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DESCRIPTION

Description

[0001] This invention relates to winding assemblies. More particularly, but not exclusively, this invention relates to tightening arrangements incorporating winding assemblies. This invention also relates to ratchet spools for use in winding assemblies. In addition, this invention relates to lids incorporating such winding assemblies.

[0002] It is known to load goods on pallets. Lids can be mounted on the loads. Such lids are provided with straps to tighten the lid against the load. The lids include tightening mechanisms, operated by levers, to tighten the strap, thereby pulling the lid against the load. In some situations, using the tightening mechanisms by operating the levers can be time consuming.

[0003] US 8 974 159 B1 discloses a vehicle load securing apparatus comprising a frame including opposite side walls and an end wall extending between the side walls. A spool is rotatably mounted on the frame and includes a rotating shaft. A length of an elongate member has a hook mounted thereon. The elongate member is at least partially wrapped about the spool. A ratcheting structure may control rotation of the spool between an engaged position in which the ratcheting structure resists rotation of the spool in an unwind direction and a disengaged position in which the ratcheting structure permits rotation of the spool in the unwind direction. The shaft may have a first end portion extending through one of the side walls of the frame. A section of the first end portion has a substantially hexagonal cross-sectional shape for engagement by a tool.

[0004] EP 1 289 850 A1 discloses load strapping means for use with 4-way pallets. The load strapping means comprises a cap for placing on a load on a 4-way pallet. At least two strapping strands are retractable through openings into housings at opposite sides of the cap. Spring means within the housings retract the strapping strands. Hooks on the free ends of the strapping strands engage the underside of the platform of a 4-way pallet. Tensioning means within the housings tighten the strapping strands between the cap and the pallet after interposing a load between the cap and the pallet. Stop means limit retraction of the hooks into the housings when not engaged with a pallet.

[0005] EP 1 628 889 A1 discloses a cap for use on a palletized load. The cap has a main moulding that provides housings at a pair or two pairs of opposite sides for a cassette. A strap passes through a slotted crossbar between a drum and a hook. Two prongs engage the underside of the platform of a pallet (e.g. at each side of a middle spacer). The strap is then tensioned by a linkage between the slotted crossbar and a lever movable between an inoperative position and an operative position to rotate the crossbar to wind the strap thereon.

[0006] According to one aspect of this invention, there is provided a winding assembly comprising:

a ratchet spool rotatable about a principal axis, said ratchet spool having a main part and a plurality of ratchet teeth arranged circumferentially around the main part;

a tensioning arrangement through which an elongate tensioning member can extend;

a transmission arrangement between the ratchet spool and the tensioning arrangement;

wherein the ratchet spool has a first attaching formation to attach the transmission arrangement to the ratchet spool, and the tensioning arrangement has a second attaching formation to attach the transmission arrangement to the tensioning arrangement; and

a ratchet arrangement to engage the ratchet teeth of the ratchet spool and rotate the ratchet spool in a driving direction about said principal axis;

wherein rotation of the ratchet spool in said driving direction is transmitted by the transmission arrangement to the tensioning arrangement to drive the tensioning arrangement rotatably in a winding direction to wind the elongate tensioning member around the tensioning arrangement;

characterised in that the ratchet spool has a drive formation for driving the ratchet spool in said driving direction;

wherein the main part defines a through hole, and the ratchet spool includes a drive member extending through the hole;

wherein the drive member has a shaft and a head, the head defining the drive formation, and the ratchet spool further includes a fastening member arranged on the drive member to secure the drive member to the main part; and

wherein the shaft and the fastening member are threaded, the fastening member being screwed onto the shaft of the drive member to secure the drive member to the main part.

[0007] According to another aspect of this invention, there is provided a ratchet spool for use in a winding assembly, said ratchet spool being rotatable about a principal axis, and said ratchet spool comprising:

a main part;

a plurality of ratchet teeth arranged circumferentially around the main part, the teeth being engageable by a ratchet arrangement for driving the ratchet spool in a driving direction about said principal axis; and

a drive formation for driving the ratchet spool in said driving direction;

wherein the main part defines a through hole, and the ratchet spool includes a drive member

extending through the hole;

wherein the drive member has a shaft and a head, the head defining the drive formation, and the ratchet spool further includes a fastening member arranged on the drive member to secure the drive member to the main part;

characterised in that the shaft and the fastening member are threaded, the fastening member being screwed onto the shaft of the drive member to secure the drive member to the main part.

[0008] According to another aspect of the invention, there is provided a lid comprising:

a body;

an elongate tensioning member within the body, the elongate tensioning member being movable between a retracted condition in which the elongate tensioning member is retracted within the body, and an extended condition in which the elongate tensioning member extends from the body; and

a winding assembly as described above operable on the elongate tensioning member.

