

(19) **DANMARK**



Patent- og
Varemærkestyrelsen

(10) **DK/EP 3216954 T3**

(12) Oversættelse af
europæisk patentskrift

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- (51) Int.Cl.: **E 05 B 67/00 (2006.01)** **B 62 H 5/00 (2006.01)** **E 05 B 71/00 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-01-25**
- (80) Dato for Den Europæiske Patentmyndigheds
bekendtgørelse om meddelelse af patentet: **2020-12-30**
- (86) Europæisk ansøgning nr.: **17157749.7**
- (86) Europæisk indleveringsdag: **2017-02-24**
- (87) Den europæiske ansøgnings publiceringsdag: **2017-09-13**
- (30) Prioritet: **2016-03-11 DE 102016104474**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV
MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
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- (54) Benævnelse: **KÆDELÅS**
- (56) Fremdragne publikationer:
DE-A1-102006 057 759
DE-A1-102009 039 156
DE-B3-102006 006 891
US-A- 1 511 119

Description

The present invention relates to a chain lock having at least one securing part and a chain which is permanently fastened to the securing part at one end.

- 5 Such a chain lock serves, for example, to secure bicycles or motorcycles against unauthorized use or against theft. The chain can be permanently fastened at the other end to a further securing part of the chain lock, with the securing parts being lockable to one another to form a closed loop. For this purpose, the chain lock can, for example, have a combination locking mechanism or a key-actuated locking mechanism.

10 A chain lock is known from the document DE 10 2009 039 156 A1 in which a chain is permanently fastened to a securing part (e.g. to a cylinder housing) at one end in that two fastening pins engage into a peripheral groove of a chain connector piece. This type of fastening has the advantage that the connector piece is connected to the securing part rotatable
15 about its longitudinal axis. This type of fastening, however, is also undesirably complex since it requires a high production precision (e.g. positioning of the fastening pins within the peripheral groove).

A simpler fastening is possible when a chain link is at least substantially rigidly fastened to the
20 associated securing part, in particular by a press fit (crimp connection). The problem, however, exists in this respect that the chain link may be able to be unscrewed from the securing part under certain circumstances by applying a high torque to the chain link relative to the securing part (for example, by means of a screwdriver inserted into the chain link).

25 A chain lock is known from the document DE 10 2006 057 759 A1 in which a crimp connection is provided between a bolt mandrel and a bolt body.

A chain lock having a securing part and a chain is disclosed in DE 10 2006 006 891 B3, said chain being permanently fastened to the securing part at one end, wherein the chain has a chain
30 end link having a narrowed longitudinal section which is inserted into a reception slot of the securing part and which is fixed there by means of a pin.

US 1 511 119 A discloses a tire lock which is fastened by means of a chain and an additional belt, wherein an end of the chain is received in a notch and is held by means of a pin.

It is the object of the invention to provide a chain lock in which an end of the chain is permanently fastened to an associated securing part in a simple, but nevertheless reliable manner.

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This object is satisfied by a chain lock having the features of claim 1 and in particular in that the chain has a chain end link having a fastening mandrel, wherein an introduction section of the fastening mandrel is inserted into a reception opening of the securing part; wherein the introduction section of the fastening mandrel has a prolongation having a non-circular cross-section at its end; and wherein the reception opening of the securing part has a reception section in which the prolongation of the fastening mandrel is received in an at least substantially shape-matched manner.

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The chain can have a plurality of chain links of which one is fixedly connected to the chain end link, in particular by mutual engagement. The chain end link can have an eyelet for this purpose to which the fastening mandrel is fixedly connected, with the eyelet and the fastening mandrel in particular being able to be formed integrally.

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The fastening mandrel can have an elongate and in particular straight-line shape. Provision is made for the permanent fastening of the chain end link to the securing part that an introduction section of the fastening mandrel is inserted into a reception opening of the securing part, wherein the final fixing of the fastening mandrel in the reception opening is possible in a variety of ways, for example by a radial pressing or crimping of the securing part in the environment of the reception opening, by driving in one or more fastening pins and/or by welding.

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In accordance with the invention, the introduction section of the fastening mandrel has a prolongation at its free end, in particular an integral extension section having a non-circular cross-section, wherein the reception opening of the associated securing part has an at least substantially shape-complementary reception section in which the prolongation of the fastening mandrel is received. The prolongation of the fastening mandrel and accordingly the reception section of the securing part can, for example, have a cross-section in the form of an elongate rectangle. The reception section can form the end of the reception opening. The reception

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section can be bounded by a base of the reception opening if it forms a blind hole in the securing part.

5 It is hereby achieved that the fastening mandrel received in the securing part is sufficiently reliably fixed against a violent rotation relative to the securing part, i.e. with respect to a torsion. A torque applied to the fastening mandrel from the outside can in particular be absorbed over the length of the fastening mandrel, with the final positional fixing of the fastening mandrel in the direction of rotation taking place at its tip, that is at said prolongation of the fastening mandrel which is arranged, unlike an eyelet of the chain end link projecting out
10 of the securing part, relatively deep within the securing part.

