can be stuck as an additional auxiliary element through the cross hole. The screw or the bolt can be screwed or welded into the cross hole.

A bush through which the additional auxiliary element passes can be welded into the cross hole as an additional auxiliary element.

According to a further embodiment of the invention, an insert can be inserted into the round tube in the area of its attachment point.

A round pipe section that is positively locked into the swivel shaft designed as a round tube can be provided as an insert, wherein the round tube is compressed together with the tube section. This being, the tube section serving as an insert can be designed with relatively thick walls so that the attachment point of the swivel shaft is consequently very sturdy.

Alternatively, the insert can also be designed as a square tube, wherein the swivel shaft designed as a round tube is pressed to a square around the square tube.

The insert can also be a square block made of full material, wherein the round tube is then pressed to a square around the square block.

For all the embodiments of the invention that are provided with an insert, a cross hole can be drilled in the area of the attachment point through the round tube as well as through the inserted insert.

Further embodiments can be designed in such a way that the round tube is encompassed by a retaining element for fixing the driving lever. For example, this encompassing can comprise a tube section with a polygon shape that fully surrounds the swivel shaft over a predefined longitudinal portion of the swivel shaft. This being, the retaining element designed as a tube section can be welded to the outer lateral surface of the shaft, wherein the retaining element itself constitutes the driving lever. In other embodiments, it can also provided to mold an outwardly projecting projection radially to the swivel shaft, for example by welding a bush or a bolt to the retaining element for configuring the driving lever.

In a similar embodiment, it can also be provided to design the retaining element as a round tube section that circumferentially surrounds the swivel shaft. This being, it can be provided to provide the retaining element on its lateral surface with at least one recess in order to weld the swivel shaft and the retaining part not only on the front sides of the retaining element to the swivel shaft but furthermore also between both front sides in the area of a recess in the retaining element that extends radially and partially around the circumference.

Alternatively, the round tube can also be passed through for fixing the driving lever and finally both of the aforesaid fixing methods can be combined with each other.

The inventions shall be explained hereunder by describing some of the embodiments with reference to the attached drawings.

Fig. 1 shows a schematic diagram of a cross section perpendicular to the axis of rotation of an embodiment of a drive according to the invention.

Fig. 2 shows a schematic diagram of an arrangement comprising a slider and an output element of an embodiment of a drive according to the invention.

Fig. 3 shows a schematic diagram of an arrangement comprising a slider and an output element of an embodiment of a drive according to the invention.

Fig. 4 shows a schematic diagram of a section of a slider of an embodiment of a drive according to the invention.

Fig. 5 shows a schematic diagram of an output element and a corresponding transmission shaft of an embodiment of a drive according to the invention.

Fig. 6 shows a schematic diagram of a cross section perpendicular to the axis of rotation of an arrangement comprising an output element and a transmission shaft of an embodiment of a drive according to the invention.

Fig. 7 shows an arrangement comprising an output element and a transmission shaft of an embodiment of a drive according to the invention.

Fig. 8 shows a first exemplary embodiment of a swivel shaft according to the invention, wherein a bolt that engages into a pocket of the driving lever is welded to the swivel shaft.

Fig. 9 shows a second exemplary embodiment of a swivel shaft with a welded bolt with an outside toothing.

Fig. 10 shows a further exemplary embodiment of a swivel shaft according to the invention for which the swivel shaft is provided with a cross hole through which a screw or a bolt is stuck.

Fig. 11 shows a cross hole in the swivel shaft with inserted reinforcing elements.

Fig. 12 shows a section of the swivel shaft with a welded bolt.

Fig. 13 shows a section along the line XIII-XIII of Fig. 12.

Fig. 14 shows a section of the swivel shaft with a flattened or ovally pressed attachment point and with a welded bush as reinforcement.

Fig. 15 shows a section along the line XV-XV of Fig. 14.

Fig. 16 shows a section of the swivel shaft for which the attachment point is locally pressed as a square.

Fig. 17 shows a first embodiment of an insert for insertion into the swivel shaft.

Fig. 18 shows a second embodiment of an insert for insertion into the swivel shaft.

Fig. 19 shows a third embodiment of an insert for insertion into the swivel shaft.

Fig. 20 shows a further embodiment of a driving lever as a retaining element welded to the swivel shaft.

Fig. 21 shows a further embodiment of a driving lever as a retaining element welded to the swivel shaft with a stud extending radially outwards from the retaining element.

