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Actuating lever.

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An actuating lever for a clamping device for an adjustable steering column of a vehicle may comprise a first part comprising a hole; and a second part comprising a handle portion, a connection, and at least one shear means, wherein the connection may extend through the hole of the first part and is configured to allow relative rotation between the first and second parts. The first part may comprise at least one opening for the shear means, the at least one opening covering a circumference of the at least one shear means when the at least shear means extends into the at least one opening; and the first and second parts are rotatable relative to each other around the connection when force is applied to the second part to shear the at least one shear means. The amount and/or shape of the at least one shear means is configured to regulate the force required to initiate a rotational movement of the second part in relation to the first part.

A method for manufacturing an actuating lever may comprise the steps of providing the first part at least partly in a moulding tool; and moulding the second part onto the first part such that the connection and the shear means are formed by the hole and the at least one opening respectively.

Actuating Lever

Technical Field

5 The present disclosure relates to an actuating lever, especially to an actuating lever for a clamping device for an adjustable steering column of a vehicle. More particularly, the present disclosure relates to an actuating lever, a method for making the same, and the tool for making it.

Background

10 Vehicle steering columns which are adjustable in a rake and/or reach direction normally are retained in a desired position by means of a releasable clamping device. The clamping device is operated by an actuating lever coupled to the clamping device and controlled by the vehicle driver. The steering column is adjusted for driver comfort and is unclamped to perform the adjustment. When the
15 adjustment is done the steering column is clamped again. This operation is only performed when the vehicle is at stand still.

In an event of a collision, the lever rests in its clamped position. During the collision the knees of the driver move so as to come into contact with the lever. For the sake of safety the lever is required to collapse or shear away from the driver under a
20 specific load. However, the lever must also remain strong enough to withstand normal lock and unlock forces.

The actuating lever is often a sturdy component that is designed to withstand repeated operations. The lever also has to be sufficiently robust to sustain a degree of unintended loads that may be categorised as abuse. However, with these
25 considerations, the lever can become strong enough to be the source of driver or occupant injury in the event of a collision of the vehicle.

It is desirable that loads on the lever in a specified direction should cause the lever to break, shear, or bend, to prevent driver or occupant injury.

A known form of lever is disclosed in WO 03018384. The lever disclosed
30 incorporates a buckling point which tends to change the shape of the lever in the event of an impact. GB 2464490 discloses an actuating lever for a clamping device for an adjustable steering column. Here the lever is designed to simply break away

as a loose part. It is desirable not to have loose parts break away during a collision with a vehicle.

It is desirable to avoid cumbersome arrangements and to keep the technical solutions as simple as possible. It is desirable to avoid expensive arrangements and to keep the production costs as low as possible.

The present invention is directed to overcoming one or more of the problems as set forth above.

Summary of the Invention

10 It is an object of the present invention to provide an actuating lever for a clamping device for an adjustable steering column of a vehicle. This object can be achieved by the features as defined by the independent claims. Further enhancements are characterized by the independent claims.

15 According to one embodiment, an actuating lever for a clamping device for an adjustable steering column of a vehicle may comprise a first part comprising a hole; and a second part comprising a handle portion, a connection, and at least one shear means, wherein the connection may extend through the hole of the first part and is configured to allow relative rotation between the first and second parts. The first part may comprise at least one opening for the shear means, the at least one opening covering a circumference of the at least one shear means when the at least shear means extends into the at least one opening; and the first and second parts are rotatable relative to each other around the connection when force is applied to the second part to shear the at least one shear means.

20 According to one embodiment, the second part may be moulded onto the first part, such that the connection and the shear means are formed by the hole and the at least one opening, respectively.

According to one embodiment, a moulding tool may be configured for producing the actuating lever according to any one of the embodiments above.

30 According to one embodiment, a method for manufacturing an actuating lever may comprise the steps of providing the first part at least partly in a moulding tool; and moulding the second part onto the first part such that the connection and the shear means are formed by the hole and the at least one opening, respectively.