A "non-circular" cross-section of the prolongation of the fastening mandrel in this connection in particular means a polygonal cross-section, e.g. triangular, quadrilateral, pentagonal or hexagonal, with the connection lines between the corners of the cross-sectional shape being
15 able to be in a straight line or also curved. Provision can be made with a polygonal cross-section that the adjacent connection lines at each corner of the cross-sectional shape form an acute angle, a right angle or an obtuse angle from the view of the center of the cross-sectional shape (i.e. an angle $< 180^\circ$) such is the case, for example, with a triangle or a rectangle.

Provision can be made alternatively to this that the adjacent connection lines only form an
20 acute angle, a right angle or an obtuse angle with respect to one another (i.e. an angle $< 180^\circ$) at some corners and that the adjacent connection lines at different corners form a reflect angle with respect to one another (i.e. an angle $> 180^\circ$ and $< 360^\circ$). This is the case, for example, when the cross-section of the prolongation has the shape of a cross (torque transmission in the manner of a cross-recess screwdriver) or of a star.

25 The fact that the prolongation of the fastening mandrel should be received in the associated reception section of the securing part in an "at least substantially" shape-matched manner means that tolerances typical for the manufacture can be provided such as are in particular typically provided in castings, in particular when a cutting post-processing should not be
30 necessary in order nevertheless to ensure a problem-free connectability (joining) of the two parts. It is important that the reception section of the reception opening is formed complementary in cross-section to the non-circular base shape of the prolongation of the fastening mandrel.

The prolongation of the fastening mandrel has a different cross-section than the introduction section of the fastening mandrel. The prolongation of the fastening mandrel can hereby be adapted for an ideal force transmission or an ideal torque transmission in the reception section of the reception opening, while the introduction section of the fastening mandrel can be
5 configured for an insertion into the reception opening of the securing part that is particularly simple from a technical production aspect.

Advantageous embodiments of the invention are described in the dependent claims and in the following.

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In accordance with an embodiment, the introduction section of the fastening mandrel is not received in exactly a shape-matched manner in the reception opening of the securing part. This can be desirable from a technical production aspect to ensure a problem-free insertion of the fastening mandrel into the securing part. The same securing part can furthermore hereby also
15 be suitable for receiving other loop elements, for example when an identical securing part should be usable not only for a chain lock, but also for a cable lock in which a wire cable braid is inserted into the reception opening of the securing part and is fixed there. The introduction section of the fastening mandrel can in particular be received with larger tolerances in the reception opening of the securing part than the arrangement of the prolongation of the fastening
20 mandrel in the reception section of the reception opening. These features can in particular be with reference to an installation state of the chain lock before a pressing of the securing part for the purpose of a fixing of the fastening mandrel. After such a pressing (forming of a crimp connection), the cross-sectional shape of the fastening mandrel and/or of the reception opening can be modified with respect to the following explanations due to deformation.

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In accordance with a further embodiment, the introduction section of the fastening mandrel is held by a press fit, as already mentioned, in the reception opening of the securing part and is hereby fixed. A pressing or crimping of the securing part in the environment of the reception opening can be provided for this purpose in the radial direction with respect to a longitudinal
30 axis of the fastening mandrel, whereby the periphery of the securing part is reduced in the environment of the reception opening.

In accordance with a further embodiment, the prolongation of the fastening mandrel has a smaller cross-section than the introduction section of the fastening mandrel. The prolongation

provided at the tip of the fastening mandrel can thus form a tapered or flattened portion of the fastening mandrel.

In accordance with an embodiment, the prolongation of the fastening mandrel can have a cross-section which at least substantially has the shape of an elongate rectangle. The prolongation can hereby form a flattened portion. The long sides of the rectangular shape can, for example, be approximately twice as long as the short sides of the rectangular shape. As already mentioned, other cross-sectional shapes are, however, also possible, e.g. a triangle, a square, a cross or a star.

The reception section of the reception opening can accordingly also have at least substantially a rectangular cross-section in this embodiment. A particularly good force transmission or a particularly good torque transmission from the fastening mandrel over the prolongation to the peripheral boundary of the reception section of the reception openings is hereby possible.

The reception section preferably forms a constriction with respect to the reception opening.

In accordance with an embodiment, the introduction section of the fastening mandrel can have a quadratic cross-section. The transmission of a torque from the introduction section of the fastening mandrel to the peripheral boundary of the reception opening is hereby likewise possible.

It is furthermore preferred if the material of the fastening mandrel has a higher toughness than the material of the securing part. For example, the fastening mandrel can be formed from steel, while the securing part is formed from zinc die casting. A specific deformation of the fastening mandrel in the direction of rotation (torsion) over the length of introduction section is hereby possible on the application of a torque to the fastening mandrel, while the end of the introduction section – that is said prolongation – is held in a stable manner in the reception section of the securing part without the introduction section breaking off in this process.