A cross-section perpendicularly to the axis of rotation of an embodiment of a drive 1 according to the invention is schematically represented in Fig. 1. The drive 1 according to the invention comprises a housing 8 in which a spindle 2, a spindle nut 3, a motor drive 4, a slider 5 as well as an output element 6 are placed. It can be seen in Fig. 1 that, for the embodiment described, the spindle nut 3 is driven by a motor drive 4 of an electric motor. The spindle 2 is non-rotatably connected with the slider 5. During a rotation of the spindle nut 3 caused by a drive by the motor drive 4, the spindle 2 and thus the slider 5 change their position along the longitudinal direction X. Furthermore, it can be seen in Fig. 1 that the output element 6 is configured in the manner of a toothed wheel that has teeth 61 as first toothing elements. The slider 5 has bar-shaped elements 51 as second toothing elements, these elements being placed laterally with reference to the direction along the axis of rotation on a drive section of the slider 5 that is fixedly connected to the spindle 2. Furthermore, it can be seen in Fig. 1 that the interlocking toothing of the teeth 61 of the output element 6 with the bar-shaped elements 51 of the slider 5 makes available an operative connection between the output element 6 and the slider 5. Due to the relative arrangement of the slider 5 and of the output element 6 as well as the operative connection made available, a rotation of the output element 6 around the axis of rotation is caused during a linear displacement of the slider 5 along the longitudinal direction X. This being, the output element 6 has a passage 62 that has a square cross-section. A transmission shaft 7 with a corresponding, in particular with a square cross-section or a round cross-section with drivers provided thereon, can be introduced into this passage 62 so that the transmission shaft is non-rotatably connected with the output element 6.

An arrangement comprising the output element 6 and the slider 5 of an embodiment of a drive 1 according to the invention is schematically represented in Fig. 2. In the embodiment represented in Fig. 2, the output element 6 has two toothing portions. A first group of teeth 61 is provided on a first toothing portion, a second group of teeth 61 is provided on a second toothing portion. The slider 5 has an drive section 53 on the one side of which a first group of bar-shaped elements 51 is provided with respect to a direction along the axis of rotation and on the second side of which a second group of bar-shaped elements 51 is provided with respect to a direction along the axis of rotation. The bar-shaped elements 51 have a cylindrical configuration and have a circular cross-section. The teeth 61 each have a bulge. In the embodiment according to Fig. 2, the drive section 53 of the slider 5 is placed between the two toothing portions of the output element 6 with respect to a direction along the axis of rotation, wherein the toothing portions of the output element 6 overlap with the slider 5 in sections along the transverse direction Y and along the longitudinal direction Y. A particularly good guiding of the output element 6 and of the slider 5 with respect to one another is thus made available. Moreover, due to the provision of a central drive section 53 to which a spindle can be placed for driving the slider 5 and due to the provision of an interlocking toothing on both sides of the drive section 53, a particularly equal transmission of force between the slider 5 and the output element 6 is ensured so that an oblique stress of the slider 5 or of the output element 6 is avoided as far as possible. For the embodiment according to Fig. 2, a threaded bore into which a spindle 2 can engage with a corresponding outer thread is provided in the drive section 53 of the slider 5. A displacement of the slider 5 along the longitudinal direction can be caused correspondingly by a rotation of the spindle 2.

An arrangement of a further embodiment of a drive 1 according to the invention is schematically represented in Fig. 3. The arrangement according to Fig. 3 substantially differs from the arrangement according to Fig. 2 in that the output element 6 of the embodiment according to Fig. 3 has circular projections 63 that are provided laterally on the output element 6 with respect to a direction along the axis of rotation. A particularly good guiding of the output element 6 in the housing

8 is ensured by these circular projections 63 that engage, for a drive 1 according to the invention, into corresponding circular grooves of the housing 8.

A section of the slider 5 of an embodiment of a drive 1 according to the invention is represented in Fig. 4. This being, the transmission section of the slider 5 is represented in Fig. 4. This transmission section is designed in the manner of a perforated rail that is designed in the manner of a U-profile. This being, the U-profile has breakthroughs 52 on its bottom that are spaced from each other in the longitudinal direction X. For the drive according to the invention that comprises a slider 5 according to Fig. 4, the output element 6 is designed in the manner of a toothed wheel, the teeth of which engage into the breakthroughs 52 of the slider 5 for making available the operative connection between the slider 5 and the output element 6.

The output element 6 and the transmission shaft 7 of an embodiment of a drive 1 according to the invention are schematically represented in Fig. 5. It can be seen in Fig. 5 that, for the embodiment described, the transmission shaft 7 is designed in the manner of a tube with a round cross-section to which a driver 71 is fixed in a fixed position. For this exemplary embodiment described here, the driver 71 is welded to the round rube. The output element 6 has a passage 62 that has a cross-section perpendicularly to the axis of rotation that corresponds to the common cross-section of the tube and of the driver 71. For the embodiment described, the transmission shaft 7 can, due to the circular cross-section of its tube, be particularly easily arranged in a piece of furniture so that the transmission shaft 7 can act as the axis of rotation of a piece of furniture. Simultaneously, with the driver 71 welded to the tube of the transmission shaft 7, a cross-section of the transmission shaft 7 that can be simply fixed so as to be torque proof is made available in a particularly simple manner with a passage 62 that has a corresponding cross-section. This being, for the torque-proof fixing, only the transmission shaft 7 only needs to be inserted into the output element 6 through the passage 62 or the output element 6 only needs to be slid onto the transmissions shaft 7 along the axis of rotation.