According to one embodiment, the amount and/or shape of the at least one shear means is configured to regulate the force required to initiate a rotational movement of the second part in relation to the first part.

At least one of the above embodiments provides one or more solutions to the problems and disadvantages with the background art. Other technical advantages of the present disclosure will be readily apparent to one skilled in the art from the following description and claims. Various embodiments of the present application obtain only a subset of the advantages set forth. No one advantage is critical to the embodiments. Any claimed embodiment may be technically combined with any other claimed embodiment(s).

Brief Description of the Drawings

The accompanying drawings illustrate presently preferred exemplary embodiments of the disclosure, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain, by way of example, the principles of the disclosure.

FIG. 1 shows an actuating lever and a steering column according to an exemplary embodiment of the present disclosure;

FIG. 2 shows an actuating lever according to an exemplary embodiment of the present disclosure;

FIG. 3 shows an actuating lever according to an exemplary embodiment of the present disclosure; and

FIG. 4 shows an actuating lever according to an exemplary embodiment of the present disclosure.

Detailed Description

FIG. 1 illustrates a steering column and an actuating lever 1 according to an embodiment. A steering wheel may be mounted onto the steering column at the right hand side. The left hand side of the steering column is mounted towards the front of the vehicle. It may be taken from FIG. 1 that the actuating lever 1 may extend down below the steering column. During a collision, the knees of a driver may come into contact with the actuating lever 1. As a result, the actuating lever 1

may pivot away from the driver when a load P is applied to the actuating lever 1. The load P is measured so that a driver's knees do not get damaged during a collision when the knees are forced onto the actuating lever 1. The load P must also be higher than the forces resulting from normal lock and unlock forces, and a certain amount of abuse of the lever.

FIG. 2 illustrates an actuating lever 1 according to an embodiment. The actuating lever may comprise a first part 10 and a second part 20. The first part 10 may be, for example, a flat lever and/or a pressed steel lever. The second part 20 may be a plastic handle. The plastic handle may be moulded onto at least a part of the first part 10.

FIGs. 3 and 4 show an actuating lever 1 according to an embodiment in more detail. Here a part of the second part 20 that is in contact with the first part 10 is cut away so that the connections between the two parts are illustrated. From FIGs. 3 and 4 it may be taken how the second part 20 is connected to the first part 10.

The first part 10 comprises a hole 14. The second part 20 comprises a handle portion 26, a connection 24, and at least one shear means 22. The connection 24 extends through the hole 14 of the first part 10 and is configured to allow relative rotation between the first part 10 and the second part 20.

The first part 10 comprises at least one opening 12 for the shear means 22. The at least one opening 12 covers a circumference of the at least one shear means 22 when the at least shear means 22 extends into the at least one opening 12. The at least one opening 12 circumvents the at least one shear means 22. The edge of the at least one opening 12 are thus in contact with the at least one shear means 22 all around the shear means 22. This allows the shear means 22 to shear. The at least one shear means 22 may be configured such that it becomes fractured along a plane as a result of forces acting parallel to that plane. The plane may be in the plane that the second part 20 may rotate during a collision.

The first part 10 and the second part 20 are rotatable relative to each other around the connection 24. The rotation takes place when a force P is applied to the second part 20 to shear the at least one shear means 22. In this way the second part 20 rotates around the connection 24 and a driver's knees are not damaged in the case of a collision.

While the illustrated exemplary embodiment in FIGs. 3 and 4 shows only one shear means 22 and one opening 12, there could be two or more shear means 22 and corresponding openings 12. In this way the load P necessary for the actuating lever 1 to collapse and fold can be adjusted. The adjustment can also be made by sizing the at least one opening 12 for the shear means 22. A larger opening 12 would result in a larger shear means 22 which requires a larger force P. A smaller opening 12 would result in a smaller shear means 22 which requires a smaller force P.