In accordance with an embodiment, at least one fastening pin can be provided which engages partly into the securing part and partly into the fastening mandrel in a radial direction with respect to a longitudinal axis of the fastening mandrel. A further fixing of the fastening mandrel in the reception opening of the securing part can hereby be effected.

Said securing part of the chain lock can generally comprise a lock body; or a securing spigot which is lockable to a lock body; or a bolt which is lockable to a lock body. The securing part can in particular be a part of a combination lock or of a key-actuated lock. A securing spigot of such a chain lock can, for example, have a plurality of elevated portions and recesses adjacent hereto for a corresponding number of number rings of a combination locking mechanism. A bolt of such a chain lock can in particular have a thickened portion bounded by a peripheral groove for a key locking mechanism, with one or more locking balls selectively being able to engage into the peripheral groove, for example.

In accordance with an embodiment of the chain lock in accordance with the invention, it can also have a plurality of fastenings of the explained kind. The chain can in particular be permanently fastened at another end to a further securing part of the chain lock, wherein the chain has a further chain end link having a further fastening mandrel at the other end; wherein an introduction section of the further fastening mandrel is inserted into a reception opening of the further securing part; wherein the introduction section of the further fastening mandrel has a prolongation with a non-circular cross-section at its end; and wherein the reception opening of the further securing part has a reception section in which the prolongation of the further fastening mandrel is received in an at least substantially shape-matched manner. The one securing section can, for example, comprise a securing spigot or a bolt, wherein the other securing section comprises a lock body; and wherein the two securing sections are permanently, but flexibly connected to one another via the chain.

The invention will be described in the following only by way of example with reference to the drawings.

Fig. 1 shows two mutually engaging securing parts of a chain lock with a combination locking mechanism, with the chain not being shown;

Fig. 2 shows the two securing parts in accordance with Fig. 1, with a respective half of respective cover elements and the number rings of the combination locking mechanism being removed;

Fig. 3 shows the two securing parts in accordance with Fig. 2 in a longitudinal sectional view, with the sectional plane being arranged almost at the center;

Fig. 4 shows the arrangement in accordance with Fig. 2 in a perspective view of the rear side of one of the two securing parts with a view into a reception opening of this securing part: and

Fig. 5 shows a chain end link for fastening in one of the two securing parts in accordance with Fig. 1.

Figure 1 shows in a perspective view a securing part 11 and a further securing part 11' of which a respective cover element 13 and 13' can be recognized. Four number rings 15 of a combination locking mechanism can be seen between the two securing parts 11, 11'. The securing parts 11, 11' form parts of a chain lock whose further parts – in particular a chain with chain end links – are not shown in Figure 1.

The parts of the cover elements 13, 13' facing the observer and the number rings 15 have been removed in Figure 2. It can hereby be seen that the one securing part 11 comprises a securing spigot 17, while the further securing part 11' comprises a lock body 19 having a guide sleeve 21 for the securing spigot 17. The securing spigot 17 and the lock body 19 have a respective reception opening 23, 23' for fastening a respective chain end link.

It can be seen from the sectional view in accordance with Figure 3 that the reception openings 23, 23' have a longitudinal shape and open at their end into a respective reception section 25, 25' having a reduced cross-section. It can be seen from the perspective view in accordance with Figure 4 that the reception opening 23 has a constant quadrilateral cross-section having two parallel straight-line sides and two arcuate sides. It can furthermore be recognized from Figures 3 and 4 that the respective reception section 25, 25' has a substantially rectangular cross-section, wherein the cross-sectional shape has two parallel, straight-line sides which are, however, radially inwardly offset with respect to the straight-line sides of the cross-section of the respective reception opening 23, 23' such that the respective reception section 25, 25' forms a narrowed portion. The short sides of the rectangular shape of the respective reception section 25, 25' are arcuate.

An associated chain end link 31 is shown in Figure 5. The chain end link 31 has an eyelet 33 and a fastening mandrel 35. The fastening mandrel 35 extends in a straight line along a longitudinal axis L. The eyelet 33 and the fastening mandrel 35 have a quadratic cross-section. The fastening mandrel 35 has an introduction section 37 which is adjacent to the eyelet 33. The fastening mandrel 35 furthermore has a prolongation 39 at its free end that forms a step-shaped flattened portion with respect to the introduction section 37. The cross-section of the prolongation 39 has the shape of an elongate rectangle.

