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

(11) EP 2 420 388 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.07.2013 Bulletin 2013/29

(51) Int Cl.:
B44D 3/38 *(2006.01)* ***B65H 75/44*** *(2006.01)*
B65H 75/40 *(2006.01)*

(21) Application number: **10173271.7**

(22) Date of filing: **18.08.2010**

(54) **A chalk line device with means for preventing chalk line breakage**

Kreidelinienvorrichtung mit einer Vorrichtung zum Verhindern von Schnurbruch

Dispositif de cordeau traceur ayant un mécanisme pour prévenir la rupture du cordeau

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

(43) Date of publication of application:
22.02.2012 Bulletin 2012/08

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EP 2 420 388 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the Invention

[0001] The present invention relates to a chalk line device comprising a retracting device which is linked to a spool via a set of gears. A chalk line is attached to said spool and may either be coiled onto said spool or uncoiled from said spool.

Technical Background

[0002] Chalk lines are widely used during building construction for marking lines on floors, walls and the like. For example, it can be used where cuts shall be made or where cabinets, shelves and other built-in furnishings are to be installed. A chalk line is wound on a reel or spool and coated with dry chalk. The free end of the chalk line is held at a predetermined location and the chalk line is stretched to the opposite end of a line to be marked. The ends of the chalk line are placed against the surface to be marked and the length of the chalk line there between is stretched taut. The center of the chalk line is then drawn outwardly from that surface and released. The resiliency of the chalk line causes the line to rebound against the surface to be marked, thereby causing a linear chalk marking to be formed upon a wall or floor.

[0003] US2006/0144985 relates to chalk line device having a helical gear and an improved locking assembly. The locking assembly comprises a first lock member having a lock button. The locking assembly also comprises a second lock member including an opening to lockingly engage the first lock member and having a plurality of teeth at one end disposed adjacent one of the helical gears used in this embodiment. The second lock member engages with the helical gear in response to a movement of the lock button member.

[0004] Sometimes when rewinding the chalk line the chalk line get caught and may break. The same may happen if someone trips over the chalk line during use. The chalk line then has to be replaced or fixed. Hence there is a need for a device which prevents the chalk line to break.

Summary of the Invention

[0005] The object of the present invention is to provide a chalk line that overcomes the above issues.

[0006] The invention is based on the insight that by, at least temporarily, disconnecting a force transmission to the chalk line, it is possible to prevent the chalk line from breaking.

[0007] The invention relates to a chalk line device comprising a retracting device which is linked to a spool via a set of gears, a chalk line which is attached to said spool and which may either be coiled onto said spool or uncoiled from said spool. The retracting device is a rotatable crank. Said set of gears and said spool being rotatably disposed inside a housing to rewind the uncoiled chalk line when said retracting device transmits a force onto said spool via said set of gears. When said spool is exposed to a torque which exceeds a threshold value at least one force transmitting link between said retracting device and said spool disconnects and reconnects, and the disconnection and reconnection continues until a user stops rotating the crank. An arrangement like this prevents that the chalk line breaks when the torque gets to high, for example if the chalk line get stuck somewhere when rewinding the chalk line onto the spool, or if someone trips over the chalk line during use. Instead of the chalk line breaking, the chalk line device reacts when the torque reaches a threshold value by disconnecting at least one force transmitting link between two parts in the chain between the retraction device and the spool. A force transmitting link may be a connection or an engagement between two parts where a force is transmitted during rewinding the chalk line. For example, such a connection/engagement can be between the retracting device and the set of gears, between two gears in the set of gears, between the set of gears and the spool or anywhere were it is possible to disconnect two parts in order to disconnect the links between the retraction device and the spool. This can be done in several ways. For example, the set of gears may be designed in such a way that at least two connected meshing gears separate from each other when the torque exceeds the threshold value. If the link to be disconnected is between the retracting device and the set of gears, the connection can be a mutually matching engagement accomplished by mutually matching teeth where the teeth are so design that when the torque exceeds its threshold value the mutually matching teeth connection separates from each other and/or separates and connects by turns. Another alternative is that the retracting device or the set of gears may have thin wings/protrusions/flat springs which are in a force transmitting engagement/connection with the other part, i.e. the set of gears or retracting device. The thin protrusion may then be so designed that it snaps over the contact area of the other part when the torque exceeds the threshold value. For example, if the thin protrusion is arranged on the retracting device and the set of gears has at least one surface which connects with the thin protrusion. When said retracting device is rotated in order to rewind the chalk line onto the spool, the thin protrusion pushes the set of gears in a rotational movement. When the torque exceeds the threshold value, the thin protrusion bends, due to its design, and it pass the engagement surface, i.e. the retracting device and the set of gears disconnects. However, this could also be the done the other way around, i.e. the thin protrusion could be on the set of gears.

[0008] According to at least one exemplary embodiment said retracting device comprises a drive shaft which comprises at least a first connection part, which connects said retracting device to said set of gears, said set of gears comprises a mutually matching second connection

part adapted to connect with said first connection part of said drive shaft, wherein said force transmitting link, which is disconnectable, is between said drive shaft and said set of gears. By having the disconnectable force transmitting link between the drive shaft and the set of gears, which is arranged in the housing, said force transmitting link may also be arranged inside the housing and may therefore be protected from the outside environment i.e. dirt and handling of the chalk line device during use, storing and transportation.

[0009] According to at least one exemplary embodiment said first connection part of said drive shaft comprises at least one protrusion which protrudes perpendicular to a centre axis of said drive shaft and said mutually matching second connection part of said set of gears comprises at least one protrusion receiving part into which said protrusion of said drive shaft at least partly fits or matches. This is an easy way, i.e. easy connection, to transmit the force from the retracting device to the set of gears. It is also easy to manufacture and to assemble. One part may be fitted into the other, i.e. the protrusion into the mutually matching protrusion receiving part which may be a free space, in the area of connection, in the set of gears. As an alternative the protrusion may protrude in an angle which is not perpendicular to the centre axis, i.e. an angle which is larger or smaller than 90° or they may protrude in the direction of the centre axis of the drive shaft.

[0010] According to at least one exemplary embodiment said protrusion of said first connection part of said drive shaft comprises a first guiding means, and said second connection part comprises mutually matching first guiding elements to said first guiding means, and when said torque exceeds said threshold value said first guiding means and said first guiding element guides said drive shaft and said set of gears to move from their connected position to a disconnected position. By letting the drive shaft and the receiving part have guiding means and elements which are mutually matching, extra parts may not be needed to accomplish the disconnection.

[0011] According to at least one exemplary embodiment said protrusion of said first connection part of said drive shaft comprises a second guiding means, and said second connection part of said set of gears, comprises a mutual matching second guiding element to said second guiding means, wherein said second guiding means and said second guiding elements guides said drive shaft and said set of gears back from their disconnected position to a connected position. By letting the drive shaft and the receiving part have guiding means and elements which are mutually matching, extra parts may not be needed to accomplish a connection again between the drive shaft and the set of gears.

