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(54) Title: STEERING COLUMN LEVER WITH ROTARY COUPLING BETWEEN A SWITCH PIN AND A HOUSING, STEERING POST MODULE, MOTOR VEHICLE AND METHOD FOR PRODUCING A STEERING COLUMN LEVER

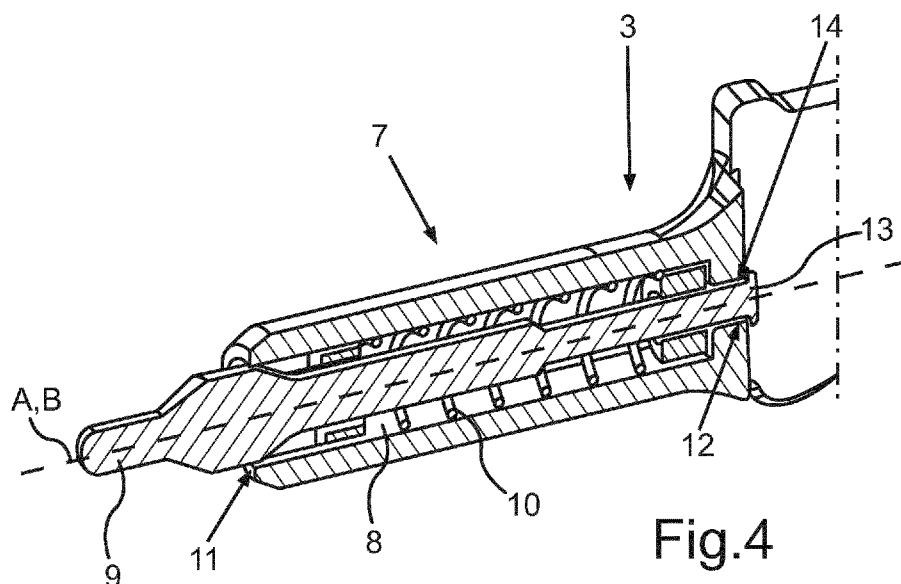


Fig.4

(57) Abstract: The invention relates to a steering column lever (3, 4) for a steering post module (1) of a motor vehicle (5), which has a housing (7), and has a switch pin (9), which is preloaded by a spring element (10) in the direction of a longitudinal axis (A) of the steering column lever (3, 4) and is movably disposed in the housing (7), the switch pin (9) has a coupling element (13), which can be coupled to a mating coupling element (14) formed at the housing (7) by a rotation around the longitudinal axis (A) and a coupled state or a decoupled state is adjusted depending on a rotational position between the coupling element (13) and the mating coupling element (14) to each other. The invention also relates to a steering post module (1), to a motor vehicle (5) and to a method for mounting a steering column lever (3, 4).



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Steering column lever with rotary coupling between a switch pin and a housing, steering post module, motor vehicle and method for producing a steering column lever

The invention relates to a steering column lever for a steering post module of a motor vehicle, which has a housing. The steering column lever moreover includes a switch pin separate from the housing, which is preloaded in the direction of a longitudinal axis of the steering column lever by a spring element of the steering column lever and is movably disposed at the housing. Moreover, the invention also relates to a steering post module for a motor vehicle with at least one such steering column lever. Moreover, the invention also relates to a motor vehicle with a corresponding steering post module. Furthermore, the invention also relates to a method for mounting a steering column lever.

Steering column levers and steering post modules are known from the prior art. Here, reference is for example to be made to DE 10 2014 109 726 A1. The same is also known from DE 10 2014 107 840 A1.

Different operating functions and functional units of a motor vehicle can be adjusted by a steering column switch. Here, a direction indicator can for example be activated by actuating the steering column lever. Similarly, a windshield washer system and/or a windshield wiper can for example be actuated. For example, a headlight flasher can also be actuated. These operating functions are to be only exemplarily understood and not to be conclusively understood. They illustrate, which functionality such a steering column lever has and which significance it therefore has in a vehicle.

In conventional steering column levers, mounting the individual parts is very expensive. Here, it is provided that the switch pin is shifted into the interior of the housing and therein virtually locks. Thereto, the switch pin has a locking element, which engages behind a locking collar protruding inwards radially to the longitudinal axis in axially inserting along the longitudinal axis of the steering column lever into the housing. The switch pin is preloaded in the direction of the longitudinal axis of the steering column lever and thus in axial direction by the spring element, wherein the preload force of the spring element here acts in this locked state such that the two locking elements are pressed against each other.

However, in this known configuration, high mounting forces occur in axial direction to be able to press the locking element past the switch pin first at the locking web at the housing. In this mounting, material abrasion and in this connection burrs can also arise, which also can impair the further relative movability of the components to each other. The locking bead formed at the housing, which protrudes radially inwards, also requires axial space demand in this context such that the switch pin then also has to be correspondingly extended thereby. Moreover, this axial retention is only suitable to a limited extent since certain radial movability of the switch pin in the housing is also allowed by the then relatively narrow switch pin or the locally narrow configuration of the locking element at the switch pin and thereby slip of the switch pin past the locking bead of the housing can also occur, whereby this locked connection can then also undesirably detach.

Not least, this configuration is also provided with a relatively low retaining force of this coupled state between the switch pin and the housing in order not to cause undesired plastic deformations and/or even breaking off of locking elements, which are relatively delicately and small formed.

It is the object of the present invention to provide a steering column lever, a steering post module, a motor vehicle as well as a method for mounting a steering column lever, by which or in which the retention of the switch pin in the housing of the steering column lever is improved.

This object is solved by a steering column lever, a steering post module, a motor vehicle as well as a method according to the independent claims.

In an embodiment of a steering column lever according to the invention, which is formed for a steering post module of a motor vehicle, it includes a housing and a switch pin separate therefrom. Moreover, the steering column lever includes a spring element, which is also formed separately from the housing and from the switch pin. The switch pin is preloaded in the direction of a longitudinal axis of the steering column lever by this spring element and disposed in the housing and also movably disposed in the housing. The housing in particular represents a cannula-like component, which has a channel in the direction of the longitudinal axis of the steering column lever, in which the switch pin is disposed. The switch pin is in particular a rectilinear peg, which extends in the direction of the longitudinal axis of the steering column lever with its longitudinal axis. In the mounted state, the spring element, which is in particular a coil spring and thus presents a helix

winding, is disposed encompassing the switch pin and in particular also disposed in this channel of the housing.

In a preferred implementation, the switch pin has a coupling element, which can be coupled to a mating coupling element formed at the housing by a rotation around the longitudinal axis. At least two rotational positions are provided defined between the coupling element and the mating coupling element around the longitudinal axis, by which different coupling states between these elements are preset.

Depending on a defined rotational position of the coupling element to the mating coupling element around this longitudinal axis of the steering column lever, a coupled state is adjusted in defined manner or a decoupled state is adjusted in defined manner. By the configuration of the switch pin with a coupling element and the housing with a mating coupling element, a mechanical connecting device is provided, which is a rotary connection. Thus, a first rotational position can in particular be adjusted, in which the coupling element and the mating coupling element are decoupled, and a second rotational position different from the first rotational position around the longitudinal axis can be adjusted, which then defines the coupled state between the coupling element and the mating coupling element. By such a configuration, a very simple mechanical connection principle is provided on the one hand, which is very robust and can also take up correspondingly large forces on the other hand, which can occur in mounting, without functional impairments or damages to the switch pin and/or the housing occurring. By such an azimuthal coupling, which explicitly requires an azimuthal adjustment of the coupling element to the mating coupling element around the longitudinal axis of the steering column lever, the coupled and the decoupled state can also be very precisely and purposefully adjusted. Thereby, mounting is also fast and simply allowed. Moreover, by such a configuration, a very high retention force of the coupled state can also be achieved since the coupling element and the mating coupling element themselves are mechanically very stable and are also correspondingly robustly disposed at the switch pin and the housing.

Moreover, it is also allowed by this configuration that undesired material shearings and the occurrence of burrs can be avoided. The permanent functionality of the individual components as well as the relative movability thereof to each other, in particular of the switch pin to the housing in axial direction and thus in the direction of the longitudinal axis of the steering column lever, is thereby also achieved.