According to one embodiment, the actuating lever 1 is made by forming, for example by moulding, the second part 20 onto the first part 10. In this way the connection 24 and the at least one shear means 22 are formed during the forming process. For example, the first part 10 may be put partly into a mould so that the second part 20 can be moulded, over-moulded, onto the first part 10. In this process the hole 14 and the at least one opening 12 will cause the connection 24 and the at least one shear means 22, respectively, to form during the moulding process.

This results in a very inexpensive way to manufacture the actuating lever 1. It also results in a very solid and accurate actuating lever 1. The actuating lever 1 can withstand normal use and abuse, but also folds away at a given force P, according to necessary safety regulations. How the actuating lever 1 is manufactured and its resulting technical function provides thus a technical advantage and solves technical problems mentioned above.

In one embodiment, the first part 10 of actuating lever 1 may be a flat lever with a rectangular cross section. The second part 20 may be moulded over at least a part of the flat lever in the axial direction thereof and moulded over at least four sides of the rectangular cross section. According to one embodiment, the at least one shear means 22 extends from one side of the second part 20 and connects to the opposite side of the second part 20. The at least one shear means 22 may thus be moulded onto the first part 10 and formed during the moulding, thereby connecting the two opposite sides over-moulded onto the first part 10.

According to one embodiment, the first part 10 may be a pressed steel lever and the second part 20 is a plastic handle. This provides numerous technical advantages for the moulding process to manufacture the actuating lever 1.

According to one embodiment, the at least one hole 14 in the first part 10 may be circular in shape and forms a swivel pivot for the second part 20. Any other suitable form for creating a swivel pivot may be used.

5 According to one embodiment, the at least one opening 12 may extend all the way through the first part 10. The at least one opening 12 may be circular in shape. According to one embodiment the at least one opening may not necessarily go all the way through the first part 10. The at least one opening 12 may thus be similar to a dent creating a hold for the at least one shear means 22. Alternatively, or in addition, the at least one opening 12 may be a texture creating a hold for the at least
10 one shear means 22.

According to one embodiment, the first part 10 may be substantially parallel to the axis of the steering column when mounted on an adjustable steering column of a vehicle. The first part 10 may not project below the steering column when mounted on an adjustable steering column of a vehicle. The second part 20 may be the only
15 part that project below the steering column when mounted on an adjustable steering column of a vehicle. The actuating lever 1 is thus configured such that, when mounted on an adjustable steering column of a vehicle, the first part 10 does not engage a driver's knees.

20 According to one embodiment, a moulding tool may be used for over-moulding the second part 20 onto the first part 10. The moulding tool may be an injection moulding tool for creating the second part 20 onto the first part 10. The moulding tool may have injection openings located where the connection 24 and/or the at least one shear means 22 are. This would ensure proper moulding and manufacture of the actuating lever 1. The moulding tool may additionally be configured to mould
25 the second part 20 as described in any of the embodiments above.

According to one embodiment, a method for manufacturing an actuating lever 1 may comprise the following steps. A first method step may be providing the first part 10 at least partly in a moulding tool. A second method step may be moulding the second part 20 onto the first part 10 such that the connection 24 and the at least
30 one shear means 22 are formed by the hole 14 and the at least one opening 12, respectively.

According to one embodiment, the moulding process provides the collapsing point of the actuating lever 1. The amount and/or shape of the at least one shear means 22 is configured to regulate the force P required to initiate a rotational movement of the second part 20 in relation to the first part 10. The force P required to collapse the actuating lever 1 may be decided by forming the at least one opening 12 in the first part 10. During the over moulding of the second part 20 the at least one shear means 22 is formed and hereby the force P is set.

It will be apparent to those skilled in the art that various modifications and variations can be made to the actuating lever, method, and moulding tool. Other embodiments will be apparent to those skilled in the art from consideration of the specification and practice of the disclosed actuating lever, method, and moulding tool. It is intended that the specification and examples be considered as exemplary only, with a true scope being indicated by the following claims and their equivalents.