An arrangement of the output element 6 and of the transmission shaft 7 of an embodiment of a drive 1 according to the invention is schematically represented in Fig. 6. The output element 6 has a passage 62 that has an opening at its upper end in the transverse direction Y for ensuring the insertion of the transmission shaft 7 into the passage 62 along the transverse direction Y. Furthermore, the passage 62 has a section, the sides of which extend parallel and parallel to the transverse direction Y. A particularly easy insertion of the transmission shaft 7 into the passage 62 is thus made possible. Moreover, the transmission shaft 7 has, as explained for Fig. 5, a driver 71, wherein the driver 71 and the tube of the transmission shaft 7 together form a cross-section that corresponds with the cross-section of the passage 62 of the output element 6 for ensuring a torque-proof fixing of the transmission shaft 7 relative to the output element 6.

An arrangement comprising the output element 6 and the transmission shaft 7 of a drive 1 according to the invention is schematically represented in Fig. 7. As explained to Fig. 6, the output element 6 has, also for the embodiment according to Fig. 7, a passage 62 with an opening into which the transmission shaft 7 can be inserted perpendicularly to the axis of rotation. In contrast to the embodiment according to Fig. 6, for the embodiment according to Fig. 7, a pin 72 is placed on the side of the passage 62 that is opposed to its opening along the transverse direction Y. The pin 72 acts as a driving element of the output element 6 that extends perpendicularly to the direction of the axis of rotation. The transmission shaft 7 is designed as a tube with a round cross-section and has a hole that is provided perpendicularly to the axis of rotation in the transmission shaft 7 and that corresponds with a pin 72 of the output element 6. This hole acts as a corresponding driving element of the transmission shaft 7. The pin 72 is placed in the passage, in particular relative to the opening of the passage 62 in such a manner that the pin can mesh with the hole in the transmission shaft 7 while the transmission shaft 7 is inserted in the passage 62.

In all the embodiments described hereunder of the swivel shaft or of the transmission shaft, the swivel shaft is designed as a round tube 101.

According to Fig. 8, a bolt 102 that engages in a pocket 103 of a driving lever 104 is welded to the outer surface of the round tube 101. This being, the driving lever 104 is actuated by means of a slider (that is not represented in the drawing) of an adjusting drive. When the driving lever 104 is actuated, the swivel shaft is respectively pivoted about a predetermined angle.

According to Fig. 9 of the drawings, instead of the bolt 102 represented in Fig. 8, a toothed bolt 105 is welded to the outer surface of the round tube 101. This being, the outer toothing 106 serves to the form-fitting connection with a driving lever that is not represented in detail in the drawing.

According to Fig. 10, the round tube 101 is provided with a transverse hole 107. A screw 108, the threaded end 109 of which is screwed into a driving lever that is not represented in the drawing, is inserted through the cross hole 107, while the screw head 110 bears on the opposed outer surface of the round tube 101.

A bolt or another pin-shaped connecting element that is connected with the respective driving lever can also be provided instead of a screw 108.

A similar embodiment to that of Fig. 10 is represented in Fig. 11. However, in this case, the inner sides of the round tube 101 are combined with reinforcing elements 110 through which the screw 108 or another pin-shaped fixing element passes.

A similar embodiment with that of Fig. 10 and 11 is again represented in Fig. 12 and 13. However, in this case, the cross hole 107 is provided on both sides with inwards vaulted edges 112. An additional stability is created by these edges 112. A bolt 113 that is welded into the cross hole from both sides is inserted through the cross hole 107. This being, the inwards oriented edges 112 support the welding process since they form an additional material accumulation as shown in particular in the section according to Fig. 13.

For the embodiment according to Fig. 14 and 15, the round tube 101 is locally flattened or ovally pressed in the area of the attachment point 116 of the driving lever 104 and a cross hole 107 through which a screw that is not represented in the figure or a bolt passes is provided as in the exemplary embodiments represented in Fig. 10 to 13. The screw or the bolt can be screwed or welded into the cross hole 107.

As it can be seen in Fig. 14 and 15, a bush 115 is inserted in the cross hole 107 and is welded in the cross hole 107 so that an additional reinforcement is achieved. A screw or a bolt can then be passed through the bush 115, as already described, and connected with a driving lever that is not represented in the drawing.

A further embodiment of a swivel shaft designed as a round tube 101 is represented in Fig. 16, wherein the round tube 101 that constitutes the swivel shaft is pressed to a square in the area of the attachment point 116. This geometrical shape already creates an additional reinforcing effect.

According to a further embodiment of the invention, an insert is inserted in the area of the attachment point 116 before it is pressed to a square, insert around which the attachment point is pressed as a square.

The insert can be designed, for example, as a tube section that is inserted in a positive locking manner in the round tube 101. The round tube 101 is then pressed to a square together with the inserted tube section so that it results the outer shape that is represented in Fig. 16. After pressing by means of a press tool with 4 jaws, the round tube 101 consists in its fixing area 116 of a thick-walled square unit that forms a good fit for fixing a driving lever.

Three further embodiments of an insert are represented in the Fig. 17 to 19.

According to Fig. 17, the insert 117 is designed as a square tube that is inserted in the round tube 101 and the fixing area 116 is then pressed as a square around the square tube.

According to Fig. 18, the insert can be designed as a massive square block 118 that is inserted before pressing the round tube 101. The compressing to the square element is carried out thereafter.

According to Fig. 19, the square block 119 is provided with a cross hole 120 that is aligned with a cross hole that is provided in the round tube and that has to be made before or after compressing. A screw or a bolt that is connected with a driving lever can then be inserted through the cross hole passing through both parts.