In particular, the coupling element is integrated in the switch pin such that an integral component is here provided. Correspondingly, it is provided in a further advantageous implementation that the mating coupling element is formed integrated in the housing and thus is also manufactured integrally with this housing. Thereby, the number of components can respectively be reduced and positional tolerances can be avoided. Moreover, the loadability of the coupling element on the one hand and the mating coupling element on the other hand is also increased by this configuration.

In an advantageous implementation, it is provided that the coupling element is formed at a rear end of the switch pin protruding into the housing. By this exposed position of the coupling element, which thus in particular virtually represents the end-side termination of the switch pin, a particularly simple and purposeful coupling to the mating coupling element is achieved. An undesired far axially passing into each other is thereby prevented, whereby the switch pin can also be provided reduced in length.

Preferably it is provided that the coupling element is a locking beam. By this geometry, a simple coupling process and decoupling process with the mating element is allowed. On the other hand, a coupling element compact in itself yet massive and robust is provided by this configuration. The advantageous cuboid configuration of the coupling element in this respect thus allows particular rigidity and torsional stiffness of the coupling element.

In particular, it is provided that this locking beam is oriented perpendicular to the longitudinal axis of the steering column lever and thus also perpendicular to the longitudinal axis of the switch pin with a beam longitudinal axis. Thus, this configuration of the coupling element virtually represents a propeller-like or hammerhead-shaped shaping.

In particular, the coupling element presents an asymmetric configuration in circumferential direction around the longitudinal axis of the switch pin and thus also in circumferential direction around the longitudinal axis of the steering column lever, which thus is non-rotationally symmetrically formed in this circumferential direction. This is a particularly advantageous implementation, since the individual rotational positions, by which a coupled state on the one hand and a decoupled state on the other hand are defined, can thus be achieved in particularly secure manner. For example, if a false rotational position in this respect between the switch pin and the housing is then adjusted for example in mounting and thus in the first decoupled state, thus, the mounting cannot be continued to the effect that a coupled state then resulting therefrom between the coupling element and the mating coupling element would occur. Therefore, the correct rotational position also

has to be first adjusted to then be able to achieve the second rotational position and the coupled state characterized thereby anyway starting from this defined decoupled state, which is in particular characterized by a very specific first rotational position. Thus, high mounting safety is also achieved and misinterpretation of a certain positioning between the switch pin and the housing to the effect that a coupled state between the coupling element and the mating coupling element already would have been achieved can be avoided. By this configuration, haptic feedback to the mounting scenario and thus also to the assembler is also in particular given. Because a certain plunge depth of the switch pin into the housing in particular has to be achieved in the direction of the longitudinal axis of the steering column lever to be then able to achieve the second rotational position starting therefrom by a rotation around the longitudinal axis of the steering column lever. Thus, if the first rotational position is first not correctly adjusted and a plunge depth of the switch pin into the housing required over a desired length viewed in the direction of the longitudinal axis of the steering column lever is not allowed, it can immediately be recognized that the first rotational position is not yet correctly adjusted to then also be able to achieve a subsequently following second rotational position anyway.

In particular, it is provided that the mating coupling element is a reception for the coupling element, into which the coupling element can plunge at least in certain areas viewed in the direction of the longitudinal axis of the steering column lever. Thus, it is required that at least an overlap area by area between the coupling element and the mating coupling element, in particular passing past each other, is required in this axial direction to then be able to adjust the second rotational position. In particular, it is therefore provided that only in this first rotational position, this overlap at least in certain areas in axial direction, in particular complete passing of the coupling element and the mating coupling element past each other with respect to each other can be achieved.

By such a configuration of the coupling element and the mating coupling element, the mechanical operative connection of these two elements for adjusting the coupled state can be particularly advantageously achieved and a particularly mechanically loadable and positionally stable adjustment of the coupled state can be achieved.

In particular, it is provided that this reception is a pass-through hole, which has a non-rotationally symmetrical geometry in circumferential direction around the longitudinal axis of the steering column lever. By such a configuration of the reception, a type of encoding for assembly is thus also provided. Only if the coupling element with its also again individual geometry is placed viewed in circumferential direction around the longitudinal

axis and thus has such a rotational position that it can be passed through this pass-through hole at least in certain areas, in particular can be completely passed through with its entire axial length, the correct first rotational position is then adjusted. Thereby too, the facts already said above are again accounted for in improved manner and the mounting scenario is particularly expediently and simply comprehensibly allowed. Preferably said pass-through hole is a slit.

In a further advantageous implementation, it is provided that the switch pin with the coupling element in a first rotational position, in which the coupling element is decoupled from the mating coupling element with respect to an axial protection effected in the direction of the longitudinal axis of the steering column lever, can be passed through the pass-through hole and the coupling element and the mating coupling element are coupled for axial protection in the state passed through the pass-through hole in a second rotational position rotated with respect to the first rotational position. In particular, it is provided that there is only a first rotational position, in which the coupling element in its individual geometry fits through the pass-through hole again specifically arranged in azimuthal direction, which has a shaping compatible with the coupling element.

In particular, it is provided that an axial position between the housing and the switch pin is secured in the coupled state to the effect that the switch pin cannot be automatically further shifted in the direction, in which the preload force of the spring element axially acts. However, the switch pin can further be shifted relative to the housing in a direction along the longitudinal axis of the steering column lever, which is opposite to the operative direction of the preload force of the spring element. In the coupled state, axial movement limitation between the switch pin and the housing is thus defined in the direction of the effect of the preload force of the spring element. Especially by this explained type of coupling, this state is also securely kept and even if relatively severe forces act on the coupling element and the mating coupling element by the acting preload force, these forces can be securely taken up in unrestricted manner.

Advantageously, the mechanical connection between the coupling element and the mating coupling element is formed as a bayonet joint or a twist lock. Such a specific rotary connection is particularly advantageous since it allows relatively simple geometric configurations of the coupling element and the mating coupling element, moreover is also very simply adjustable and the conversion between a decoupled and a coupled state of the mentioned elements can be very fast and reliably effected. Moreover, especially in such a configuration, it is also allowed that the two different rotational positions, which

define the coupled state on the one hand, the decoupled state of the elements on the other hand, can also be relatively close to each other viewed in azimuthal direction and thus in circumferential direction around the longitudinal axis of the steering column lever such that only a relatively slight rotational movement is required to be able to perform conversion from one of the rotational positions to the other one.

In particular, it is provided that the rotational position defining the decoupled state is disposed in a circumferential angle less than or equal to 90° to that rotational position defining the coupled state. However, other, larger angular intervals can also be formed for this maximum positional deviation of these two rotational positions.

In an advantageous implementation, it is provided that the mating coupling element in particular has a keyhole geometry, in particular in its configuration as a pass-through hole. In particular, the geometry of this pass-through hole is formed with a central area, to which protrusions or bulges adjoin at opposing locations, in particular viewed in 180° in circumferential direction around the hole axis of the pass-through hole. In particular, the central area is configured such that the switch pin can be passed through the central area in relatively exactly fitting manner with that length section, which directly adjoins to the coupling element at the one end of the switch pin such that the switch pin is then disposed in the pass-through hole virtually without radial backlash in the passed-through state and thus in particular then also in the coupled state of the coupling element to the mating coupling element such that the position between the switch pin and the housing can also be very exactly kept in this respect. Especially the axial relative movement between the switch pin and the housing can thereby also be very rectilinearly and precisely allowed.

In particular, the bulges adjoining to the central area of the pass-through hole are provided with a clear width, which is smaller than the diameter of the central area, in particular are smaller than or equal to the radius of the central area.

Thereby, the above mentioned advantages are again improved and the correct passing through of the coupling element formed with compatible geometry to these bulges is thereby particularly advantageously achieved. Undesired incorrect assembling or inserting into each other and also passing past each other between the coupling element and the mating coupling element is thereby prevented.

In a further advantageous implementation, it is provided that the steering column lever has a sleeve separate from the housing, which is formed for axial retention of the spring

element at the switch pin and which can be coupled to the coupling element. This is a further very advantageous implementation because the spring element can thereby be directly retained at the switch pin itself and further components, in particular of the housing, are not required to allow this position at the switch pin.