15

Conclusies

1. Aandrijfhendel voor een kleminrichting voor een verstelbare stuurkolom van een voertuig, waarbij de hendel omvat
5 een eerste deel (10) omvattend een gat (14); en
een tweede deel (20) omvattend een handgreepdeel (26), een verbinding (24) en ten minste een afschuifmiddel (22), waarbij de verbinding (24) zich uitstrekt door het gat (14) van het eerste deel (10) en is geconfigureerd om relatieve rotatie tussen de eerste en tweede delen (10, 20) mogelijk te maken;
10 waarbij
een eerste deel (10) ten minste een opening (12) omvat voor het ten minste ene afschuifmiddel (22), waarbij de ten minste ene opening (12) een omtrek van het ten minste ene afschuifmiddel (22) bedekt wanneer het ten minste [ene] afschuifmiddel zich uitstrekt in de ten minste ene opening (12); en
15 de eerste en tweede delen (10, 20) draaibaar zijn ten opzichte van elkaar rondom de verbinding wanneer kracht wordt uitgeoefend op het tweede deel (20) om het ten minste ene afschuifmiddel (22) af te schuiven.
2. Hendel volgens conclusie 1, waarbij het tweede deel (20) is gevormd op het eerste
20 deel (10), zodat de verbinding (24) en het afschuifmiddel (22) respectievelijk worden gevormd door het gat (14) en de ten minste ene opening (12).
3. Hendel volgens conclusie 1 of 2, waarbij het eerste deel (10) een platte hendel is met een rechthoekige doorsnede; en
25 het tweede deel (20) is gegoten over ten minste een deel van de platte hendel in de axiale richting en is gegoten over vier zijden van de rechthoekige doorsnede.
4. Hendel volgens conclusie 3, waarbij het ten minste ene afschuifmiddel (22) zich uitstrekt vanaf een zijde van het tweede deel (20) en aansluit op de
30 tegenoverliggende zijde van het tweede deel (20).
5. Hendel volgens een van de voorgaande conclusies, waarbij het eerste deel (10) een geperste stalen hendel is en het tweede deel (20) een kunststof handgreep is.

6. Hendel volgens een van de voorgaande conclusies, waarbij het ten minste ene gat (14) in het eerste deel (10) cirkelvormig is en een zwenkas vormt voor het tweede deel (20).
- 5 7. Hendel volgens een van de voorgaande conclusies, waarbij de ten minste ene opening zich helemaal uitstrekt door het eerste deel (10) en cirkelvormig is.
8. Hendel volgens een van de voorgaande conclusies, waarbij het eerste deel (10) in hoofdzaak parallel is aan de as van de stuurkolom wanneer gemonteerd op een
10 verstelbare stuurkolom van een voertuig, en
waarbij het eerste deel (10) niet uitsteekt onder de stuurkolom wanneer gemonteerd op een verstelbare stuurkolom van een voertuig.
9. Gietgereedschap voor het produceren van de aandrijfhendel volgens een van de
15 conclusies 1 tot en met 8.
10. Werkwijze voor het produceren van een aandrijfhendel volgens een van de
conclusies 1 tot en met 8, omvattend de stappen van
het ten minste gedeeltelijk verschaffen van het eerste deel (10) in een
20 gietgereedschap; en
het gieten van het tweede deel (20) op het eerste deel (10), zodat de verbinding (24) en het afschuifmiddel (22) respectievelijk worden gevormd door het gat (14) en de ten minste ene opening.
- 25 11. Werkwijze volgens conclusie 10, waarbij de hoeveelheid en/of vorm van het ten minste ene afschuifmiddel (22) is geconfigureerd om de kracht te regelen die is vereist om een rotatiebeweging van het tweede deel (10) ten opzichte van het eerste deel (20) in gang te zetten.
- 30 12. Hendel zoals in hoofdzaak beschreven met verwijzing naar de beschrijving en/of de tekeningen.
13. Werkwijze zoals in hoofdzaak beschreven met verwijzing naar de beschrijving en/of de tekeningen.