To permanently fasten a chain (not shown) to the securing part 11 or 11' in accordance with Fig. 1, the introduction section 37 of the fastening mandrel 35 of the chain link 31 in accordance with Figure 5 can be inserted into the reception opening 23, 23' of the securing part 11, 11'. The prolongation 39 in this respect engages into the reception section 25, 25' at the end of the respective reception opening 23, 23' in an at least substantially shape-matched manner, wherein the substantially rectangular prolongation 39 is surrounded by the peripheral boundary of the reception section 25, 25' without clearance or almost without clearance at least at the long sides of the rectangular shape. On the manufacture of the chain lock, a radial pressing of the securing part 11, 11' to the fastening mandrel 35 can still take place after the insertion of the fastening mandrel 35 into the respective reception opening 23, 23' to fix the chain end link 31 against a pulling out from the reception opening 23, 23' of the securing part 11, 11'.

It is achieved by the substantially shape-matched reception of the prolongation 39 – that is the tip of the fastening mandrel 35 – in the reception section 25, 25' at the end of the reception opening 23, 23' that the fastening mandrel 35 fixed in the securing part 11, 11' is also fixed against a violent rotation about its longitudinal axis L, i.e. with respect to a torsion, in order also to prevent the fastening mandrel 35 from being rotated within the reception opening 23, 23' on the application of high torques. It is in this respect a measure which is simple to implement from a technical production aspect, but which shows a sufficient effect.

Reference numeral list

11, 11'	securing part
13, 13'	cover element
15	number ring
17	securing spigot

	19	lock body
	21	guide sleeve
	23, 23'	reception opening
	25, 25'	reception section
5	31	chain end link
	33	sleeve
	35	fastening mandrel
	37	introduction section
	39	prolongation
10	L	longitudinal axis

Patentkrav

1. Kædelås med mindst en sikringsdel (11) og en kæde, som i én ende er permanent fastgjort til sikringsdelen (11), hvor kæden har et kædeendeled (31) med en fastgørelsesdorn (35), hvor et indføringsafsnit (37) af fastgørelsesdornen (35) er indført i en modtageåbning (23) på
5 sikringsdelen (11), hvor indføringsafsnittet (37) af fastgørelsesdornen (35) for enden har et fremspring (39) med et ikke-cirkekrundt tværsnit, hvor fremspringet (39) af fastgørelsesdornen (35) har et andet tværsnit end indføringsafsnittet (37) af fastgørelsesdornen (35), og hvor modtageåbningen (23) på sikringsdelen (11) har et modtageafsnit (25), i hvilket fremspringet (39) af fastgørelsesdornen (35) i det mindste i det væsentlige optages formluttende.
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2. Kædelås ifølge krav 1,
hvor indføringsafsnittet (37) af fastgørelsesdornen (35) ikke optages på præcis formluttende måde i modtageåbningen (23) på sikringsdelen (11).
- 15 3. Kædelås ifølge krav 1 eller 2,
hvor indføringsafsnittet (37) af fastgørelsesdornen (35) holdes ved hjælp af en prespasning i modtageåbningen (23) på sikringsdelen (11).
4. Kædelås ifølge et af de foregående krav,
20 hvor fremspringet (39) af fastgørelsesdornen (35) har et mindre tværsnit end indføringsafsnittet (37) af fastgørelsesdornen (35).
5. Kædelås ifølge et af de foregående krav,
hvor fremspringet (39) af fastgørelsesdornen (35) har et tværsnit, som i det mindste i det
25 væsentlige har form af et aflangt rektangel.
6. Kædelås ifølge et af de foregående krav,
hvor indføringsafsnittet (37) af fastgørelsesdornen (35) har et kvadratisk tværsnit.
- 30 7. Kædelås ifølge et af de foregående krav,
hvor fastgørelsesdornens (35) materiale har en større sejhed end sikringsdelens (11) materiale.

8. Kædelås ifølge et af de foregående krav,

hvor der er tilvejebragt mindst en fastgørelsesstift, som delvist griber ind i sikringsdelen (11) og delvist i fastgørelsesdornen (35) i radial retning i forhold til en længdeakse (L) af fastgørelsesdornen (35).

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9. Kædelås ifølge et af de foregående krav,

idet sikringsdelen (11) omfatter:

et låselegeme (19);

en sikringstap (17), som kan låses på et låselegeme (19); eller

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en bolt, som kan låses på et låselegeme

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10. Kædelås ifølge et af de foregående krav,

hvor kæden i en anden ende er permanent fastgjort til en yderligere sikringsdel (11), hvor kæden i den anden ende har et yderligere kædeendeled (31) med en yderligere fastgørelsesdorn (35), hvor et indføringsafsnit (37) af den yderligere fastgørelsesdorn (35) er indført i en modtageåbning (23) på den yderligere sikringsdel (11), hvor indføringsafsnittet (37) af den yderligere fastgørelsesdorn (35) for enden har et fremspring (39) med et ikke-cirkekrundt tværsnit, og hvor modtageåbningen (23') af den yderligere sikringsdel (11) har et modtageafsnit (25'), i hvilket fremspringet (39) af den yderligere fastgørelsesdorn (35) i det mindste i det væsentlige optages formluttende.