[0012] According to at least one exemplary embodiment said first guiding means and first guiding element each comprise an inclined surface on said protrusion and on said protrusion receiving part. Inclined surfaces are easy to manufacture and easy to control. The threshold value of the torque may be determined by the friction between the two inclined surfaces and the inclination of the inclined surfaces.

[0013] According to at least one exemplary embodiment said second guiding means and second guiding elements each comprise an inclined surface on said protrusion and on said protrusion receiving part.

[0014] According to at least one exemplary embodiment said chalk line device further comprises a spring, which is arranged in connection with said drive shaft in such a way that said spring keeps said drive shaft in connection with said set of gears when said torque is below said threshold value. Depending on the design of the chalk line device and the design of the disconnectable link between the drive shaft and set of gears it might be desirable to, in some kind of way, hold the two parts in a connected state. Using a spring is an easy and effective way, since a spring is flexible and can be compressed or stretched when the two parts disconnects. The threshold value of the torque may also be determined by the spring force of the spring. It should be understood that a spring may also be used for embodiments in which said disconnectable force transmitted link is located elsewhere.

[0015] According to at least one exemplary embodiment said spring is compressed when said drive shaft and said set of gears are disconnected and said spring forces said drive shaft and said set off gears back to a connected position together with said second guiding means and second guiding elements. The spring will use its spring force to push the drive shaft and the set of gears back to a connected position. Instead of using a complicated mechanism this may be done automatically by using the spring force.

[0016] According to at least one exemplary embodiment said spring is a coil spring. The coil spring may be a simple coil spring off the shelf which is very cost effective or it may be a specially adapted spring. As an alternative a folded flat spring may be used.

[0017] According to at least one exemplary embodiment said set of gears comprises an internal gear, to which said retracting device is linked, and an external gear, encircled by and in meshed contact with said internal gear, said external gear being linked to said spool. If the retraction device is connected to an internal gear which encircles an external gear, which obvious is smaller than the internal gear, the external gear will rotate faster than the internal gear, i.e. the spool will rotate faster than the retraction device when rewinding the chalk line onto the spool. That is, the set of gears of this kind accomplishes that the rewinding of the chalk line onto the spool is faster than it would be without this kind of set of gears.

[0018] According to at least one exemplary embodiment said threshold value of said torque is defined by the friction and/or the inclination between said inclined surfaces of the first guiding means and first guiding element.

[0019] According to at least one exemplary embodi-

ment said threshold value of said torque is further defined by the spring force of said spring.

[0020] According to at least one exemplary embodiment when said torque exceeds said threshold value, said protrusion of said first connection part disconnects from said protrusion receiving part and due to further exposure of said torque, said protrusion connects with said protrusion receiving part again or another adjacent protrusion receiving part. Due to rotational movement of the drive shaft or the set of gears the parts will disconnects and connects again. The protrusion of the first connection part of the drive shaft disconnects from the protrusion receiving part of the second connection part. Due to the design and due to rotation of the two parts, i.e. the drive shaft and set of gears, the protrusion either connects the same protrusion receiving part again or an adjacent arranged protrusion receiving part. If the drive shaft has only one protrusion, the set of gears may have either one or several protrusion receiving parts. If it only has one protrusion receiving part, the protrusion will connect the same protrusion receiving part. If the set of gears has several protrusion receiving parts, the protrusion will connect the adjacent, in the rotation direction, arranged protrusion receiving part. If the drive shaft has several protrusions and the set of gears has the same number of protrusion receiving parts, the protrusions will jump/slip over to the next adjacent protrusion receiving part which is arranged in the rotation direction.

[0021] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise.

[0022] Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, as well as from the drawings.

Brief Description of the Drawings

[0023] The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of exemplary embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Fig. 1 shows a chalk line device according to an embodiment of the invention in an exploded perspective view.

Fig. 2 shows the chalk line device in Fig. 1 in a cross-sectional view in perspective.

Fig. 3a - Fig. 3d shows the connection between the drive shaft and the set of gears in the chalk line device in Fig. 1 according to the invention in more detail. However, with more connection parts and receiving parts in order to illustrate the principle more clearly.

Fig. 4 shows a second embodiment in a perspective view of the connection between the drive shaft and the set of gears in the chalk line device in Fig. 1.

Detailed Description of Exemplary Embodiments

[0024] An embodiment of the invention will be described in more detail in the following with reference to the accompanying drawings.

[0025] Fig. 1 and Fig. 2 will be described together for a better understanding. The same numbers are used for the same features. Fig. 1 and Fig. 2 show a chalk line device 1 comprising a housing 2a, 2b with a top part 2a and a bottom part 2b. The two parts are connected to each other by fastening means, here in shape of screws 3. A retracting device 5 is linked to a spool 4 via a set of gears 9. The spool 4 is mounted inside the housing 2a, 2b for rotation and for retaining a chalk line (not shown). The chalk line has opposite ends. One end is secured to the spool 4 in a conventional manner. The other end of the chalk line emanates from the housing 2a, 2b through the chalk line aperture 10. The chalk line may either be coiled onto the spool 4 or uncoiled from the spool 4. The housing 2a, 2b also has the function to make up the chalk cavity, i.e. where the chalk is stored during use.

[0026] A retracting device 5, here exemplified as a crank 5 for rewinding said chalk line onto to the spool 4, is arranged onto the chalk line device 1 via a drive shaft 6 protruding through the top part 2a of the housing 2a, 2b into the cavity of the housing 2a, 2b. The drive shaft 6 is releasably connected to the set of gears 9, which is arranged inside the housing. The set of gears 9 connects the crank 5 to the spool 4 in such a way that when the crank 5 is rotated, the spool 4 is also rotated, however it rotates faster than the crank 5 due to the design of the set of gears 9. The set of gears 9 comprises an internal gear 11 and an external gear 12. The internal gear 11 is connected to the crank 5. The internal gear 11 encircles the external gear 12, here exemplified as a spur gear 12. The external teeth of the spur gear 12 reside in meshed engagement with the internal teeth 17 of the internal gear 11. At its axial centre the spool 4 is formed with an axial aperture of square cross section 28 (See Fig. 2) with a cylindrical opening 8 adapted to receive a central, square portion 13 of the spur gear 12. Hence, when the crank 5 is rotated, i.e. it transmits a force, it rotates the internal gear 11 with the same speed. The internal gear 11 rotates the spur gear 12, which due to the construction, i.e. that the internal gear 11 has more teeth than the spur gear 12, the spur gear 12 rotates faster that the internal gear 11 and the spur gear 12 will then rotate the spool 4.