[0009] The winding assembly may constitute a tightening assembly for tightening the elongate tensioning member. The tightening assembly may tighten the elongate tensioning member when the elongate tensioning member is secured to a pallet.

[0010] The tensioning arrangement may comprise a slotted member. The elongate tensioning member may comprise a strap.

[0011] The drive formation may be spaced from the ratchet teeth. The drive formation may be provided on the principal axis. The drive formation may extend along said principal axis. The drive formation may comprise a recess defined within the main part. The drive formation may have an axis, which may extend co-axially with the principal axis. The axis of the drive formation may extend co-linearly with the principal axis.

[0012] The recess may be a polygonal recess. The recess may be configured to receive a tool, which may be a driver, such as a key. The driver may be a polygonal driver, having a polygonal end profile.

[0013] The tool may be an electric tool capable of rotating the driver. The recess may be a hexagonal recess or other suitable shape, such as star shaped. The driver may be a hex driver, a star shaped driver or any other suitably shaped driver.

[0014] The transmission arrangement may comprise a linkage, which may comprise a flexible elongate linkage, such as a wire, cable or wire rope.

[0015] The first attaching formation may comprise a first annular groove formation defined by the main part. The first annular groove formation may extend circumferentially around the main part.

[0016] The linkage may be received in the first annular groove formation when the ratchet spool is rotated in the driving direction. The linkage may be wound around the first annular groove formation when the ratchet spool is rotated in the driving direction.

[0017] The first attaching formation may include a bore defined by the ratchet spool. The bore may be a through bore. The bore may be defined by the main part.

[0018] The bore may open into the first annular groove formation. The transmission arrangement may be received in the bore to attach the transmission arrangement to the ratchet spool.

[0019] The ratchet teeth may be spaced circumferentially around the main part. The ratchet teeth may extend radially from the main part. The main part may be substantially cylindrical.

[0020] The main part may include a toothed portion and a base portion. The ratchet teeth may be provided on the toothed portion.

[0021] The base portion may be provided at one end of the toothed portion. The first attaching formation may be defined between the toothed portion and the base portion.

[0022] The second attaching formation may comprise a second annular groove formation. The linkage may extend around the second annular groove formation.

[0023] The linkage may be wound around the second annular groove formation. The linkage may be unwound from around the second annular groove formation when the tensioning arrangement is rotated in the winding direction.

[0024] The ratchet arrangement may comprise an operating member. The ratchet arrangement may comprise a pawl to engage the ratchet teeth. The operating member may effect movement of the pawl into engagement with the ratchet teeth.

[0025] The operating member may comprise a lever. The lever may be pivotally movable about the principal axis.

[0026] The operating member may be movable from an inoperative position to an operative position. Movement of the operating member from the inoperative position to the operative position causes the ratchet arrangement to engage the ratchet teeth.

[0027] The winding assembly may include a first return element for returning the operating member to the inoperative position. The first return element may comprise a first coil spring.

[0028] The winding assembly may further include a second return element for rotating the tensioning arrangement in the opposite direction to the winding direction. The second return element may comprise a second coil spring.

[0029] The drive formation may be a recess defined axially by the main part of the ratchet spool.

[0030] The base portion may define a central aperture aligned with the through hole.

[0031] The drive member may also extend through the aperture. The drive member may comprise a bolt.

[0032] The head may define the recess.

[0033] The fastening member may be arranged on the shaft.

[0034] The fastening member may comprise a nut. The nut may be screwed onto the shaft of the drive member.

[0035] The tool may cooperate with the drive formation defined by the fastening member to rotate the ratchet spool.

[0036] An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a lid in use on a load;

Figure 2 is a perspective view of a winding assembly for use in the lid shown in Figure 1;

Figure 3 is a plan view of the winding assembly;

Figure 4 shows the winding assembly in use, in which an elongate tensioning member is attached to a pallet;

Figure 5 is a perspective view of a ratchet spool for use with the winding assembly;

Figure 6 is a top plan view of the ratchet spool;

Figure 7 is a side view showing the ratchet spool and a transmission arrangement separate from each other;

Figure 8 is a view from the front and above of a lever for use in the winding assembly;

Figure 9 is a view from below of the lever;

Figure 10 is a view from the front of a release slider for use with the lever;

Figure 11 is a view from the rear of the release slider;

Figure 12 is a view of a driving pawl for use with the lever;

Figure 13 is a view from the rear of the lever showing the release slider and driving pawl;

Figure 14 is a view similar to the view shown in Figure 13 but with the slider in a pawl-releasing position;

Figure 15 is a sectional view through the lever, showing the lever in a rest position;

Figure 16 is a sectional view through the lever, showing the lever in a projecting position;

Figure 17 is a sectional view through the lever, showing the lever in a drive pawl-releasing condition;

Figure 18 is a sectional view through the lever, showing the lever in a latching pawl-releasing condition;

Figure 19 is an exploded side view showing a further ratchet spool, being an embodiment of the invention, and a transmission arrangement separate from each other;

Figure 20 is a close up view of the further ratchet spool; and

Figure 21 is a perspective view of a winding assembly incorporating the ratchet spool shown in Figures 19 and 20.