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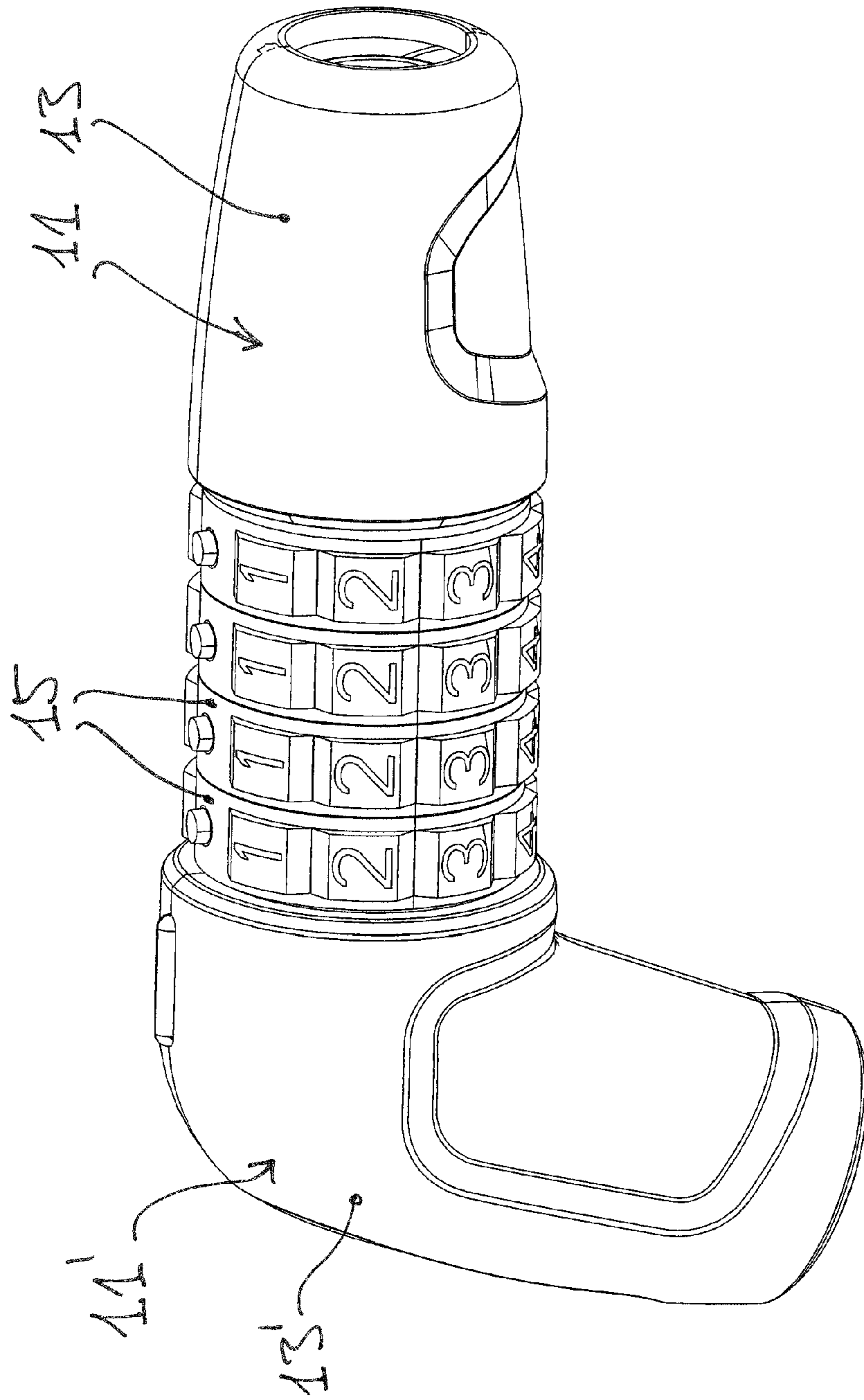