Thus, it is then also allowed that the spring element is disposed at the switch pin itself and still a possibility of expansion and compression of the spring element given in the direction of the longitudinal axis of the switch pin is achieved. Since the sleeve is advantageously also relatively movably disposed or supported at the switch pin in the direction of the longitudinal axis of the switch pin, this movability of the spring element and thus the compression and expansion of the spring element at the switch pin is supported. In this context, the sleeve represents an end-side stop for the spring element such that the spring element either cannot undesirably radially slip or warp and bend in this respect. In particular, the sleeve is formed such that an end of the spring element plunges into this sleeve such that a certain reception and guidance of the spring element by this sleeve is also achieved.

In particular, the steering column lever has a second separate sleeve, which can be fitted onto the switch pin and against which the spring element then strikes in the state fitted onto the switch pin with an end opposing the first sleeve. It can also be provided that the switch pin itself has a further such stop for this further end of the spring element in integrated manner such that the spring element is then correspondingly retained in axial direction on both sides and thus at both opposing ends and axial slip of the spring element from the switch pin is prevented.

In particular, it is provided that the sleeve has a mating coupling element and the coupling element of the switch pin and the mating coupling element of the sleeve can be coupled by a rotation around the longitudinal axis of the switch pin, which is in particular also the longitudinal axis of the steering column lever and a coupled state or a decoupled state for axial retention of the spring element at the switch pin is adjusted depending on a rotational position of the coupling element of the switch pin to the mating coupling element of the sleeve. This too is a very advantageous implementation for the simple and fast yet secure and mechanically loadable mounting of the spring element directly on the switch pin itself. In particular, it is here provided that this mechanical connection between the coupling element of the switch pin and the mating coupling element of this first sleeve is also a bayonet joint.

In particular, this mating coupling element of the sleeve is formed in a sleeve bottom and in particular configured as a pass-through hole in this sleeve bottom.

Preferably, the geometric configuration and/or the dimension of this pass-through hole in the sleeve bottom are equal to the above mentioned embodiment of a pass-through hole of the mating coupling element at the housing. Thereby, the mounting scenario of the sleeve on the switch pin as well as the mounting of the switch pin on the housing are unified in particularly simple manner.

In a further advantageous implementation, it is provided that the switch pin is formed with the spring element and the sleeve as a pre-mounting assembly, which is then formed for further installation in the housing. This substantially simplifies the mounting of the steering column lever because the insertion of the separate spring element and the separate switch pin into the housing does not have to be effected, which optionally results in disadvantageous positions of the mentioned components in the housing and aggravates the mounting effort. By this pre-mounting assembly being already pre-mounted and provided and thus a desired position of the spring element to the switch pin being in particular also already correctly achieved, the simple and positionally accurate insertion of this pre-mounting assembly into the housing can also be more expediently and faster effected.

In particular, it is provided that the sleeve abuts on a stop in the housing in the installed state of the switch pin and the sleeve in the housing and is thereby axially retained. In particular, it is provided that this stop has the mating coupling element of the housing. Preferably, this stop is an axial bounding wall of a channel of the housing, into which the switch pin is axially inserted. By this configuration, a mechanically very robust stop is also provided, which can take up corresponding forces.

In an advantageous implementation, it is provided that in a basic position of the switch pin in the coupled state between the coupling element of the switch pin and the mating coupling element of the housing, the coupling element is axially pressed to this mating element by the preload force of the spring element. Thereby, this coupled state and the positionally accurate arrangement are supported.

In the installed state of the steering column lever at the base module of a steering post module, this basic position is then canceled and a working position is achieved, in which the switch pin is shifted out of the basic position in the direction of the longitudinal axis of

the steering column lever and the coupling element of the switch pin is then disposed without contact with and thus also spaced from the mating coupling element of the housing in this working position. In this working position, the operating conditions and functional units of the motor vehicle, which can be adjusted by this steering column lever, can then be selected and/or performed.

Furthermore, the invention also relates to a steering post module for a motor vehicle, which has at least one steering column lever according to the invention or an advantageous configuration thereof. Moreover, the steering post module includes a base module, at which the steering column lever is movably disposed. In particular, the arrangement of the steering column lever at this base module is such that the switch pin of the steering column lever is disposed in a working position different compared to an above mentioned basic position. In this working position, the coupling element of the switch pin and the mating coupling element of the housing are disposed in the second rotational position representing the coupled state around the longitudinal axis of the steering column lever and the coupling element and the mating coupling element are disposed spaced from each other in the direction of the longitudinal axis of the steering column lever. In this position, the switch pin is thus still further pressed into the housing, namely against the preload force of the spring element. The exact adjustment of the respective operating conditions is thereby improved.

Furthermore, the invention also relates to a motor vehicle with a steering post module according to the invention.

Furthermore, the invention also relates to a method for mounting a steering column lever for a steering post module of a motor vehicle. A switch pin of the steering column lever is preloaded in the direction of a longitudinal axis of the steering column lever by a spring element of the steering column lever in a housing of the steering column lever and movably disposed in the housing. For mounting the switch pin in the housing, a coupling element of the switch pin is coupled to a mating coupling element of the housing, and thereto this coupling element and this mating coupling element are disposed or oriented to each other in a first rotational position to the longitudinal axis viewed in the direction of the longitudinal axis of the steering column lever and passed past each other in this rotational position in axial direction and thus in the direction of the longitudinal axis of the steering column lever at least in certain areas, wherein the coupling element and the mating coupling element are then subsequently brought into a second rotational position to each other around this longitudinal axis of the steering column lever and the coupled state

between the coupling element and the mating coupling element is adjusted or achieved in this second rotational position. The advantages achievable by this mounting method were correspondingly set forth already above.

Further advantageous implementations of the method are given by advantageous implementations of the steering column lever, wherein the objective components then allow here the respective method steps in mounting with regard to their operative connections and their adjustable positions to each other.

Thus, in this context, it can for example also be provided that the switch pin and the spring element are pre-mounted in a pre-mounting assembly before they are then inserted into the housing. Therein, the positioning and axial retention of the spring element at the switch pin are preferably allowed by a sleeve, which is fixed to the switch pin. This sleeve can preferably be fixed thereto such that it can no longer slip from the switch pin, on the other hand can be shifted in the direction of the longitudinal axis of the switch pin relative to the switch pin on it.

Further features of the invention are apparent from the claims, the figures and the description of figures. The features and feature combinations mentioned above in the description as well as the features and feature combinations mentioned below in the description of figures and/or shown in the figures alone are usable not only in the respectively specified combination, but also in other combinations without departing from the scope of the invention. Thus, implementations are also to be considered as encompassed and disclosed by the invention, which are not explicitly shown in the figures and explained, but arise from and can be generated by separated feature combinations from the explained implementations. Implementations and feature combinations are also to be considered as disclosed, which thus do not have all of the features of an originally formulated independent claim. Moreover, implementations and feature combinations are to be considered as disclosed, in particular by the implementations set out above, which extend beyond or deviate from the feature combinations set out in the relations of the claims.

Below, embodiments of the invention are explained in more detail based on schematic drawings.

There show:

- Fig. 1 an exploded representation of an embodiment of a steering post module;
- Fig. 2 the steering post module according to Fig. 1 in the assembled state;
- Fig. 3 a simplified side view of an embodiment of a motor vehicle with an embodiment of a steering post module;
- Fig. 4 a perspective sectional representation through an embodiment of a steering column lever;
- Fig. 5 an exploded representation of partial components of the steering column lever according to Fig. 4;
- Fig. 6 the assembled state of the components according to Fig. 5, which constitute a pre-mounting assembly;
- Fig. 7 an enlarged representation of the configuration in Fig. 6;
- Fig. 8 a view of an embodiment of a mating element of a housing of the steering column lever;
- Fig. 9 a perspective representation of the steering column lever according to Fig. 4;
- Fig. 10 a perspective sectional representation through the steering column lever according to Fig. 4 in a position of the switch pin different from Fig. 4 relative to the housing of the steering column lever; and
- Fig. 11 an enlarged representation of a partial section in Fig. 10, but in a perspective different from Fig. 10.

In the figures, identical or functionally identical elements are provided with the same reference characters.