For all the exemplary embodiments according to Fig. 16 to 19, the compressing can be carried out over the whole length of the insert. For longer inserts, the compression can however be carried out in sections so that the same positive effect is achieved.

In the area of the reinforced attachment point 116 of the swivel shaft, the shaft can be encompassed or even passed through for fixing the driving lever. Fig. 20 and 21 show exemplary embodiments thereof. In the embodiment according to Fig. 20, the round profile 101 is encompassed by a square retaining tube 121 that is welded with the round profile. In this embodiment, the retaining tube 121 is inserted as such as a driving lever that has sections extending radially outwards to the swivel shaft or to the round profile 101 that serve for making available a positive locking with the output element that is not represented.

Fig. 21 shows a further embodiment, wherein the retaining tube 122 is designed as a round tube that comprises a partially circumferential recess 123 for increasing the welding seam so that the retaining part can be welded to the tube profile on its both front sides as well as also on the edge of this recess. In the embodiment indicated in Fig. 21, a stud 124 extending radially to the swivel shaft is

welded to the retaining tube 122 in order to make available a positive connection with the output elements of the furniture drive that are not represented.

Alternatively, it is also possible to combine both fixing methods with each other.

For all the exemplary embodiments described, it is determining that a local positive connection is achieved between the round tube 101 and the driving lever to be fixed thereon. All the embodiments ensure a form-fitting connection between the swivel shaft designed as a round tube 101 and the driving lever fixed thereto so that the forces applied by the adjusting drive to the driving element are reliably absorbed and induced into the swivel shaft.

Patentkrav

1. Drev til indstilling af i forhold til hinanden bevægelige dele i møbler, især lænestole, hvilket drev (1) omfatter et hus (8), hvori der er anbragt en indretning, som omfatter en i længderetningen, lineært forskydelig skyder (5) via et med en operativ forbindelse forbundet udgangsorgan (6), hvilken indretning er indrettet til - ved en lineær forskydning af skyderen (5) i længderetningen - at bevirke en drejning af udgangsorganet (6) omkring en omdrejningsakse,
og hvor den operative forbindelse omfatter en ind i hinanden gribende fortanding på skyderen (5) og udgangsorganet (6), og hvor udgangsorganet (6) har et udgangsafsnit, som strækker sig i en tværretning oven over de ind i hinanden gribende fortandinger, og hvor de ind i hinanden gribende fortandinger er tilvejebragt ved et i tværretningen nedre endeafsnit af skyderen (5), **kendetegnet ved,** at der for at tilvejebringe en føring for udgangsorganet i huset (8) under omdrejningen, til siden ved udgangsorganet (6) er indrettet mindst en cirkelformet notgang, som kan indgribe med et cirkelbueformet fremspring på huset (8), og/eller at der ved udgangsorganet (6) er indrettet mindst et cirkelbueformet fremspring (63), som indgriber i en cirkelbueformet notgang ved huset (8).

2. Drev ifølge krav 1,
kendetegnet ved, at
der ved udgangsorganet (6) er indrettet flere første fortandingselementer, og at der ved det nederste endeparti på skyderen (5) er indrettet flere sekundære fortandingselementer, som set i længderetningen har afstand fra hinanden, og - for at klargøre den operative forbindelse - at mindst et af de første fortandingselementer indgriber i mindst et af de sekundære fortandingselementer.

3. Drev ifølge krav 2,
kendetegnet ved, at
de første fortandingselementer er indrettet i et cirkelbueformet arrangement, og at især de sekundære fortandingselementer er indrettet i et lineært arrangement.

4. Drev ifølge krav 2 eller 3,

kendetegnet ved, at

de første fortandingselementer er udformet som fremspring, og at de sekundære fortandingselementer er udformet som udtagninger, som er egnet til at optage fremspringene, eller at de sekundære fortandingselementer er udformet som fremspring, og at de første fortandingselementer er udformet som udtagninger, der er egnet til optagelse af fremspring.

5. Drev ifølge krav 2 til 4,

kendetegnet ved, at

skyderen har et drivafsnit (53), og at de sekundære fortandingselementer er indrettet langs omdrejningsaksen og til siden ved drivafsnittet (53).

6. Drev ifølge krav 5,

kendetegnet ved, at

de sekundære fortandingselementer (51) er således udformet, at de rager sideværts ud fra drivafsnittet (53).

7. Drev ifølge et af kravene 5 eller 6,

kendetegnet ved, at

der ved en første side af drivafsnittet (53) er indrettet en første gruppe ved de sekundære fortandingselementer, og at der ved en anden side af drivafsnittet (53) er indrettet en anden gruppe ved de sekundære fortandingselementer, og at drivorganet (6) har et første fortandingsafsnit med en første gruppe af de første fortandingselementer og et andet fortandingsafsnit med en gruppe af de første fortandingselementer, og at drivafsnittet (53) er indrettet mellem de to fortandingsafsnit, og at den første gruppe af første fortandingselementer samvirker med den første gruppe af sekundære fortandingselementer, og at den anden gruppe af første fortandingselementer samvirker med den anden gruppe af de sekundære fortandingselementer.