Fig. 1

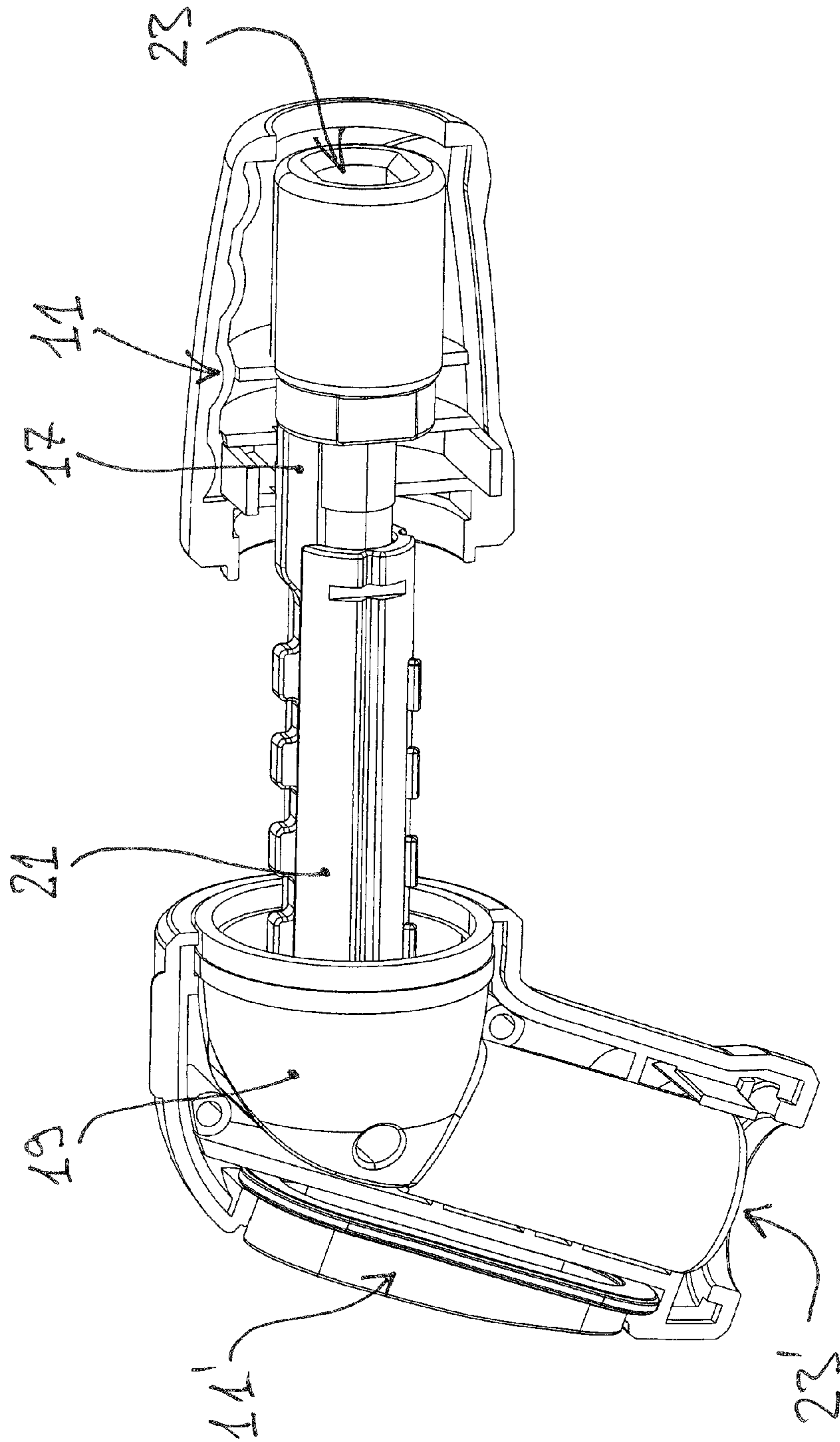


Fig. 2