In Fig. 1, a steering post module 1 for a motor vehicle is shown in an exploded representation. The steering post module 1 includes a base module 2 and two steering column levers 3 and 4 separate therefrom in the embodiment. The base module 2 can have electronic components, by which the relative movement of a steering column lever 3, 4 disposed thereon can be evaluated and which can then perform an operating function linked to this movement or generate a signal, which can then be transmitted to a further control unit, by means of which this operating function can then be initiated and/or performed.

In Fig. 2, the steering post module 1 is shown in the assembled state. It can be provided that a steering column lever 3, 4 is movable in very different spatial directions relative to the base module 2 such that the adjustment of very different and multiple operating functions or operating conditions is allowed by these different types of movement.

In Fig. 3, a motor vehicle 5 is shown in a simplified representation, which has a steering post module 1. In the embodiment, the steering post module 1 is disposed in the area of a steering wheel 6 such that a vehicle user finds the steering column levers 3 and 4 in close proximity to this steering wheel 6 and thus can simply operate them also without having to take the hands completely from the steering wheel 6.

In Fig. 4, the steering column lever 3 is exemplarily shown in a perspective sectional representation. Here, it is illustrated in the assembled state, but shown in a view, in which it is not yet installed at the base module 2 according to Fig. 1. The steering column lever 3 includes a housing 7, which virtually represents the exterior component. This housing 7 is formed cannula-like at least in certain areas and includes a receiving channel 8. A switch pin 9 of the steering column lever 3 is disposed plunging into this receiving channel 8 in certain areas. The switch pin 9 is an integral, rod-like component. A longitudinal axis A of the steering column lever 3 is parallel or coaxial to a longitudinal axis B of the switch pin 9. The steering column lever 3 moreover includes a spring element 10 separate from the housing 7 and from the switch pin 9, which is disposed in the receiving channel 8. In the embodiment, the spring element 10 is a coil spring, which is helically wound and encompasses the switch pin 9. The switch pin 9 is disposed in the housing 7 preloaded by this spring element 10. Therein, the preload force of the spring element 10 acts in the direction of the longitudinal axis A. The housing 7 has an insertion opening 11, via which the switch pin 9 is inserted into the receiving channel 8. This insertion opening 11 is formed at a front end of this housing 7 facing the base module 2. The preload force of the

spring element 10 acts such that the switch pin 10 would be pressed out of this insertion opening 11.

The switch pin 9 includes a coupling element 13 at a first rear end 12. The coupling element 13 is formed integrally with the switch pin 9 and represents the end-side termination of the switch pin 9. The coupling element 13 is shown in Fig. 4 in a state coupled to a mating coupling element 14 formed at the housing 7. Moreover, the switch pin 9 is shown in a basic position in Fig. 4, in which the mating coupling element 14 and the coupling element 13 abut on each other. By this coupled state, the switch pin 9 is prevented from being shifted out of the receiving channel 8 via the insertion opening 11 by the preload force of the spring element 10.

In Fig. 5, a view of some components of the steering column lever 3 is shown in an exploded representation. Here, the switch pin 9 is shown, wherein the configuration of the coupling element 13 is apparent here. Here, this coupling element 13 is a hammerhead-shaped part, which is also formed as a locking beam and cuboid configured. This coupling element 13 includes a beam longitudinal axis C, which is oriented perpendicularly to the longitudinal axis B of the switch pin 9. The coupling element 13 is, as it is apparent in Fig. 5, formed asymmetrically and thus non-rotationally symmetrically in circumferential direction around the longitudinal axis B of the switch pin 9. In the direction of its longitudinal axis C, the coupling element 13 is formed longer than the diameter of the switch pin 9 at this end 12. Thus, at ends opposing in the direction of the longitudinal axis C, the coupling element 13 respectively protrudes beyond the dimensions of the switch pin 9 at this end 12.

In the embodiment, the switch pin 9 has multiple length sections, which become larger with regard to their diameter. Thus, a first length section 15 including the end 12 is formed with a smaller diameter than a further length section 16 adjoining thereto. A third length section 17 is formed in turn adjoining to this further length section 16, which is barrel-shaped configured. A further length section 18 is formed adjoining thereto, which in turn has a smaller diameter, in particular a diameter corresponding to the length section 15 or the length section 16. However, another diameter of the length section 18 can also be formed, but which is smaller than that of the length section 17.

Moreover, a sleeve 19 is shown, which is an own, separate, in particular integral component. The sleeve 19 has a sleeve bottom 20, to which a sleeve jacket wall 21 adjoins. This sleeve 19 is therefore virtually pot-shaped configured. A mating coupling

element 22 of the sleeve 19 is formed integrated in the sleeve bottom 20. Here, this mating coupling element 22 is in particular a pass-through hole, which has a non-rotationally symmetrical geometry in the direction of the longitudinal axis B. The pass-through hole is especially a slit or is slit like.

Moreover, the spring element 10 is also shown in Fig. 5. Moreover, a further sleeve 23 is shown, which is also an own, in particular integral component. In the assembled state, as it is also apparent in Fig. 4, the spring element 10 is disposed between the two sleeves 19 and 23 and thereby also correspondingly retained. Thus, the spring element 10 cannot slip off the switch pin 9. Because the sleeve 23 has a smaller diameter than the length section 17 of the switch pin 9, such that the length section 17 is virtually formed as an axial stop for the further sleeve 23. In contrast, the spring element 10 plunges into this pot-shaped first sleeve 19 with an end 24 facing the first sleeve 19 and is thereby also correspondingly retained.

It can also be provided that the first sleeve 19 is not formed pot-shaped, but is formed as a corresponding cylinder such that the end 24 does not plunge into the first sleeve 19, but abuts on it on the end side.

In Fig. 6, the assembled state of the components, as they have been represented and explained in Fig. 5, is shown. Thereby, the pre-mounting assembly 25 is formed, which is already readily mounted before insertion into the housing 3. This pre-mounting assembly 25 can then be inserted into the receiving channel 8 from the insertion opening 11 in a further mounting step and then be correspondingly mounted there.

In Fig. 7, an enlarged representation of the pre-mounting assembly 25 in the area of the first sleeve 19 is shown. Here, the coupled state between the coupling element 13 of the switch pin 9 and the mating coupling element 22 of the sleeve 19 is shown. As is apparent, the mating coupling element 22 in the form of the pass-through hole is not formed rotationally symmetrically around the hole axis and thus also the longitudinal axis B of the switch pin 9. This mating coupling element 22 includes a central area 26 and outwards projecting bulges 27 and 28 adjoining thereto on opposing sides. This pass-through hole is formed in contiguous manner and without interruptions. These bulges 27 and 28 offset by 180° around the longitudinal axis B of the switch pin 9, which also represents the hole axis of the pass-through hole of the first sleeve 19, also represent a type of encoding in this sense to adjust a correct mounting and thus also a correct rotational position between the coupling element 13 and the mating coupling element 22

around the longitudinal axis B. In particular, the mechanical connection between the coupling element 13 and the mating coupling element 22 is a bayonet joint.

Therefore, for mounting, a first rotational position between the switch pin 9 and in particular the coupling element 13 to the first sleeve 19 is first adjusted. Before this adjustment of the first rotational position, the second sleeve 23 is fitted onto the switch pin 9 and then the spring element 10 is fitted. In further mounting, the sleeve 19 is then applied. Therein, the first rotational position defines itself such that the coupling element 13 can be shifted through this mating coupling element 22 such that the coupling element 13 is also completely shifted past the mating coupling element 22 in axial direction and thus in the direction of the longitudinal axis B and thus shifted through the pass-through hole. This can be effected only with one of only two possible first rotational positions in the embodiment, wherein these first rotational positions are offset to each other by 180° around the longitudinal axis B. This means that the orientation of the longitudinal axis C around the longitudinal axis B has to be such that the protruding sections of the coupling element 13 plunge through the bulges 27 and 28. This orientation of the coupling element 13 to the mating coupling element 22 represents a decoupled state between this coupling element 13 and the mating coupling element 22. In order to then achieve the coupled state between the coupling element 13 and the mating coupling element 22 starting from this shifted-through state, a relative rotation between the first sleeve 19 and the switch pin 9 has to be effected. Thereto, one of these two components is rotated relative to the other one around the longitudinal axis B and transferred from this first rotational position into a second rotational position. An exemplary second rotational position is shown in Fig. 7, in which in particular an azimuthal offset around the longitudinal axis B by 90° to the first rotational position is adjusted. In this second rotational position according to Fig. 7, the coupled state is then adjusted and defined. Here, it is in particular provided that the protruding sections of the coupling element 13 then abut on the sleeve bottom 20 since the diameter of the central area 26 is smaller than the extension of the coupling element 13 of the longitudinal axis C. Thereby, the coupling element 13 can no longer slip through the mating coupling element 22, in particular not slip through this central area 26.