8. Drev ifølge krav 7,

kendetegnet ved, at

fortandingsafsnittene overlapper drivafsnittet (53) i tværretningen for at tilvejebringe en føring for drivafsnittet (53).

9. Drev ifølge et af kravene 2 til 4,
kendetegnet ved, at
skyderen (5) har et overgangsafsnit, som er udformet som en hulskinne, og at udgangsorganet (6) har et korresponderende overføringsafsnit, som er udformet som et tandhjul, og at især skyderens (5) overgangsafsnit er udformet som et U-profil, hvori det korresponderende overgangsafsnit hørende til udgangsorganet (6) er ført.

10. Drev ifølge et af de foregående krav,
kendetegnet ved, at
udgangsorganet (6) har en langs en rotationsakse sig forløbende gennemføring med et tværsnit til optagelse af en overføringsaksel (7) med et tilsvarende tværsnit.

11. Drev ifølge krav 10,
kendetegnet ved, at
tværsnittet af gennemføringen (62) har et afsnit med to parallelt forløbende sider og/eller i det mindste afsnitsvis er udformet som en polygon, især som en kvadrat, rektangel eller trapez.

12. Drev ifølge krav 10 eller 11,
kendetegnet ved, at
overgangsakselen (7) er udformet som et rør eller en stav med rundt tværsnit, hvor en medbringer (71) er positionsfast fastgjort, især påsvejst, pånittet eller påskruet, og at tværsnittet af gennemføringen (62) korresponderer med det fælles tværsnit af rør og medbringer (71) eller af stav og medbringer (71).

13. Drev ifølge et af kravene 10 til 12,
kendetegnet ved, at

gennemføringen (62) ved sin i tværretningen set øverste ende har en åbning til indføring af overgangsakselen (7) i gennemføringen (62) vinkelret på omdrejningsaksen, og at der især i et afsnit langs omdrejningsaksen i gennemføringen (62) er indrettet et vinkelret på omdrejningsretningen forløbende medbringerorgan, og at medbringerorganet et indrettet til at kunne åbnes, så at det under indføringen af overgangsakselen i gennemføringen kan bringes i indgreb med et korresponderende medbringerorgan på overgangsakselen.

14. Møbel omfattende mindst to i forhold til hinanden bevægelige møbeldele samt et driv ifølge et af de foregående krav,
kendetegnet ved, at
drevets (1) hus (8) er positionsfast, så at der er forbindelse med en første møbeldel, og at drevets drivorgan (6) er positionsfast forbundet med en anden møbeldel, og at man ved hjælp af drevet (1) kan udføre en relativ bevægelse af de to møbeldele i forhold til hinanden.