[0027] The drive shaft 6 is, as said above, releasably connected to the set of gears 9 by being in releasable connection with the internal gear 11. The connection is established by mutually mating portions on the drive shaft 6 and on the internal gear 11 which will now be closer

described (see fig. 1). The drive shaft 6 is here exemplified as a cylindrical shaft which on its upper end (not shown in fig. 1) is connected to the crank 5 by a pivot shaft 7. The drive shaft 6 is not limited to be cylindrical, it may have any suitable shape. The drive shaft comprises a connection part 33 at its lower end. The connection part 33 comprises a flange 15, which is protruding from the end portion of the lower part 14 of the drive shaft 6 and several protrusions 18 protruding perpendicular to the centre axis (not shown) of the drive shaft 6 and from the flange 15 towards the upper end of the shaft and they are uniformly circumferentially arranged around the cylindrical shaft. Each protrusion 18 comprises a first guiding means 29 and a second guiding means 26 here exemplified as slanted surfaces.

[0028] The internal gear 11 has a base 16 from which the teeth 17 of the internal gear 11 protrudes. In the centre point of the internal gear 11 is an aperture 19 arranged for receiving the drive shaft 6. The aperture 19 is so large and a has a suitable shape so that the drive shaft 6 may protrude, when arranging the upper end into the aperture from the gear part side of the internal gear 11 without the flange 15 and the protrusions 18 of the drive shaft 6 passing through the aperture 19, i.e. the internal gear 11 is supported by the flange and the protrusions 18 from underneath. The internal gear comprises a connection part 20, 31 which is adapted to receive the connection part 33 of the drive shaft 6, i.e. the protrusions 18 of the drive shaft 6. The connection part 20, 31 of the internal gear 11 is a protrusion receiving part 31, i.e. to receive the protrusions 18 of said drive shaft 6. The protrusion receiving part 31 is exemplified as the space between several protrusions 20, uniformly arranged around the aperture 19 and at the same diameter as the protrusions 18 of the drive shaft 6. The number of protrusions 20 and the distance between the protrusions 20 are adapted to the number and width of the protrusions 18 on the drive shaft 6. The protrusions 18 of the drive shaft shall match or at least fit into the space created between the protrusions 20 of the internal gear 11. The protrusions 20 of the internal gear 11 protrudes in the same direction as the teeth 17 of the internal gear 11, and said space 31 created between the protrusions creates the receiving function. However, this is not a limited design. For example, the base 16 may be so thick that recesses may be arranged in it in order to make a receiving space for the protrusions 18 of the drive shaft 6. The protrusions 20, i.e. the space 31 comprises a first guiding element 27 and a second guiding element 30 which are mutually matching to said first guiding means 29 and said second guiding means 26 of the drive shaft 4. The first guiding element 27 and the second guiding element 30 are slanted surfaces.

[0029] Due to this design the protrusions 18 of the drive shaft 6 fits between the protrusions 20 in a meshing engagement/connection which is established when the drive shaft 6 is arranged in the aperture 19 of the internal gear 11 in such a way that the internal gear 11 is arranged between the protrusions 18 of the drive shaft 6 and the top part 2a of the housing.

[0030] The drive shaft 6 is further in its lower end formed with a central cavity 22 for accommodating a compression spring 23, for example a coil spring which extends downwardly and is seated in a spring holding arrangement 24, which is part of a circular cover 25 which encloses at least partly the set of gears 9 in order to avoid chalk in the set of gears 9.

[0031] The spring holding arrangement 24 is a circular protruding portion wherein the spring 23 is seated. Hence, the spring 23 is sandwiched between the drive shaft 6 and the spring holding arrangement 24. When the drive shaft 6 is connected to the internal gear the compression spring is under pressure in order to hold the connected position. The cover 25 is arranged between the set of gears 9 and the spool 4 and it is fixed arranged by screws 32 to the top part 2a of the housing. The spring holding arrangement 24 and the cover 25 is not limited to the described design. It may have any suitable design and be attached in any suitable way.

[0032] When the crank 5 is being rotated in order to rewind the chalk line, the drive shaft 6 will rotate, i.e. transmit a force on the internal gear 11 through the connection described above. The spur gear 12, which is arranged at a predetermined distance from the centre axis of the internal gear 11 and in meshing contact with the teeth 17 of the internal gear 11 will rotate when the internal gear 11 rotates, i.e. the internal gear 11 transmits the force to the external gear 12, which transmit the force further to the spool, which will rotate due to their connection wherein the chalk lines is rewounded i.e. coiled up.

[0033] If the chalk line gets caught when rewinding the chalk line the drive shaft 6 disconnects from the internal gear 11. This will be further explained in connection to Fig. 3a - Fig. 3d.

[0034] Fig. 3a shows the drive shaft 6 in connection with the internal gear 11. The compression spring 23 is sandwiched between the drive shaft 6 and the spring holding arrangement 24 (only partly shown) and is under pressure to hold the drive shaft and the internal gear in a connected state. The spring is, as described above, arranged in a central cavity (not shown) and attached in a suitable manner. It may however be loosely fitted inside the cavity so that the spring can the move, i.e. rotate.

[0035] Fig. 3b and Fig. 3c show how the drive shaft 6 disconnects from the internal gear 11. When the chalk line is being rewinded by the crank and if the chalk line gets caught during rewinding, the rewinding force increases. When the spool is exposed to a torque which exceeds a threshold value the force transmitting link between the drive shaft 6 and the internal gear 11 disconnects. The threshold value of the torque is here determined by the spring, i.e. the spring force and the inclination of and the friction force between the slanted surfaces 29 of the protrusions 18 and the slanted surfaces 27 of the internal gear 11. The protrusions 18 with their slanted surfaces 29, i.e. first guiding means 29 starts to slide on

the adjacent slanted surfaces 27 i.e. first guiding elements 27 of the protrusions 20 of the internal gear 11, simultaneously as the spring is being compressed (see Fig. 3b) between the drive shaft 6 and the spring holding arrangement. Fig. 3c shows when the protrusions 18 of the drive shaft 6 are totally disconnected from the internal gear 11. The drive shaft 6 has been moved from a connected position with the internal gear 11 to a disconnected position. When and if the user continues trying to rewind the chalk line the drive shaft 6 goes back again to the connected position. The spring is in this disconnected position in a compressed state.

[0036] Fig. 3d shows this, i.e. what happens when the user of the chalk line device further rotates the crank in Fig. 1 and 2. The protrusions 18 of the drive shaft 6 will connect the internal gear 11 again, however an adjacent lying protrusion receiving part 33 (se fig. 2) due to the second slanted surface 26 i.e. second guiding means 26 starts to slide on the adjacent slanted surfaces 30 i.e. second guiding element 30 and due to compressed spring 13 which wants to go back to its relaxed state. The connection and disconnection procedure continues until the user stops rotating the crank.

[0037] Due to this disconnecting/connecting procedure the spool 4 will stop rewinding the caught chalk line and thereby avoiding breakage of the chalk line. Further the user will hear an indicating sound from the chalk line device 1 when it continues to disconnect and connect again until he stops rotating the crank 5.