The sleeve 19 can then no longer slip off the switch pin 9 in this state, as it is shown in Fig. 6 and Fig. 7, but can still shift relative to the switch pin 9 thereon in the direction of the longitudinal axis B. In particular, this relative shift is such that this first sleeve 19 can be axially shifted in dismounting the spring element 10 from the switch pin 9.

In Fig. 8, the housing 7 is shown with a view to a mating coupling element 14, as it was already mentioned to Fig. 4. Here too, the mating coupling element 14 of the housing 7 is a reception in the form of a pass-through hole, especially a slit, through which the switch pin 9 can be passed with the coupling element 13. In particular, it is provided that the geometry and/or the dimension of the mating coupling element 14 are equal to the mating coupling element 22.

The mating coupling element 14 of the housing 7 preferably has a central area 29, at which bulges 30 and 31 in particular offset to each other by 180° form themselves. A keyhole-like geometry is thereby formed. By this geometry, a corresponding mounting principle of the switch pin 9 on the housing 7 is allowed, as it was explained between the first sleeve 19 and the switch pin 9.

If the switch pin 9 and in particular the pre-mounting group 25 is to be mounted on the housing 7, thus, this switch pin 9, in particular the pre-mounting assembly 25, is shifted into the receiving channel 8 via the insertion opening 11. This is effected in a rotational position around the longitudinal axis A, which is a first rotational position and thus represents a decoupled state between the coupling element 13 and the mating coupling element 14. This rotational position is preset such that the coupling element 13 can be passed through the mating coupling element 14 and the areas of the coupling element 13 protruding with respect to the length section 15 of the switch pin 9 in the direction of the longitudinal axis C can plunge through the bulges 30 and 31. In this first rotational position, the coupled state between the coupling element 13 and the mating coupling element 14 of the housing 7 is then preset here too.

In order to achieve the coupled state after passing the coupling element 13 through the mating coupling element 14 here too, a relative rotation of the switch pin 9 to the housing 7 is again performed, as it is exemplarily illustrated in Fig. 9. There, it is signaled by the arrow P, that starting from this rotational position in the passed-through state of the coupling element 13 through the mating coupling element 14, the coupled state is achieved by this rotation then into a second rotational position (which is shown). In Fig. 9, the already coupled state is then shown here too, which is characterized by this second rotational position. In this second rotational position, the coupling element 13 can no longer plunge through the mating coupling element 14 and thus not slip out in the direction of the longitudinal axis A towards the insertion opening 11. As is apparent, the housing 7 has a stop 32, which represents a bounding wall, by which the receiving channel 8 is axially bounded on the rear side. This mating coupling element 14 is integrated in this

bounding wall 32. Thus, the coupling element 13 abuts on an outer side of the bounding wall 32 facing away from the receiving channel 8.

In Fig. 10, the steering column lever 3 is shown in the assembled state in a perspective sectional representation and moreover shown in the state mounted on the base module 2, as it was explained to Fig. 2. In this mounted state, the switch pin 9 is shifted further into the receiving channel 8 in the direction of the longitudinal axis A with respect to the basic position shown in Fig. 4 such that the coupling element 13 is disposed spaced in axial direction and thus without contact with the mating coupling element 14. However, in this working position too, with regard to the rotational position around the longitudinal axis A, the coupled state between the coupling element 13 and the mating coupling element 14 is still adjusted. Only an axial shift is performed with respect to Fig. 4.

Preferably, the diameter of the central area 26 and/or of the central area 29 is such that the switch pin 9, in particular the length section 15, is inserted therein in exactly fitting manner such that a relative movement between the switch pin 9 and the housing 7 in axial direction is possible without problem, but a radial movement thus perpendicular to the longitudinal axis A is virtually prevented.

In Fig. 10, the base module 2 is only symbolically shown by a block diagram.

In Fig. 11, a view to the steering column lever 3 in the area of the coupling element 13 and the mating coupling element 14 is shown in an enlarged representation such that it is apparent here that the coupling element 13 is disposed lifted from the bounding wall and thus the stop 32 and thus is also disposed without contact with the pass-through hole representing the mating coupling element 14.