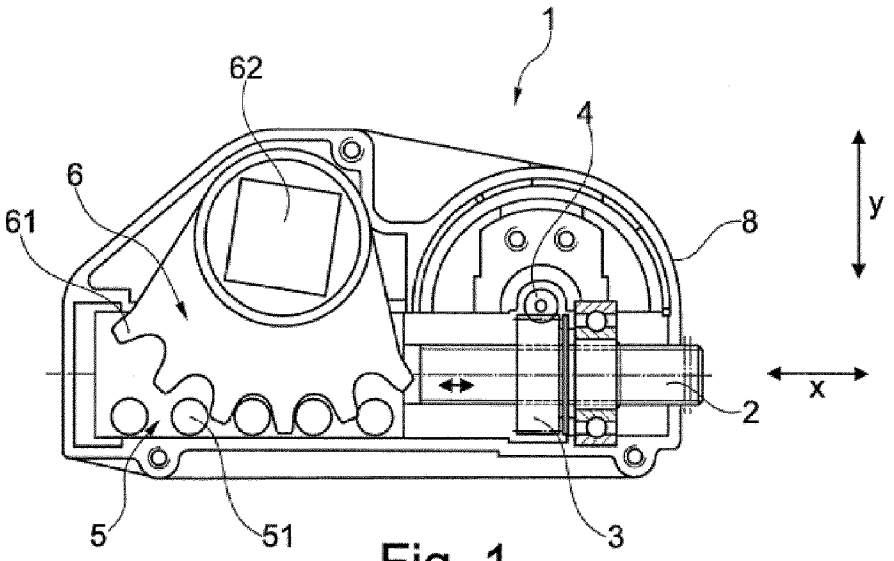


Fig. 1

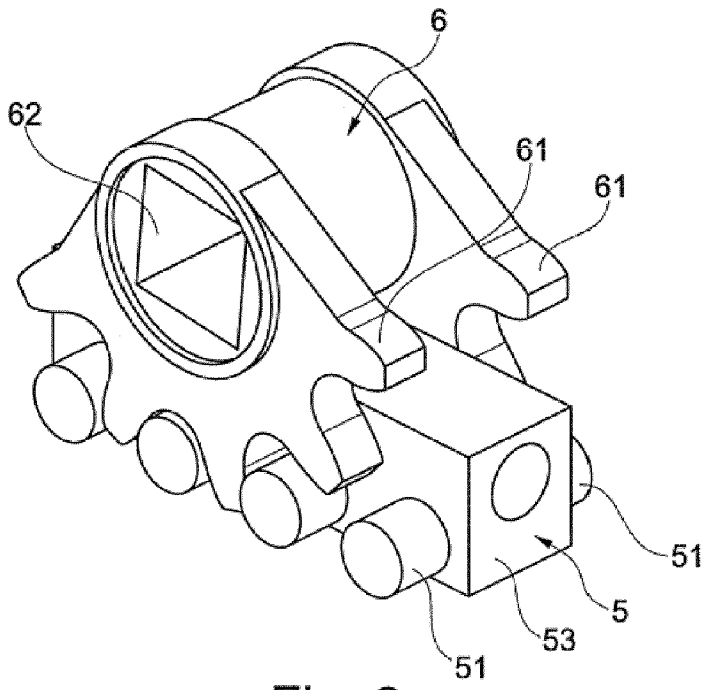


Fig. 2

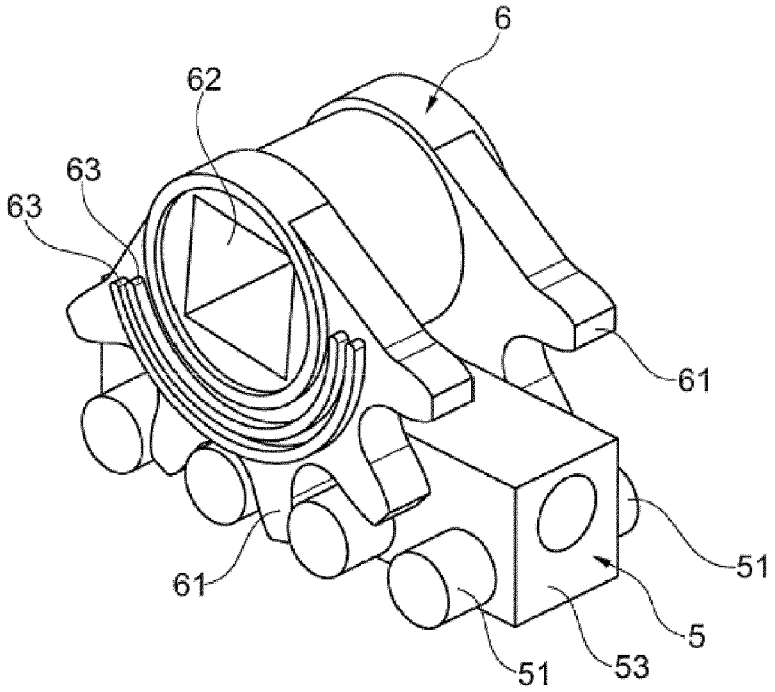


Fig. 3

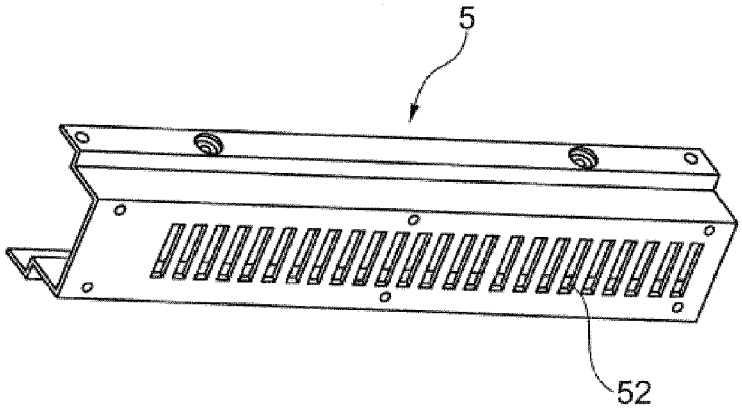


Fig. 4

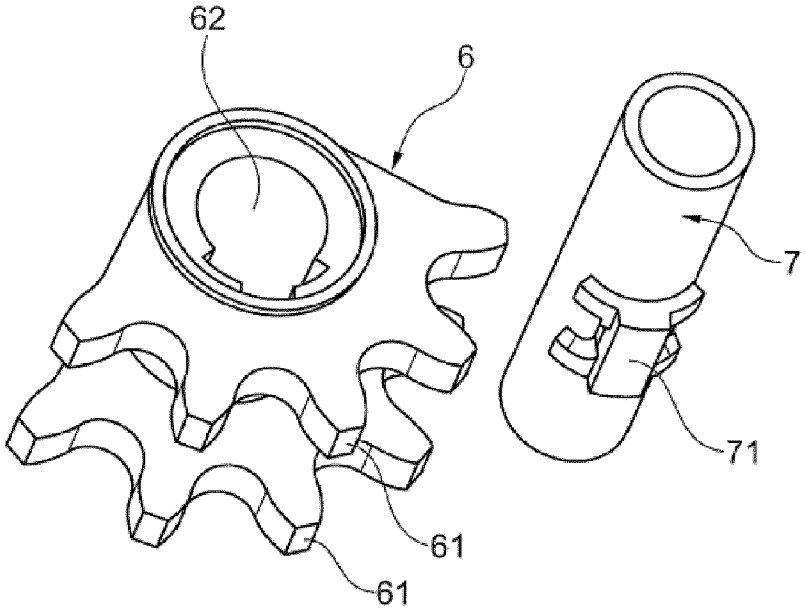


Fig. 5

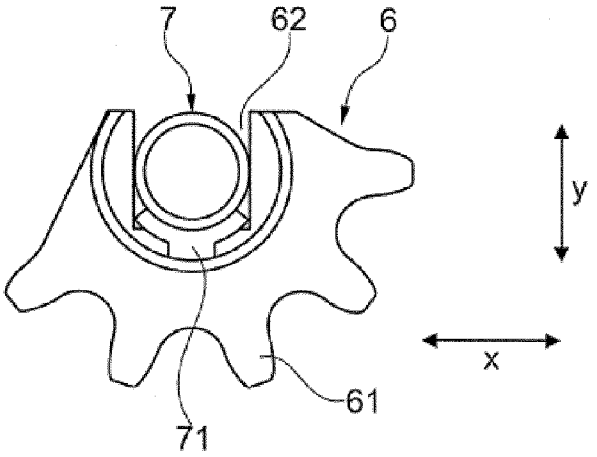


Fig. 6

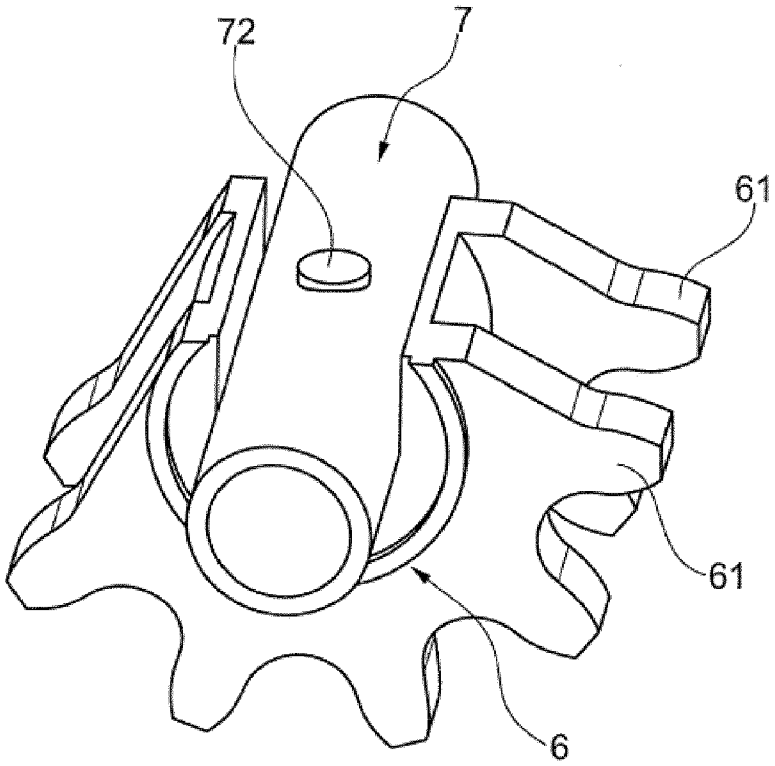


Fig. 7