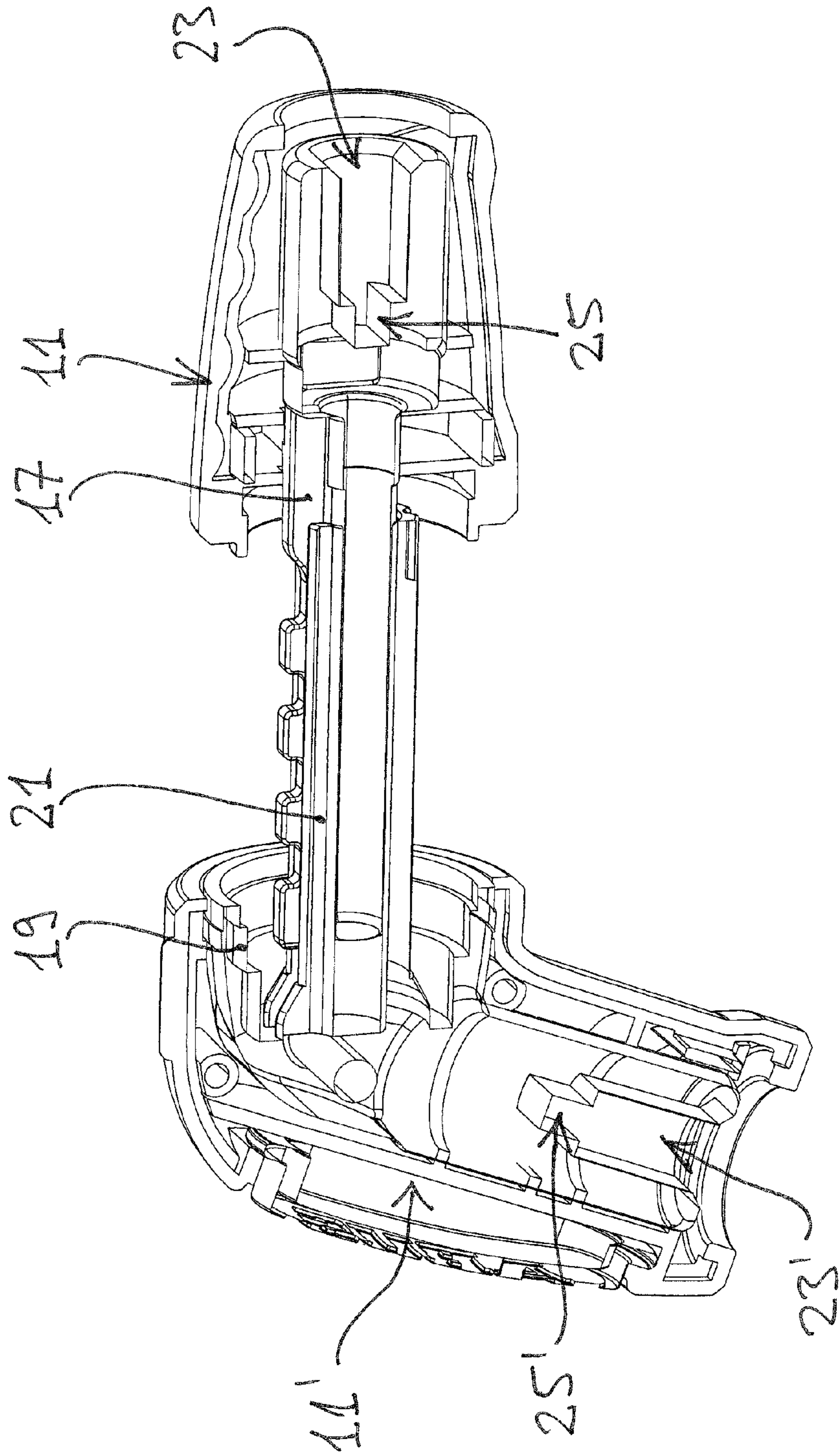


Fig. 3

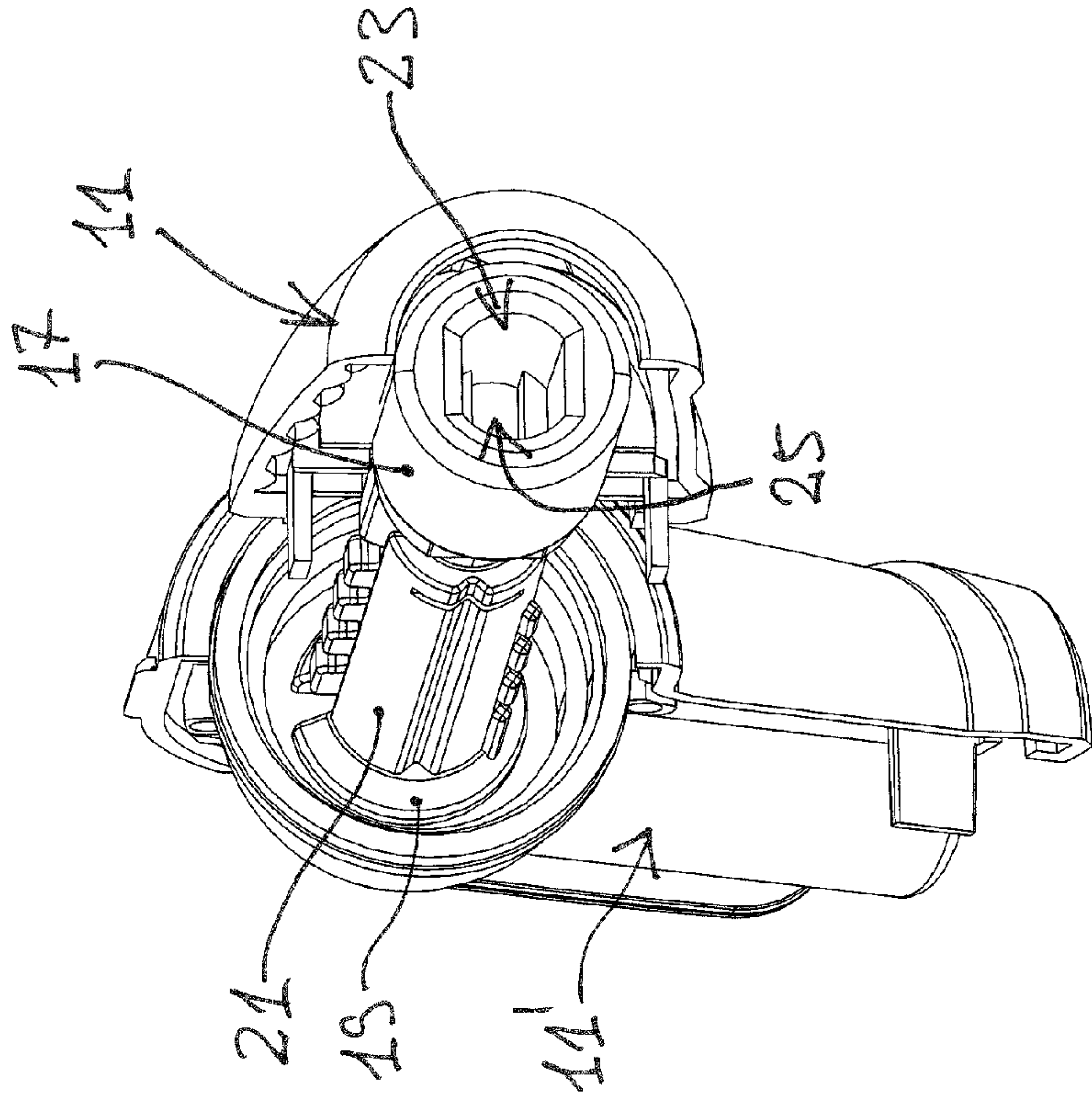