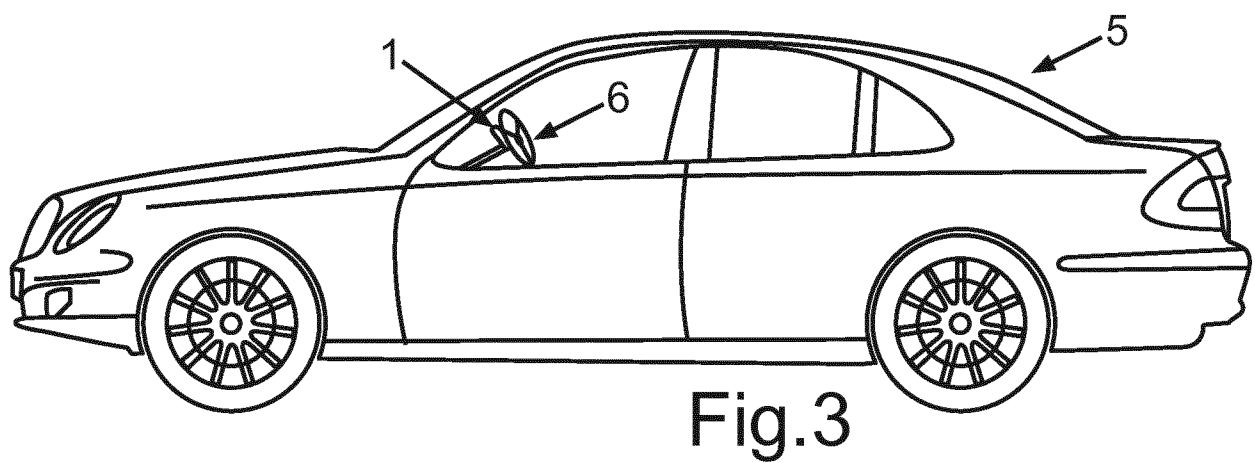
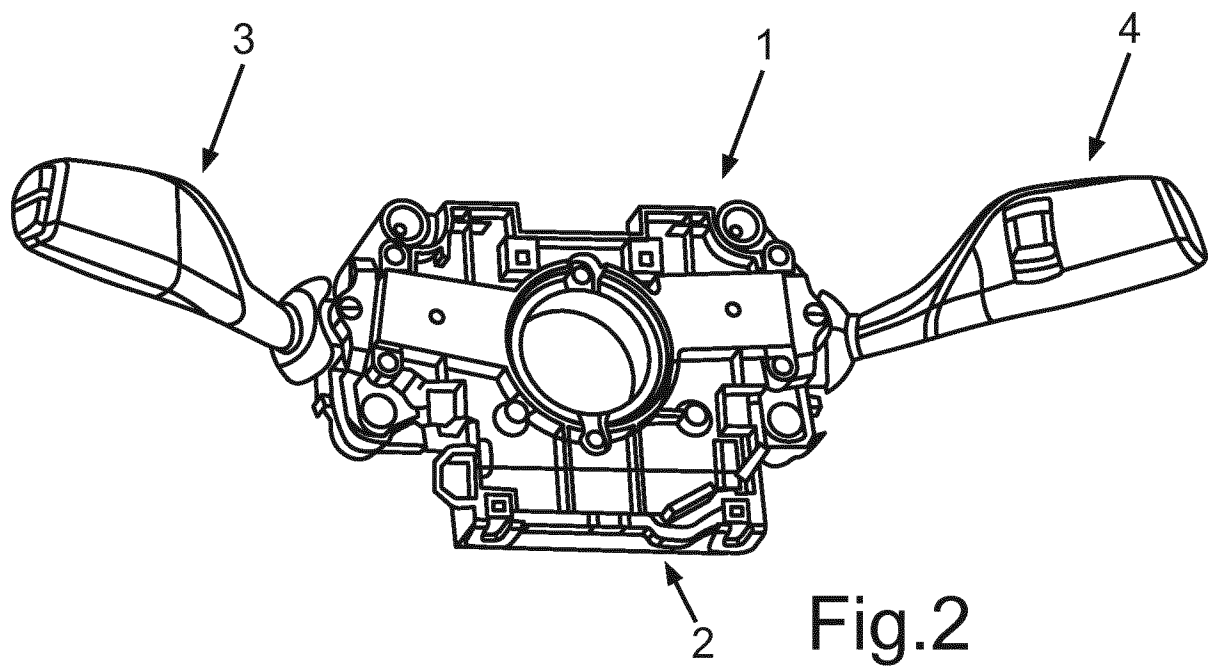
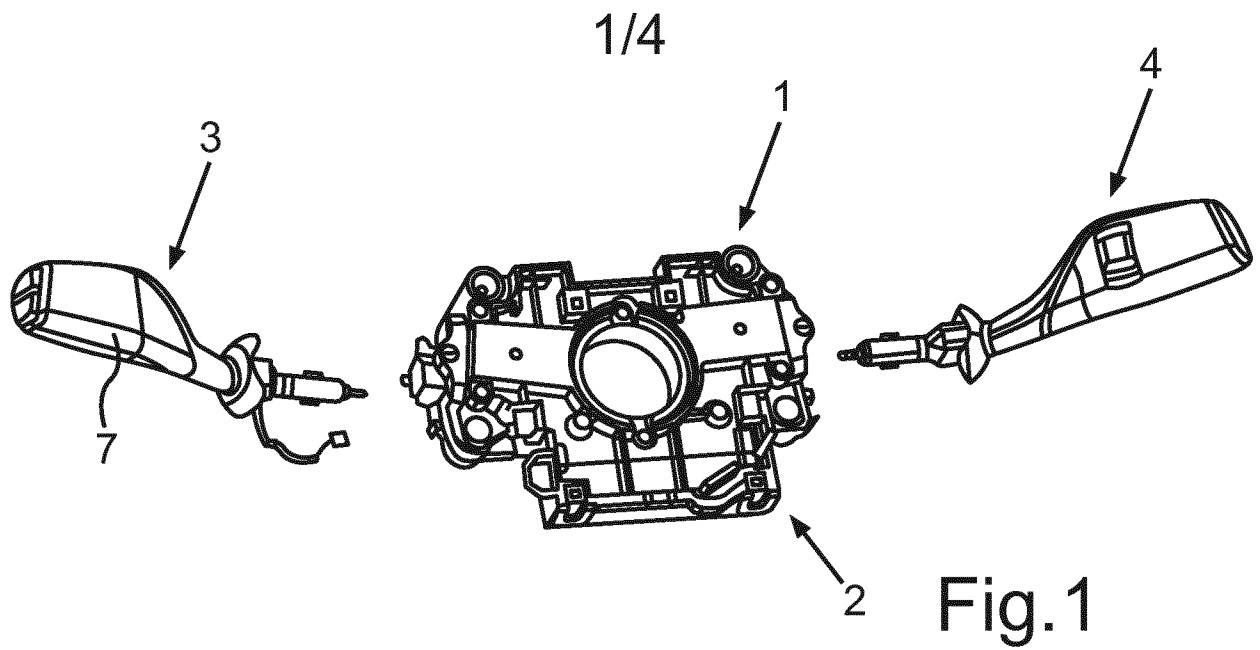
Claims

1. Steering column lever (3, 4) for a steering post module (1) of a motor vehicle (5), which has a housing (7), and has a switch pin (9), which is preloaded by a spring element (10) in the direction of a longitudinal axis (A) of the steering column lever (3, 4) and is movably disposed in the housing (7), characterized in that the switch pin (9) has a coupling element (13), which can be coupled to a mating coupling element (14) formed at the housing (7) by a rotation around the longitudinal axis (A), and a coupled state or a decoupled state is adjusted depending on a rotational position between the coupling element (13) and the mating coupling element (14) to each other.
2. Steering column lever (3, 4) according to claim 1, characterized in that the coupling element (13) is formed at a rear end (12) of the switch pin (9) protruding into the housing (7).
3. Steering column lever (3, 4) according to claim 1 or 2, characterized in that the coupling element (13) is an in particular hammerhead-shaped locking beam.
4. Steering column lever (3, 4) according to any one of the preceding claims, characterized in that the mating coupling element (14) is a reception for the coupling element (13), into which the coupling element (13) can plunge at least in certain areas.
5. Steering column lever (3, 4) according to claim 4, characterized in that the reception is a pass-through hole, which has a non-rotationally symmetrical geometry in circumferential direction around the longitudinal axis (A) of the steering column lever (3, 4).