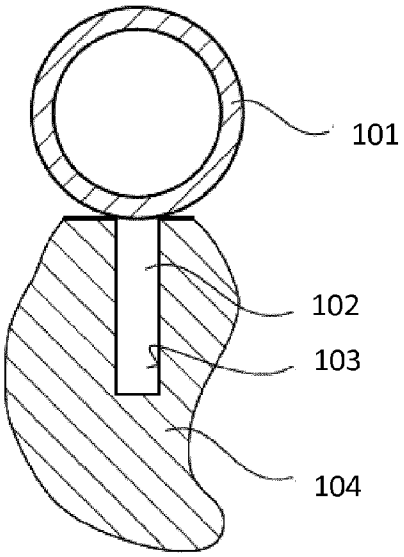


Fig. 8

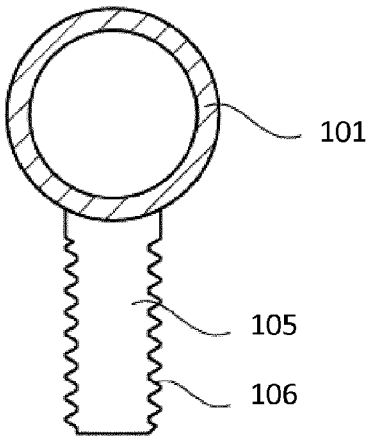


Fig. 9

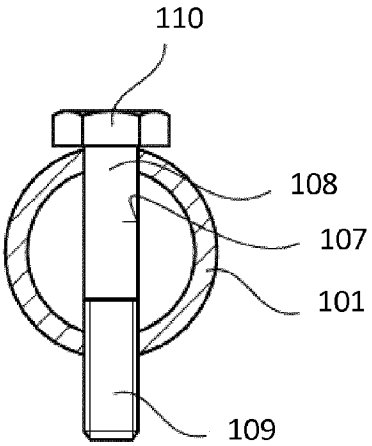


Fig. 10

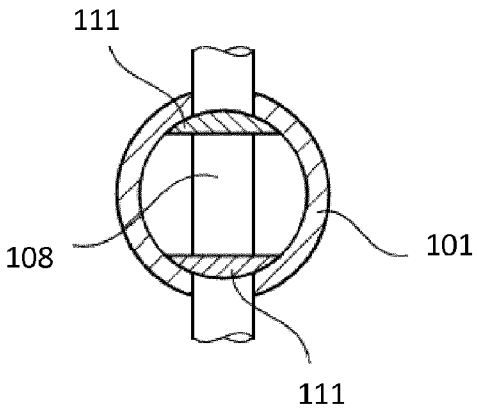


Fig. 11

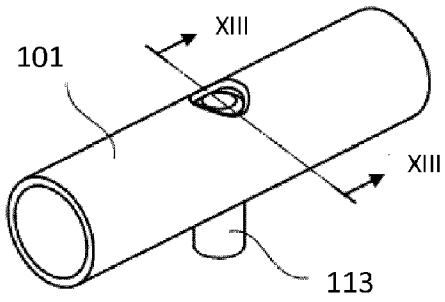


Fig. 12

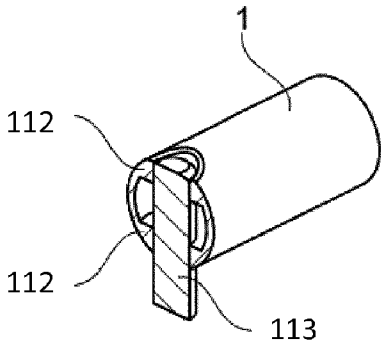


Fig. 13

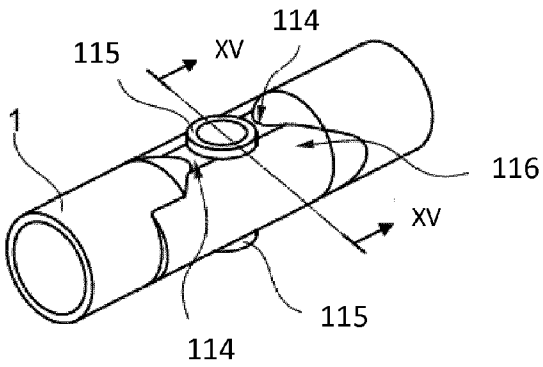


Fig. 14