[0038] The corresponding when the chalk line is in use, i.e. drawn out and someone stumble over the chalk line. The crank 5 is then usually kept in a locked position (see fig. 2), i.e. it cannot rotate. Consequently, the drive shaft is also locked and it is in a connected position with the internal gear 11. If someone pull the chalk line and if the torque exceeds the threshold value, the spring starts to get compressed, the protrusions 20 with its slanted surfaces starts to slide on the adjacent slanted surfaces of the protrusions 18 of the drive shaft 6, simultaneously as the spring is being compressed (see Fig. 3b and Fig. 3c) as described above. The internal gear 11 moves from a connected position with the drive shaft 6 to a disconnected position. When and if the pulling continues the protrusions 20 of the internal gear 11 will connect the drive shaft 6 again due to that the slanted surface starts to slide on the adjacent slanted surfaces and due to the compressed spring which wants to go back to its first connected state as described above. The connection and disconnection procedure continues until the pulling stops.

[0039] When the chalk line is being drawn out, i.e. when it shall be used, the crank 5 is either in its locked position as shown in Fig. 2 or in a rewinding position (not shown) i.e. pivoted upwards from its locked position. When the crank 5 is in its locked position (which is the normal position) and the chalk line is being drawn out, the spool 4 and the spur gear 12 rotates the internal gear 11 and since the crank 5 is locked the drive shaft 6 is also locked. When the torque exceedes the threshold value, the same happens as explained above.

[0040] However, mostly the user presses the drive shaft downwards, i.e. against the spring so that the drive shaft is in a disconnected position while the chalk line is being pulled out. When the user release the drive shaft the drive shaft connects the set of gears again and the disconnection mechanism as described above can be used.

[0041] Fig. 4 shows a second embodiment of the connection/link between drive shaft 6 and the internal gear 11. The drive shaft 6 comprises thin protrusions 118 which are protruding perpendicular to the central axis (not shown) of the drive shaft. The internal gear 11 of the set of gears has a receiving part 120, 130, comprising a protruding part 120 with spaces 130 for receiving the thin protrusions 118. Each space 130 has a surface 135 which one thin protrusion 118 connects with. When the retracting device is rotated, in order to rewind the chalk line onto the spool, the thin protrusions 118 push the internal gear 11 due to the connection between the protrusions 118 and the surface 135 in a rotational movement. When the torque exceeds the threshold value, the thin protrusions 118 bend, due to its design, and they pass the engagement surface 130. Hence, the retracting device and the internal gear 11 disconnects until the thin protrusions 118 reach the next space, where they connects again.

[0042] The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

Claims

1. A chalk line device (1) comprising a spool (4), a set of gears (9),
a retracting device (5) which is linked to said spool (4) via said set of gears (9), wherein said retracting device is a rotatable crank,
a chalk line which is attached to said spool (4) and which may either be coiled onto said spool (4) or uncoiled from said spool (4),
said set of gears (9) and said spool (4) being rotatably disposed inside a housing (2a, 2b) to rewind the uncoiled chalk line when said retracting device (5) transmits a force onto said spool (4) via said set of gears (9)
characterized in that
when said spool (4) is exposed to a torque which exceeds a threshold value at least one force transmitting link between said retracting device (5) and said spool (4) disconnects and reconnects, and the disconnection and reconnection procedure continues until a user stops rotating said crank.

2. A chalk line device (1) according to claim 1, wherein said retracting device (5) comprises a drive shaft (6) which comprises at least a first connection part (33), which connects said retracting device (5) to said set of gears (9),
said set of gears (9) comprises a mutually matching second connection part (20, 31) adapted to connect with said connection part (33) of said drive shaft (6), wherein said force transmitting link, which is disconnectable, is between said drive shaft and said set of gears.

3. A chalk line device (1) according to claim 2, wherein said first connection part (33) of said drive shaft (6) comprises at least one protrusion (18) which protrudes perpendicular to a centre axis of said drive shaft (6) and said mutually matching second connection part (20, 31) of said set of gears comprises at least one protrusion receiving part (31) into which said protrusion (18) of said drive shaft (6) at least partly fits or matches.

4. A chalk line device (1) according to claim 3, wherein said protrusion (18) of said first connection part (33) of said drive shaft (4) comprises a first guiding means (29), and
said receiving part (20, 31) comprises mutually matching first guiding elements (27) to said first guiding means (29), and
when said torque exceeds said threshold value said first guiding means (29) and said first guiding element (27) guides said drive shaft (6) and said set of gears (9) to move from their connected position to a disconnected position.

5. A chalk line device (1) according to claim 4, wherein said protrusion (18) of said first connection part (33) of said drive shaft (6) comprises a second guiding means (26), and
said second connection part (20, 31) of said set of gears (9), comprises a mutual matching second guiding element (30) to said second guiding means (26), wherein said second guiding means (26) and said second guiding elements (27) guides said drive shaft (6) and said set of gears (9) back from their disconnected position to a connected position.

6. A chalk line device (1) according to claim 4, wherein said first guiding means (29) and first guiding element (27) each comprise an inclined surface on said protrusion and on said protrusion receiving part.

7. A chalk line device (1) according to claim 5, wherein said second guiding means (26) and second guiding elements (30) each comprise an inclined surface on said protrusion and on said protrusion receiving part.

8. A chalk line device (1) according any one of claims 2-7, wherein
said chalk line device (1) further comprises a spring (23), which is arranged in connection with said drive shaft (6) in such a way that said spring (23) keeps said drive shaft (6) in connection with said set of gears (9) when said torque is below said threshold value.

9. A chalk line device (1) according to claim 8 in combination with claim 5 or 7, wherein said spring (23) is compressed when said drive shaft (6) and said set of gears (9) are disconnected and said spring (23) forces said drive shaft and said set off gears (9) back to a connected position together with said second guiding means (26) and second guiding elements (30).

10. A chalk line device (1) according to claim 8 or 9, wherein said spring (23) is a coil spring.

11. A chalk line device (1) according to any one of preceding claims, wherein
said set of gears (9) comprises
an internal gear (11), to which said retracting device (5) is linked, and
an external gear (12), encircled by and in meshed contact with said internal gear (11), said external gear being linked to said spool (4).

12. A chalk line device (1) according any one of the claims 8-11 in combination with claim 6, wherein said threshold value of said torque is defined by the friction and/or the inclination between said inclined surfaces (29, 27) of the first guiding means (29) and first guiding element (27).

13. A chalk line device (1) according to claim 8 or any of the claims 9-12 in combination with claim 8, wherein said threshold value of said torque is defined by the spring force of said spring (13).

14. A chalk line device (1) according to any one of claims 3-13, wherein, when said torque exceeds said threshold value, said protrusion (18) of said first connection part (33) disconnects from said protrusion receiving part (31) and due to further exposure of said torque, said protrusion (18) connects with said protrusion receiving part (31) again or another adjacent protrusion receiving part (31).