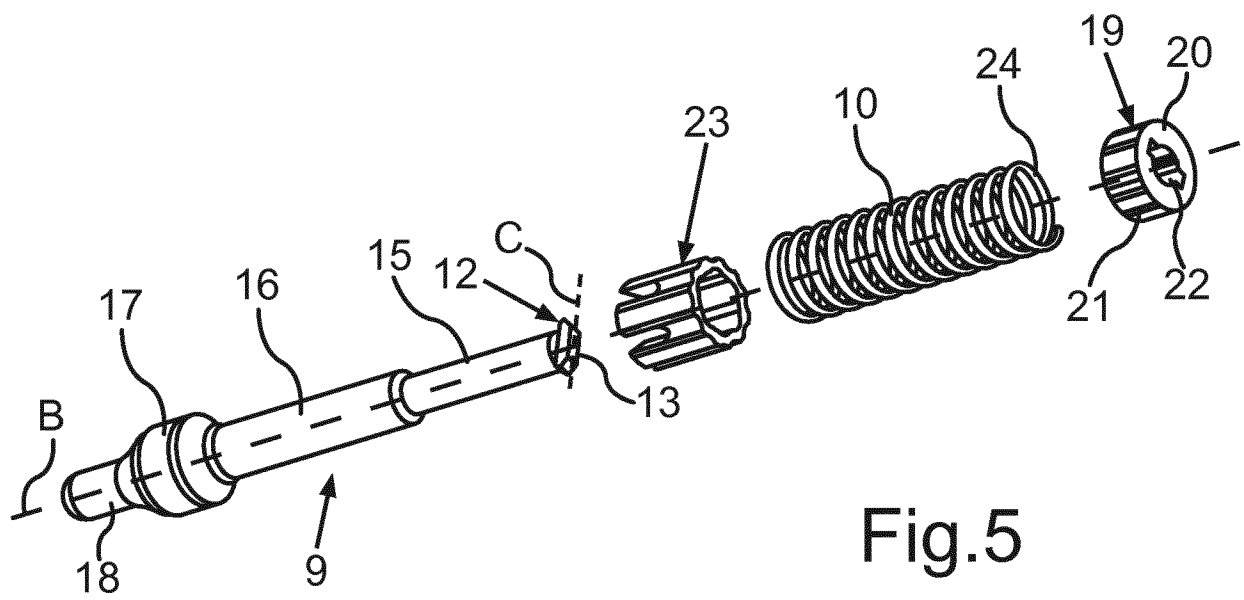
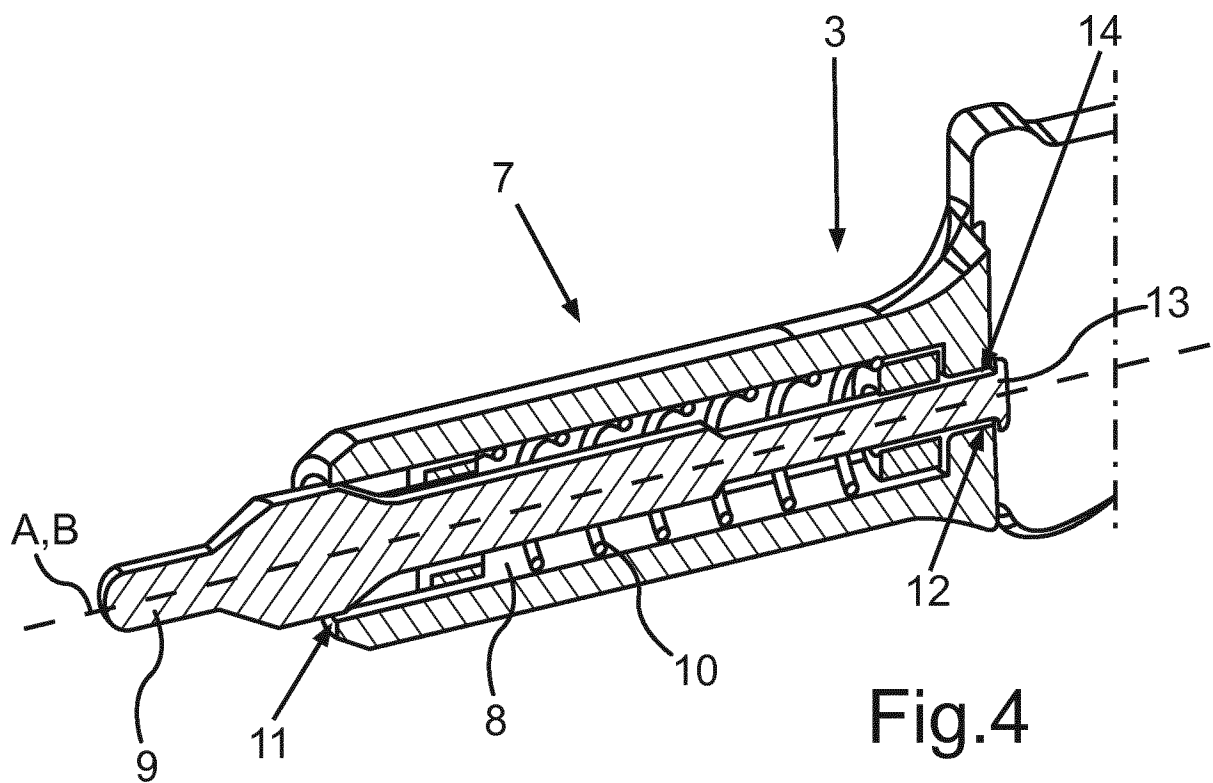
6. Steering column lever (3, 4) according to claim 5, characterized in that the switch pin (9) with the coupling element (13) can be passed through the pass-through hole in particular only in a first rotational position, in which the coupling element (13) is decoupled from the mating coupling element (14) with respect to an axial protection effected in the direction of the longitudinal axis (A) of the steering column lever (3, 4), and in the state passed through the pass-through hole in a second rotational position rotated with respect to the first rotational position, the coupling element (13) and the mating coupling element (14) are coupled for axial protection.
7. Steering column lever (3, 4) according to any one of the preceding claims, characterized in that the mechanical connection between the coupling element (13) and the mating coupling element (14) is formed as a bayonet joint or a twist lock.
8. Steering column lever (3, 4) according to any one of the preceding claims, characterized in that the steering column lever (3, 4) has a sleeve (19) separate from the housing (7), which is formed for axial retention of the spring element (10) at the switch pin (9) and which can be coupled to the coupling element (13).
9. Steering column lever (3, 4) according to claim 8, characterized in that the sleeve (19) has a mating coupling element (22), and the coupling element (13) and the mating coupling element (22) can be coupled by a rotation around the longitudinal axis (A) and a coupled state or a decoupled state for axial retention of the spring element (10) is adjusted depending on a rotational position between the coupling element (13) and the mating coupling element (14).
10. Steering column lever (3, 4) according to claim 8 or 9, characterized in that the switch pin (9) is formed with the spring element (10) and the sleeve (19) as a pre-mounting assembly (25), which is formed for further installation in the housing (7).

11. Steering column lever (3, 4) according to any one of claims 8 to 9, characterized in that
in the installed state of the switch pin (9) and the sleeve (19) in the housing (7), the sleeve (19) abuts on a stop (32) in the housing (7) and is thereby axially retained, and the stop (32) has the mating coupling element (14) of the housing (7).
12. Steering column lever (3, 4) according to any one of the preceding claims, characterized in that
in a basic position of the switch pin (9) in the coupled state between the coupling element (13) of the switch pin (9) and the mating coupling element (14) of the housing (7), the coupling element (13) is axially pressed to the mating coupling element (14) by the preload force of the spring element (10).
13. Steering post module (1) for a motor vehicle (5) with at least one steering column lever (3, 4) according to any one of the preceding claims, and with a base module (2), at which the steering column lever (3, 4) is movably disposed, in particular such that the switch pin (9) is disposed in a working position different from the basic position, in which the coupling element (13) and the mating coupling element (14) of the housing (7) are disposed in the second rotational position representing the coupled state and the coupling element (13) and the mating coupling element (14) are disposed spaced from each other in the direction of the longitudinal axis (A) of the steering column lever (3, 4).
14. Motor vehicle (5) with a steering post module (1) according to claim 13.
15. Method for mounting a steering column lever (3, 4) for a steering post module (1) of a motor vehicle (5), which has a housing (7), and has a switch pin (9), which is preloaded by a spring element (10) in the direction of a longitudinal axis (A) of the steering column lever (3, 4) and is movably disposed in the housing (7), characterized in that
for mounting the switch pin (9) in the housing (7), a coupling element (13) of the switch pin (9) is coupled to a mating coupling element (14) of the housing (7) and thereto these elements (13, 14) are passed past each other viewed in the direction of the longitudinal axis (A) of the steering column lever (3, 4) viewed in a first rotational position to the longitudinal axis (A) at least in certain areas and

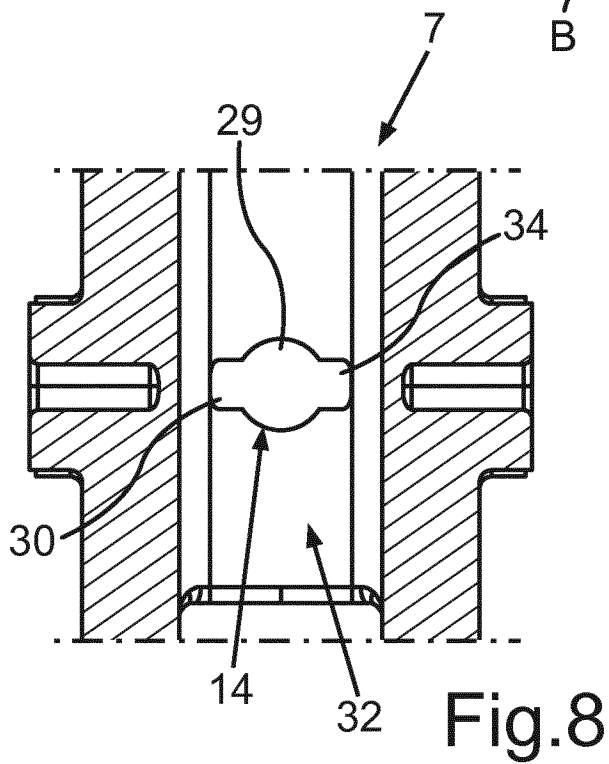
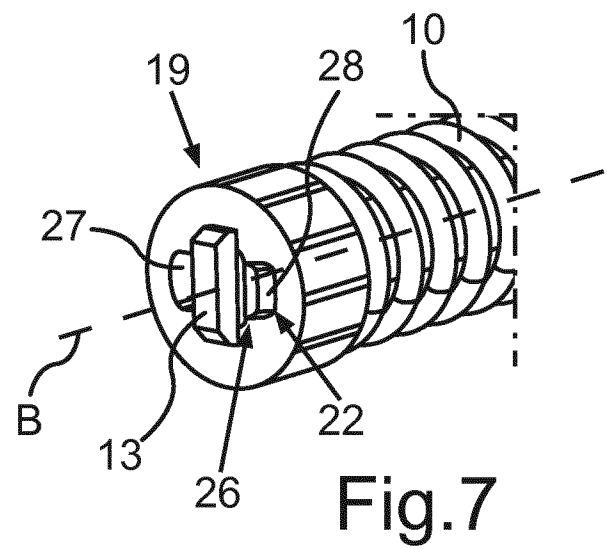
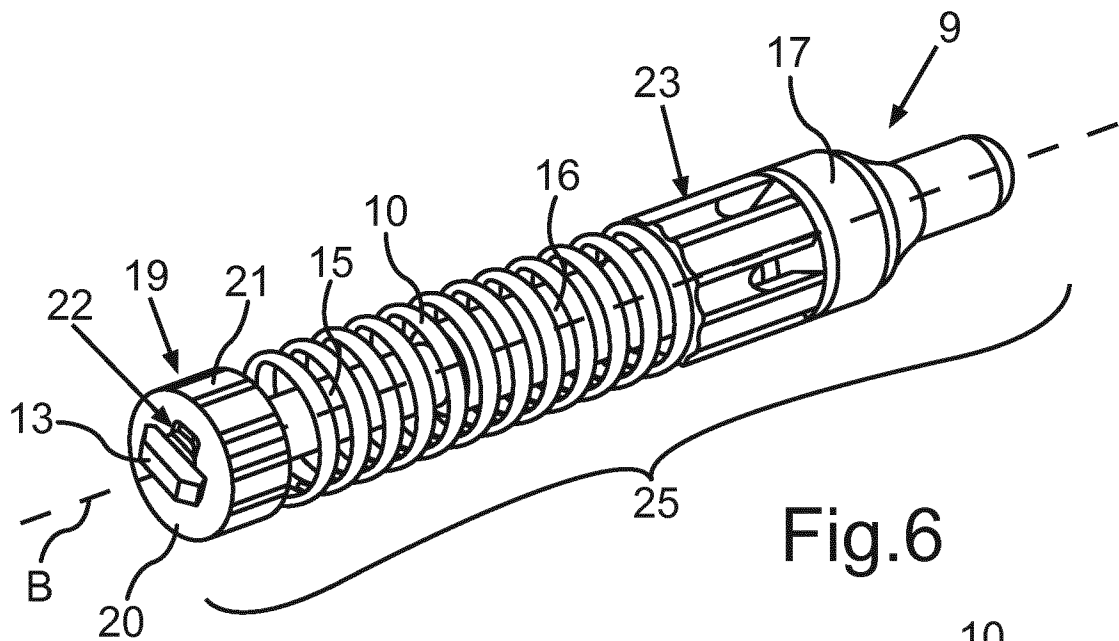
subsequently are brought into a second rotational position to each other viewed to the longitudinal axis (A), by which the coupled state is adjusted.