Fig. 4

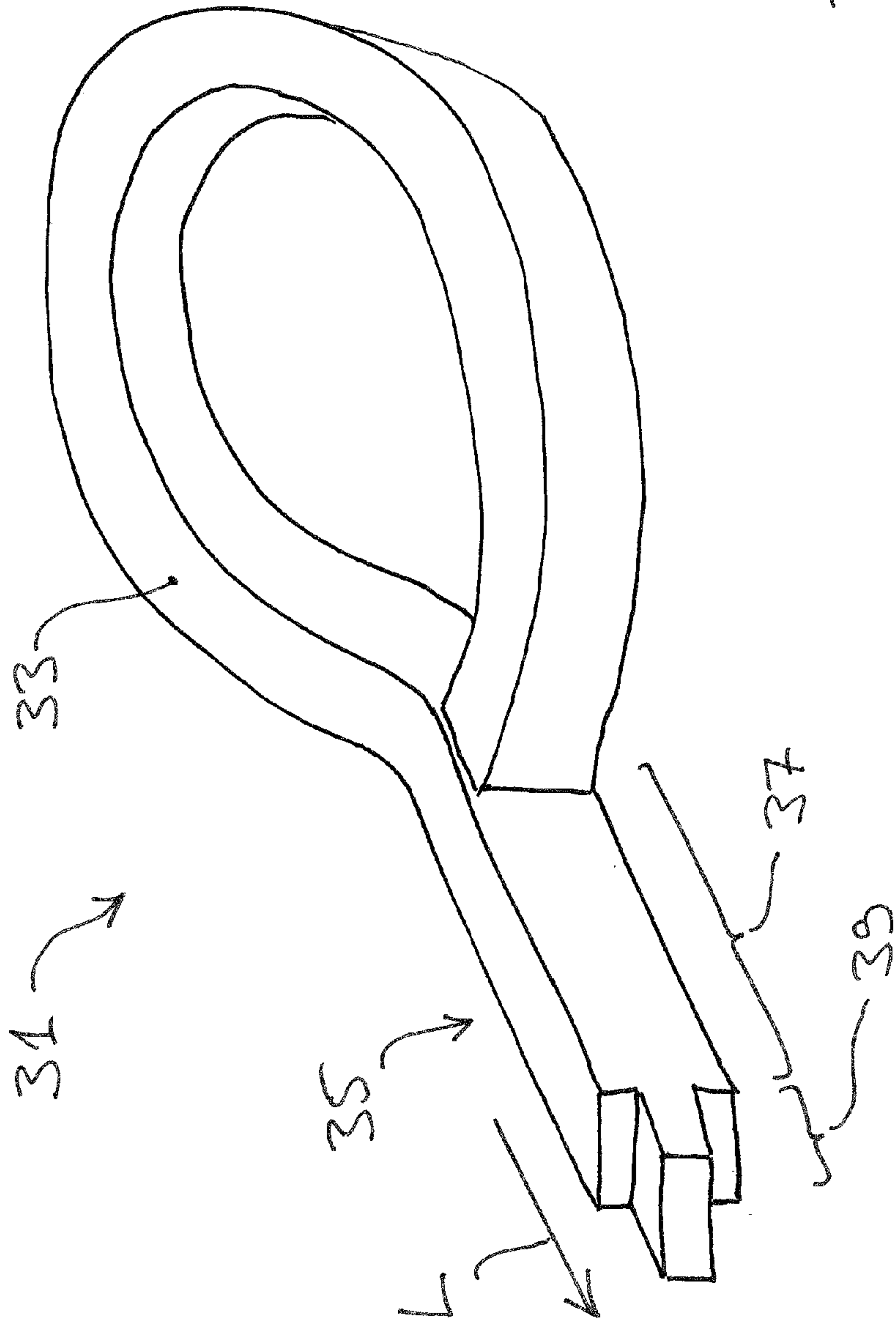


Fig. 5