Patentansprüche

1. Schlagschnurvorrichtung (1), umfassend
eine Spule (4),
einen Satz Zahnräder (9),
eine Rückzugvorrichtung (5), die mit der Spule (4) über den Satz Zahnräder (9) verbunden ist, wobei

die Rückzugvorrichtung eine drehbare Kurbel ist, eine Schlagschnur, die an der Spule (4) angebracht ist, und die entweder auf die Spule (4) aufgespult oder von der Spule (4) abgespult werden kann, wobei der Satz Zahnräder (9) und die Spule (4) drehbar innerhalb eines Gehäuses (2a, 2b) zum Aufwikkeln der abgespulten Schlagschnur angeordnet sind, wenn die Rückzugvorrichtung (5) eine Kraft über den Satz Zahnräder (9) auf die Spule (4) überträgt,
dadurch gekennzeichnet, dass,
wenn die Spule (4) einem Drehmoment ausgesetzt ist, das einen Schwellenwert übersteigt, zumindest ein Kraftübertragungsverbindungstück zwischen der Rückzugvorrichtung (5) und der Spule (4) ausrastet und erneut einrastet und der Ausrast - und Neueinrastvorgang fortläuft, bis ein Benutzer aufhört, die Kurbel zu drehen.

2. Schlagschnurvorrichtung (1) nach Anspruch 1, wobei
die Rückzugvorrichtung (5) eine Antriebswelle (6) umfasst, die zumindest ein erstes Verbindungsteil (33) umfasst, das die Rückzugvorrichtung (5) mit dem Satz Zahnräder (9) verbindet,
der Satz Zahnräder (9) ein zusammenpassendes zweites Verbindungsteil (20, 31) umfasst, das zum Verbinden mit dem Verbindungsteil (33) der Antriebswelle (6) geeignet ist, wobei sich das Kraftübertragungsverbindungsstück, das ausrastfähig ist, zwischen der Antriebswelle und dem Satz Zahnräder befindet.

3. Schlagschnurvorrichtung (1) nach Anspruch 2, wobei das erste Verbindungsteil (33) der Antriebswelle (6) zumindest einen Vorsprung (18) umfasst, der senkrecht zur Mittelachse der Antriebswelle (6) vorsteht, und das zusammenpassende Verbindungsteil (20, 31) des Satzes Zahnräder zumindest ein Vorsprungsaufnahmeteil (31) umfasst, in das sich der Vorsprung (18) der Antriebswelle (6) zumindest teilweise einfügt oder -passt.

4. Schlagschnurvorrichtung (1) nach Anspruch 3, wobei
der Vorsprung (18) des ersten Verbindungsteils (33) der Antriebswelle (4) ein erstes Führungsmittel (29) umfasst, und
das Aufnahmeteil (20, 31) zusammenpassende erste Führungselemente (27) zu dem ersten Führungsglied (29) umfasst, und,
wenn das Drehmoment den Schwellenwert übersteigt, das erste Führungsglied (29) und das erste Führungselement (27) die Antriebswelle (6) und den Satz Zahnräder (9) zum Bewegen aus ihrer verbundenen Position in eine ausgerastete Position führen.

5. Schlagschnurvorrichtung (1) nach Anspruch 4, wobei
der Vorsprung (18) des ersten Verbindungsteils (33) der Antriebswelle (6) ein zweites Führungsmittel (26) umfasst, und
das zweite Verbindungsteil (20, 31) des Satzes Zahnräder (9) ein zusammenpassendes Führungselement (30) zu dem zweiten Führungsmittel (26) umfasst, wobei das zweite Führungsmittel (26) und das zweite Führungselement (30) die Antriebswelle (6) und den Satz Zahnräder (9) aus ihrer ausgerasteten Position zurück zu einer verbundenen Position führen.

6. Schlagschnurvorrichtung (1) nach Anspruch 4, wobei das erste Führungsmittel (29) und das erste Führungselement (27) jedes eine geneigte Fläche auf dem Vorsprung und auf dem Vorsprungsaufnahmeteil umfassen.

7. Schlagschnurvorrichtung (1) nach Anspruch 5, wobei das zweite Führungsmittel (26) und das zweite Führungselement (30) jedes eine geneigte Fläche auf dem Vorsprung und auf dem Vorsprungsaufnahmeteil umfassen.

8. Schlagschnurvorrichtung (1) nach einem der Ansprüche 2 bis 7, wobei
die Schlagschnurvorrichtung (1) ferner eine Feder (23) umfasst, die derart in Verbindung mit der Antriebswelle (6) angeordnet ist, dass die Feder (23) die Antriebswelle (6) in Verbindung mit dem Satz Zahnräder (9) hält, wenn das Drehmoment unterhalb des Schwellenwerts ist.

9. Schlagschnurvorrichtung (1) nach Anspruch 8 in Kombination mit einem der Ansprüche 5 oder 7, wobei die Feder (23) zusammengedrückt ist, wenn die Antriebswelle (6) und der Satz Zahnräder (9) ausgerastet sind, und die Feder (23) die Antriebswelle und den Satz Zahnräder (9) zusammen mit dem zweiten Führungsmittel (26) und den zweiten Führungselementen (30) zurück zu einer verbundenen Position drängt.

10. Schlagschnurvorrichtung (1) nach einem der Ansprüche 8 oder 9, wobei die Feder (23) eine Schraubenfeder ist.

11. Schlagschnurvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei
der Satz Zahnräder (9)
ein inneres Zahnrad (11), mit dem die Rückzugvorrichtung (5) verbunden ist, und
ein äußeres Zahnrad (12) umfasst, das von dem inneren Zahnrad (11) umgeben ist und darin eingreift, wobei das äußere Zahnrad mit der Spule (4) verbunden ist.

12. Schlagschnurvorrichtung (1) nach einem der Ansprüche 8 bis 11 in Kombination mit Anspruch 6, wobei der Schwellenwert des Drehmoments durch die Reibung und/oder die Neigung zwischen den geneigten Flächen (29, 27) des ersten Führungsmittels (29) und des ersten Führungselements (27) definiert ist.

13. Schlagschnurvorrichtung (1) nach Anspruch 8 oder nach einem der Ansprüche 9 bis 12 in Kombination mit Anspruch 8, wobei der Schwellenwert des Drehmoments durch die Federkraft der Feder (13) definiert ist.

14. Schlagschnurvorrichtung (1) nach einem der Ansprüche 3 bis 13, wobei, wenn das Drehmoment den Schwellenwert übersteigt, der Vorsprung (18) des ersten Verbindungsteils (33) aus dem Vorsprungsaufnahmeteil (31) ausrastet und der Vorsprung (18) aufgrund weiterer Drehmomenteinwirkung sich wieder mit dem Vorsprungsaufnahmeteil (31) oder einem anderen benachbarten Vorsprungsaufnahmeteil (31) verbindet.