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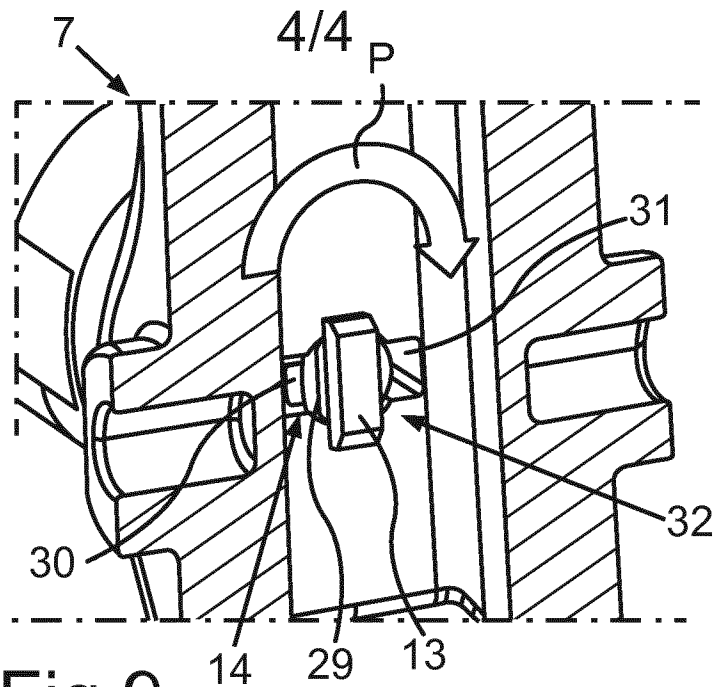


Fig.9

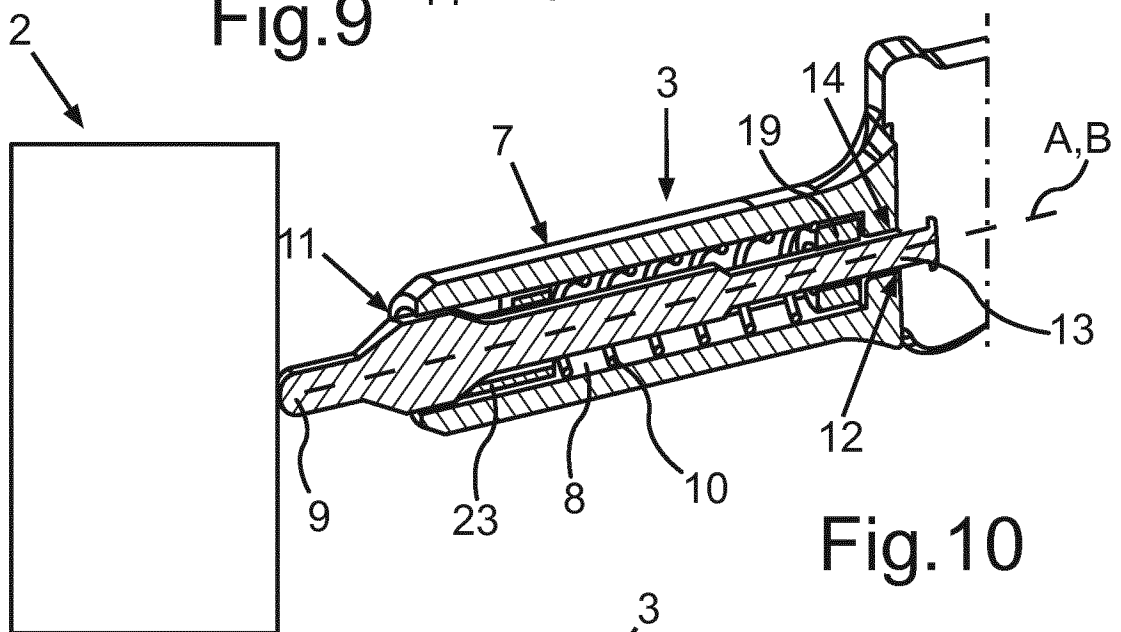


Fig.10

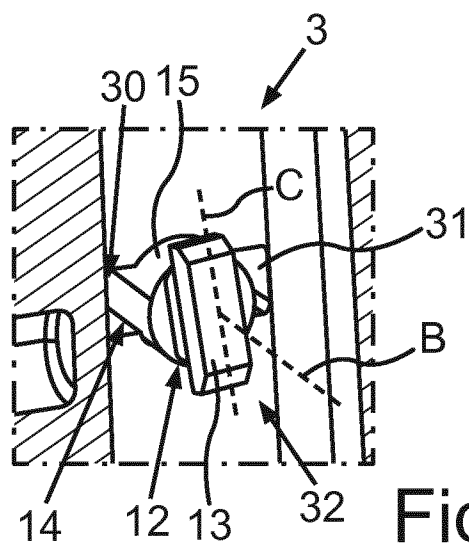


Fig.11

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/079699

A. CLASSIFICATION OF SUBJECT MATTER

INV. B60K37/06 B60Q1/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B60K B60Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 10 2014 107840 A1 (VALEO SCHALTER & SENSOREN GMBH [DE]) 17 December 2015 (2015-12-17) cited in the application paragraphs [0013], [0056], [0057]; figures 2,5 -----	1-15
A	DE 10 2012 021261 A1 (TRW AUTOMOTIVE ELECTRON & COMP [DE]) 30 April 2014 (2014-04-30) figures 1-3 -----	1-15
A	EP 1 361 112 A2 (VALEO SCHALTER & SENSOREN GMBH [DE]) 12 November 2003 (2003-11-12) figure 1 -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 January 2018

Date of mailing of the international search report

12/02/2018

Name and mailing address of the ISA/

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Erbel, Christoph

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/079699

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