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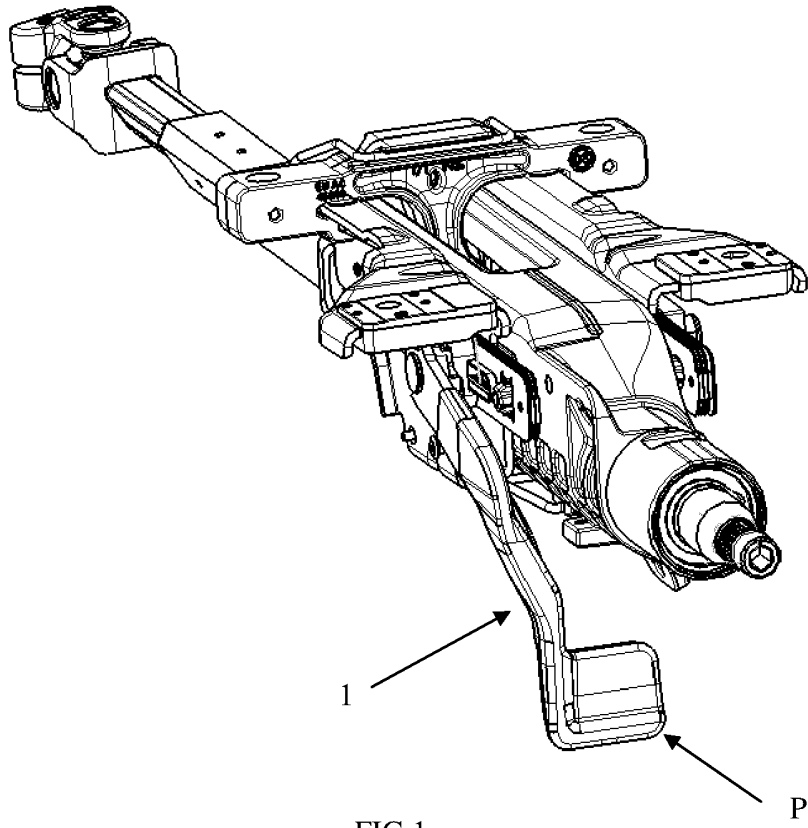