Revendications

1. Dispositif de cordeau traceur (1) comprenant:

une bobine (4),
un jeu d'engrenages (9),
un dispositif d'enroulement (5) relié à ladite bobine (4) par leditjeu d'engrenages (9), ledit dispositif d'enroulement étant une manivelle rotative,
un cordeau traceur relié à ladite bobine (4) et pouvant être enroulé sur ladite bobine (4) ou déroulé de ladite bobine (4),
ledit jeu d'engrenages (9) et ladite bobine (4) étant montés de façon rotative à l'intérieur d'un boîtier (2a, 2b) pour rembobiner le cordeau traceur déroulé lorsque ledit dispositif d'enroulement (5) transmet une force à ladite bobine (4) par ledit jeu d'engrenages (9),
caractérisé en ce que
lorsque ladite bobine (4) est soumise à un couple dépassant une valeur seuil, au moins un lien de transmission de force entre ledit dispositif d'enroulement (5) et ladite bobine (4) se déconnecte et se reconnecte, et l'opération de déconnexion et de reconnexion continue jusqu'à ce qu'un utilisateur arrête de faire tourner ladite manivelle.

2. Dispositif de cordeau traceur (1) selon la revendication 1, dans lequel
ledit dispositif d'enroulement (5) comprend un arbre d'entraînement (6) comprenant au moins une première pièce de connexion (33) reliant ledit dispositif d'enroulement (5) audit jeu d'engrenages (9),
ledit jeu d'engrenages (9) comprend une deuxième pièce de connexion (20, 31) réciproquement correspondante, adaptée pour être reliée à ladite pièce de connexion (33) dudit arbre d'entraînement (6), dans lequel ledit lien de transmission de force, susceptible d'être déconnecté, se trouve entre ledit arbre d'entraînement et ledit jeu d'engrenages.

3. Dispositif de cordeau traceur (1) selon la revendication 2, dans lequel ladite première pièce de connexion (33) dudit arbre d'entraînement comprend au moins une saillie (18) faisant saillie perpendiculairement à un axe central dudit arbre d'entraînement (6), et ladite deuxième pièce de connexion (20, 31) réciproquement correspondante dudit jeu d'engrenages comprend au moins une pièce de réception de saillie (31) dans laquelle ladite saillie (18) dudit arbre d'entraînement (6) s'introduit ou va au moins partiellement.

4. Dispositif de cordeau traceur (1) selon la revendication 3,
dans lequel ladite saillie (18) de ladite première pièce de connexion (33) dudit arbre d'entraînement (4) comprend un premier moyen de guidage (29), et
ladite pièce de réception (20, 31) comprend des premiers éléments de guidage (27) réciproquement correspondants avec ledit premier moyen de guidage (29), et
lorsque ledit couple dépasse ladite valeur seuil, ledit premier moyen de guidage (29) et ledit premier élément de guidage (27) guident ledit arbre d'entraînement (6) et ledit jeu d'engrenages (9) pour passer de leur position connectée à une position déconnectée.

5. Dispositif de cordeau traceur (1) selon la revendication 4, dans lequel
ladite saillie (18) de ladite première pièce de connexion (33) dudit arbre d'entraînement (6) comprend un deuxième moyen de guidage (26), et
ladite deuxième pièce de connexion (20, 31) dudit jeu d'engrenages (9) comprend un deuxième élément de guidage (30) réciproquement correspondant avec ledit deuxième moyen de guidage (26), dans lequel ledit deuxième moyen de guidage (26) et lesdits deuxièmes éléments de guidage (27) font repasser ledit arbre d'entraînement (6) et ledit jeu d'engrenages (9) de leur position déconnectée à une position connectée.

6. Dispositif de cordeau traceur (1) selon la revendication 4, dans lequel ledit premier moyen de guidage (29) et ledit premier élément de guidage (27) comprennent chacun une surface inclinée sur ladite saillie et sur ladite pièce de réception de saillie.

7. Dispositif de cordeau traceur (1) selon la revendication 5, dans lequel ledit deuxième moyen de guidage (26) et ledit deuxième élément de guidage (30) comprennent chacun une surface inclinée sur ladite saillie et sur ladite pièce de réception de saillie.

8. Dispositif de cordeau traceur (1) selon l'une quelconque des revendications 2 à 7, dans lequel
ledit dispositif de cordeau traceur (1) comprend en outre un ressort (23) agencé en connexion avec ledit arbre d'entraînement (6), de manière à ce que ledit ressort (23) maintienne ledit arbre d'entraînement (6) connecté audit jeu d'engrenages (9) lorsque ledit couple est inférieur à ladite valeur seuil.

9. Dispositif de cordeau traceur (1) selon la revendication 8, en combinaison avec la revendication 5 ou 7, dans lequel ledit ressort (23) est comprimé lorsque ledit arbre d'entraînement (6) et ledit jeu d'engrenages (9) sont déconnectés et ledit ressort (23) force ledit arbre d'entraînement et ledit jeu d'engrenages (9) à revenir vers une position connectée, ensemble avec ledit deuxième moyen de guidage (26) et lesdits deuxièmes élément de guidage (30).

10. Dispositif de cordeau traceur (1) selon la revendication 8 ou 9, dans lequel ledit ressort (23) est un ressort hélicoïdal.

11. Dispositif de cordeau traceur (1) selon l'une quelconque des revendications précédentes, dans lequel
ledit jeu d'engrenages (9) comprend
un engrenage interne (11) auquel est relié le dispositif d'enroulement (5), et
un engrenage externe (12) encerclé par l'engrenage interne (11) et engrenant avec celui-ci, ledit engrenage externe étant relié à ladite bobine (4).

12. Dispositif de cordeau traceur (1) selon l'une quelconque des revendications 8 à 11 en combinaison avec la revendication 6, dans lequel ladite valeur seuil dudit couple est définie par la friction et/ou l'inclinaison entre lesdites surfaces inclinées (29, 27) du premier moyen de guidage (29) et du premier élément de guidage (27).

13. Dispositif de cordeau traceur (1) selon la revendication 8 ou l'une quelconque des revendications 9 à 12 en combinaison avec la revendication 8, dans lequel ladite valeur seuil dudit couple est définie par la force de ressort dudit ressort (13).

14. Dispositif de cordeau traceur (1) selon l'une quelconque des revendications 3 à 13, dans lequel, lorsque ledit couple dépasse ladite valeur seuil, ladite saillie (18) de ladite première pièce de connexion (33) se déconnecte de ladite pièce de réception de saillie (31), et en raison d'une exposition plus longue au couple, ladite saillie (18) se reconnecte à ladite pièce de réception de saillie (31) ou à une autre pièce de réception de saillie (31) adjacente.