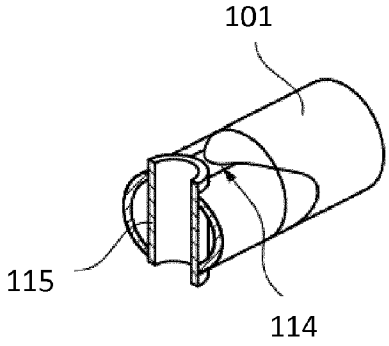


Fig. 15

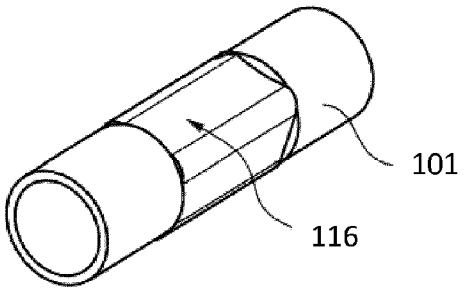


Fig. 16

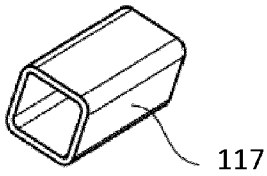


Fig. 17

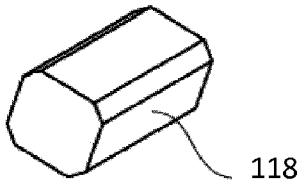


Fig. 18

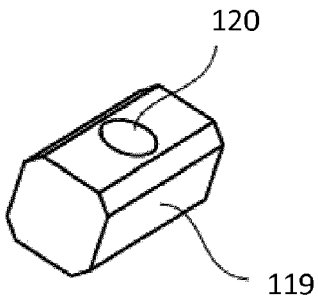


Fig. 19

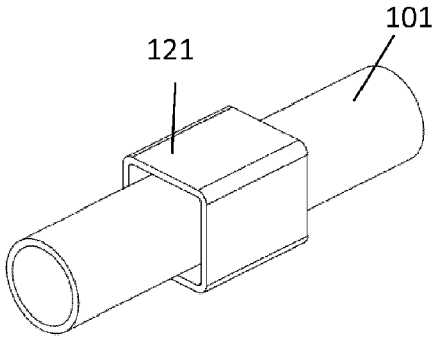


Fig. 20

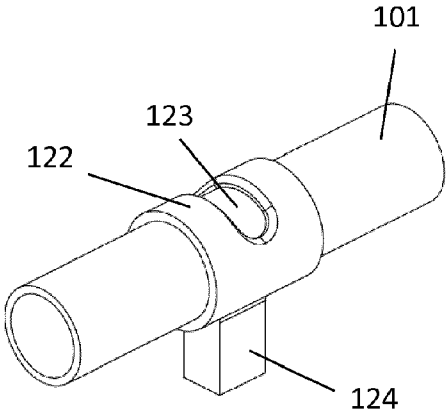


Fig. 21