FIG 1

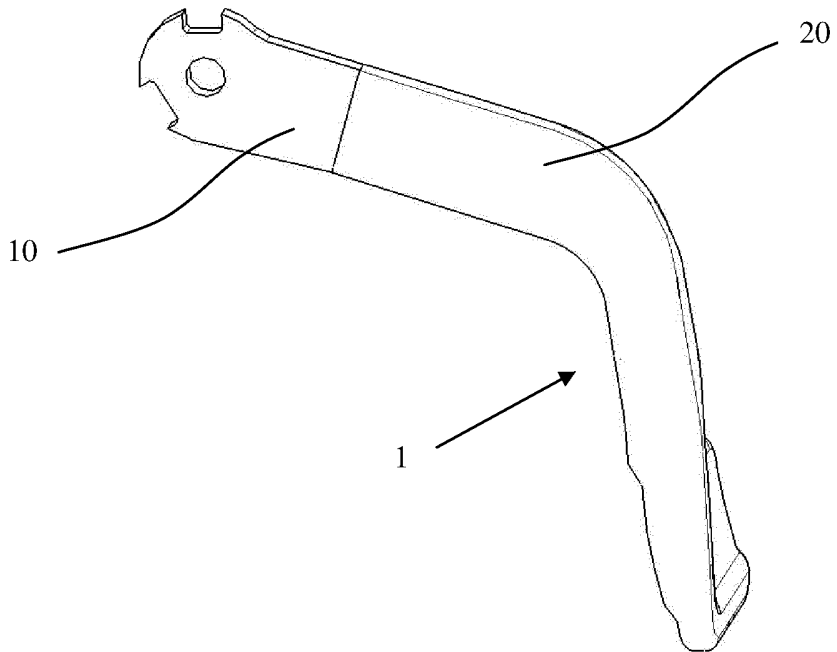


FIG 2

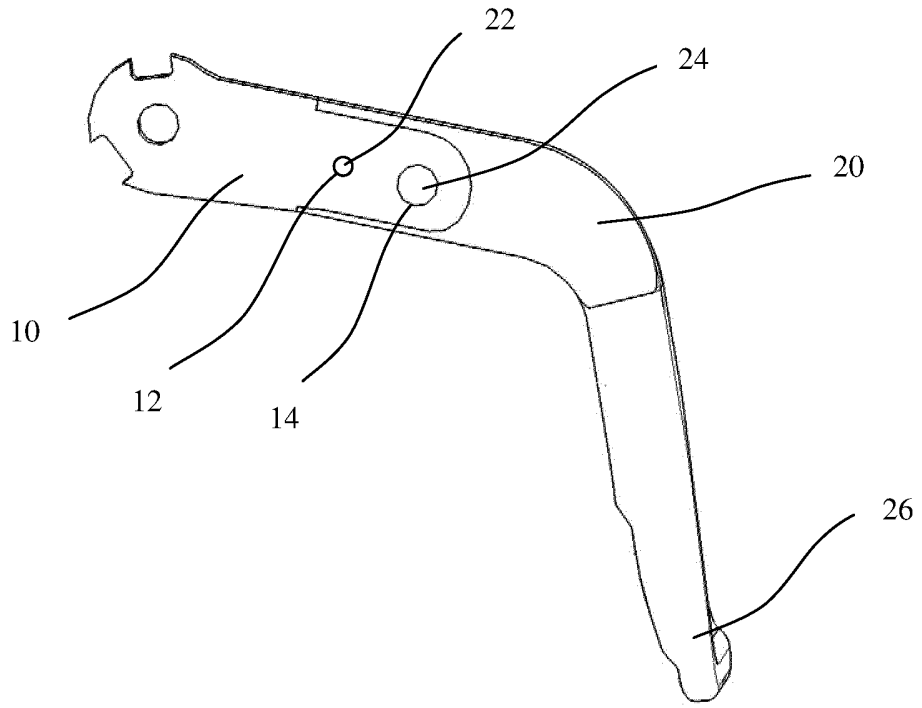


FIG 3

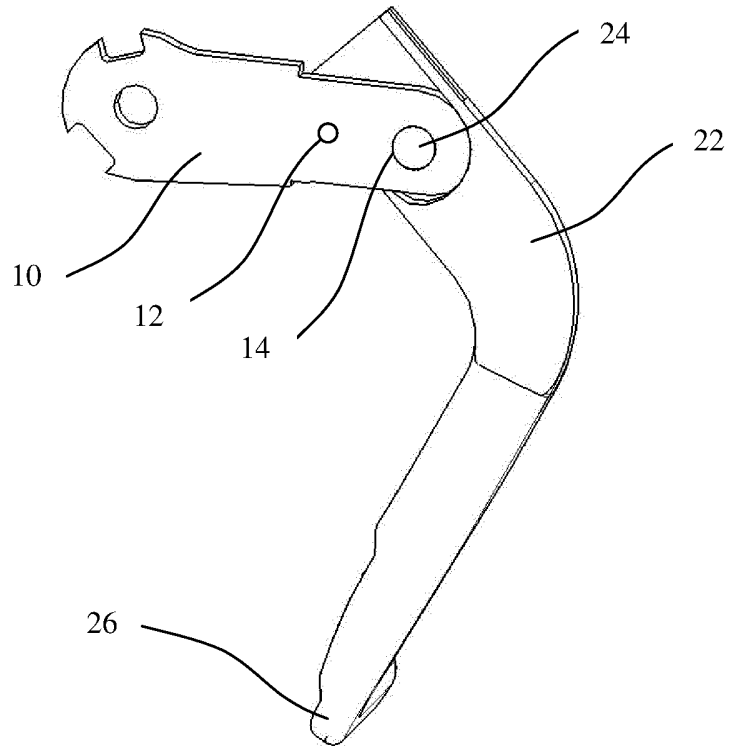


FIG 4