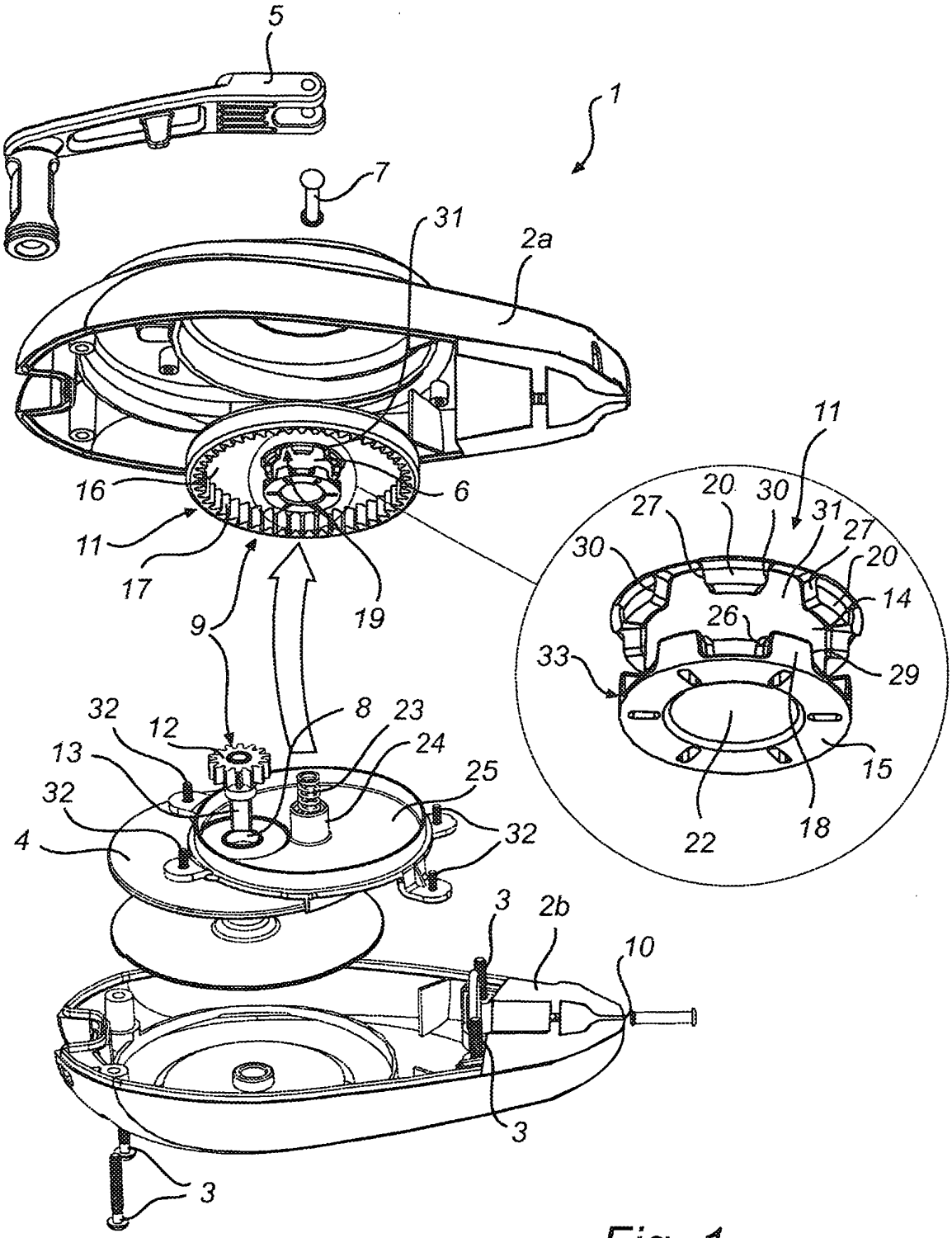

5
1
7
31
2a
11
16
6
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9
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4
3
2b
10

Fig. 1

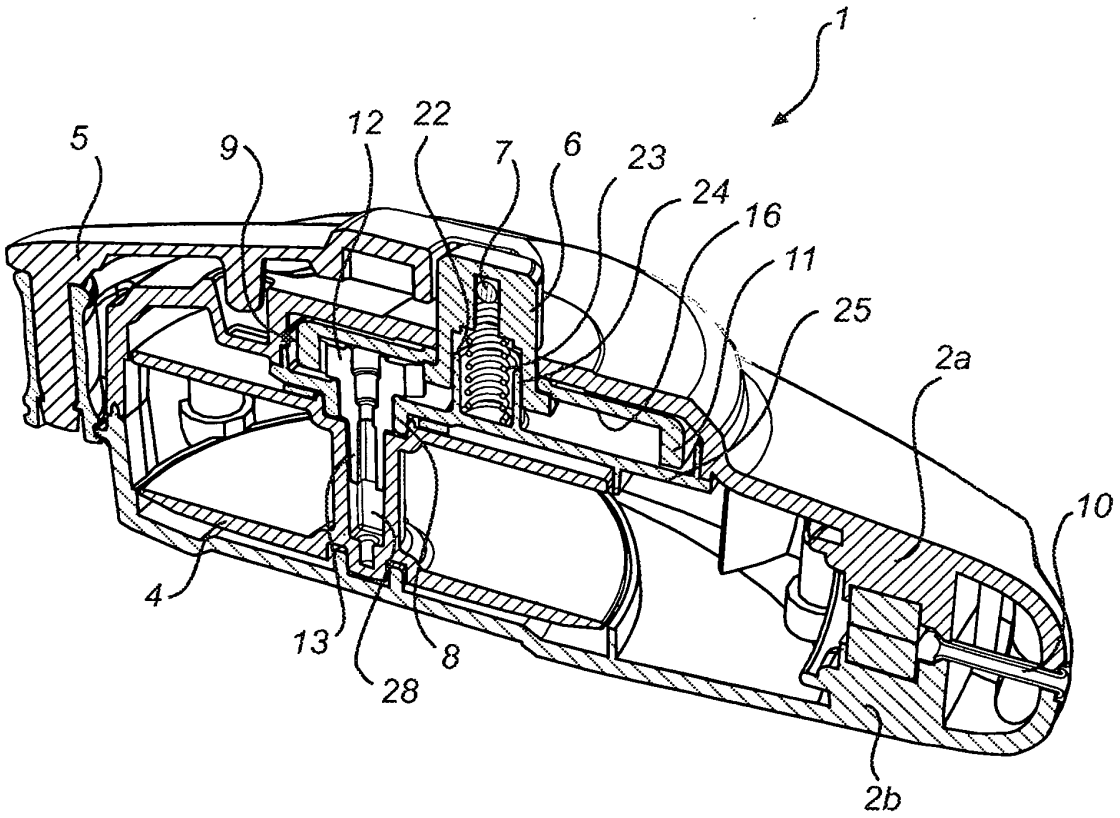


Fig. 2

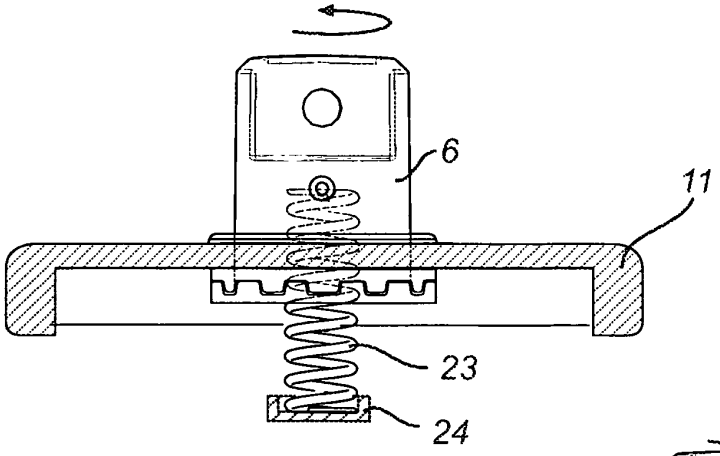


Fig. 3a

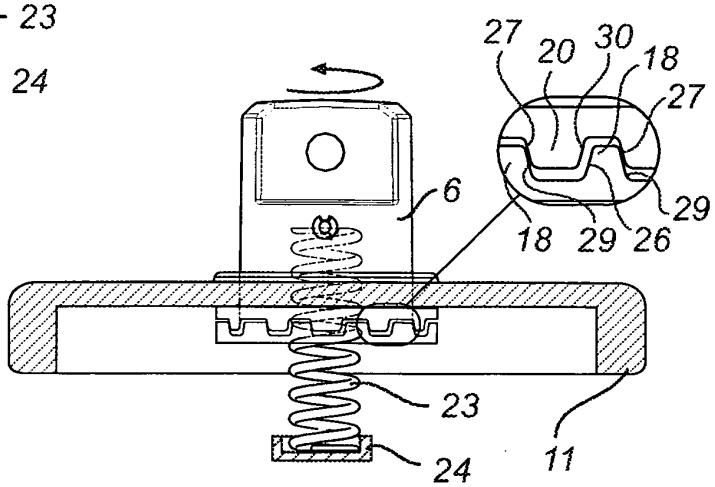


Fig. 3b

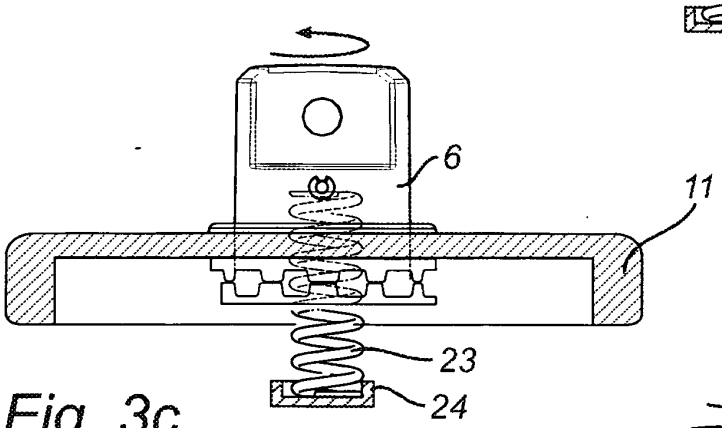


Fig. 3c

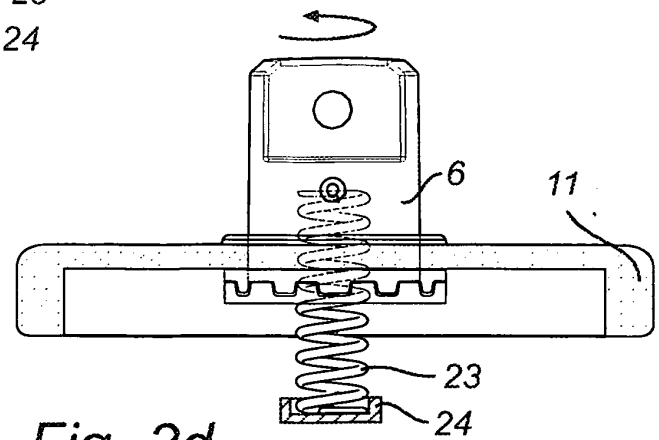


Fig. 3d

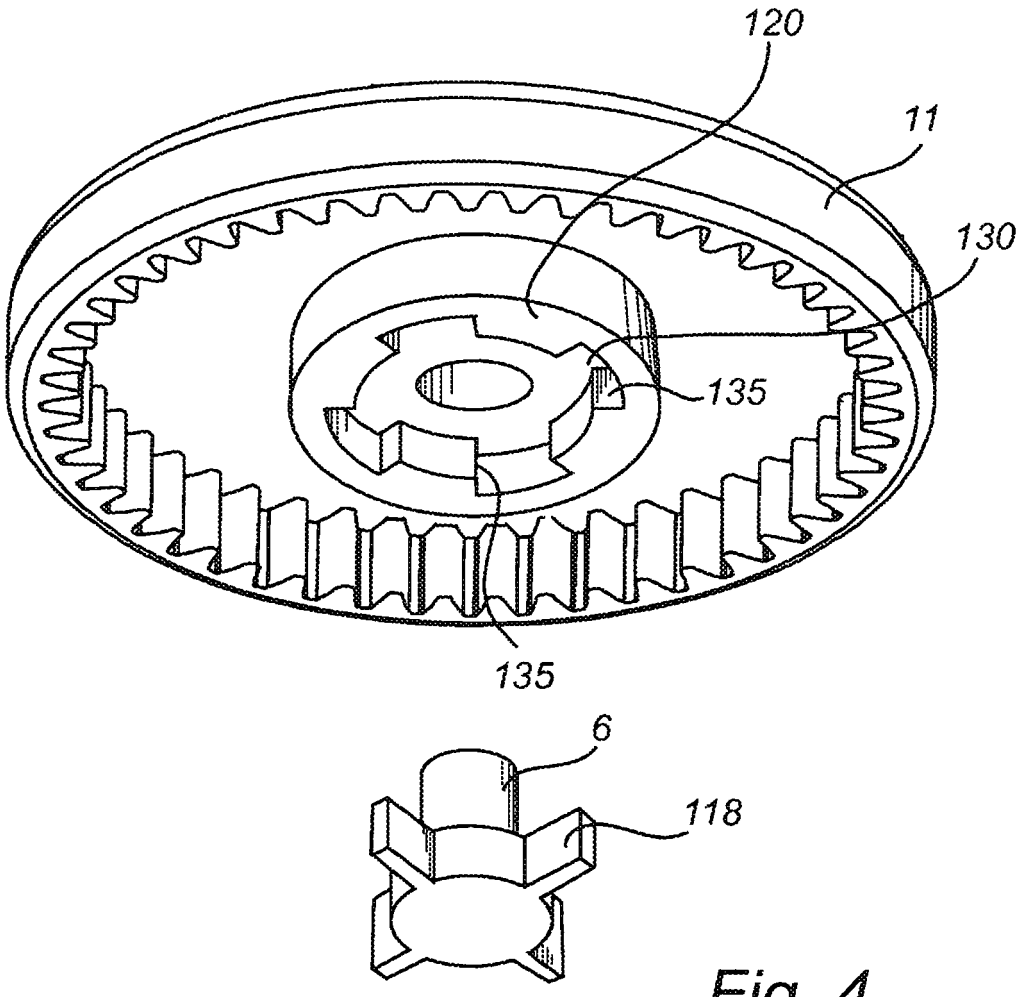


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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