[0037] Figure 1 shows a lid 1 for securing a load 2 on a pallet 3. The lid 1 comprises a body 4 with upstanding sides 5 and depending skirt 6 for embracing the top sides of the load (and also enabling a plurality of the lids 1 to be nested with each other or with pallets).

[0038] The body 4 comprises an upper portion 7 shown formed by two plastics mouldings 8, but which could be formed as a single moulding. The body 4 further includes a lower portion 9 formed by a main plastics moulding.

[0039] The lid 1 includes four elongate tensioning members in the form of straps 10. Each strap 10 is movable between a retracted condition within the upper portion 7, and an extended condition in which the strap 10 extends from the upper portion 7. Each strap 10 is provided at a respective side of the lid 1.

[0040] Each strap 10 has a distal end to which a hook 14 is attached. In the extended condition of the straps 10, the hooks 14 can be secured to the pallet 3. Each strap 10 also has

a proximal end attached to a drum 12.

[0041] Urging means (not shown), in the form of a spring, urges the drum 12 in a direction to wind the strap 10 thereon, to move the strap 10 to its retracted condition.

[0042] Only two of the straps 10 are visible in Figure 1, extending from two of the sides of the body 4. The skilled person will realise that the other two straps 10 extend from the other two sides.

[0043] When the hooks 14 are secured to the pallet 3, the straps 10 can be tensioned by the use of respective winding assemblies 16 operable on each strap 10. Each winding assembly 16 is provided within the body 4.

[0044] Each winding assembly 16 comprises a tensioning arrangement in the form of a slotted member 37 (see Figures 2 and 3). The slotted member 37 is rotatably mounted on the body 4.

[0045] The slotted member 37 is rotatable by operation of a ratchet arrangement 18 comprising an operating member in the form of a lever 19.

[0046] Figures 2 and 3 show a loop 14A attached to the strap 10. It will be appreciated that the loop 14A could be replaced by the hook 14, or other suitable feature.

[0047] The winding assembly 16 further includes a ratchet spool 59 mounted on the lever 19 in alignment with the principal axis 61. The ratchet arrangement 18 is operable on the ratchet spool 59 to rotate the ratchet spool 59, as explained below.

[0048] The ratchet spool 59 has a substantially cylindrical main part 20 and a plurality of ratchet teeth 60 extending outwardly from the main part 20.

[0049] The main part 20 further includes a base portion 25 and a toothed portion 27. The ratchet teeth 60 are provided on the toothed portion.

[0050] The base portion 25 is provided at one end of the toothed portion 27. A first attaching formation in the form of a first annular groove formation 58 is defined between the toothed portion 27 and the base portion 25.

[0051] The ratchet spool 59 (see Figures 5, 6, 7 and 15 to 18) has a plurality of ratchet teeth 60 extending outwardly from the main part 20. The ratchet teeth 60 are provided between the first annular groove formation 58 and the opposite end of the main part 20.

[0052] The lever 19 is operated by being pivotally moved about a principal axis 61 from a rest position 19(A) (see Figures 2, 3 and 15) to a projecting position 19(B) (see Figures 4, 16 and 17). The lever 19 has a drive pawl 72 (see Figures 15 to 18) to engage the ratchet teeth 60 and drive the ratchet spool 59.

[0053] A first return element in the form of a first coil spring 67 is provided between the lever 19 and the body 4 to return the lever from the projecting position 19(B) to the rest position 19(A).

[0054] The lever 19 is bifurcated to provide upper and lower flanks 63, 64 (see particularly Figures 13 and 14). The opposite ends of the first coil spring 67 respectively engage the body 4 and the upper flank 63, thereby urging the lever 19 towards the rest position 19(A). The ratchet spool 59 is disposed between the upper and lower flanks 63, 64.

[0055] The main part 20 of the ratchet spool 59 has a drive formation in the form of a hexagonal recess 21. The hexagonal recess is defined in a face 22 at an upper end of the main part 20. The hexagonal recess 21 is defined within the main part 20, and allows the ratchet spool 59 to be rotated by a tool, such as a hex key or an electric tool capable of driving a hex key. The hexagonal recess 21 is defined on and aligned with the principal axis 61. The hexagonal recess has an axis 61A that extends co-axially or co-linearly with the principal axis 61.

[0056] Thus, the ratchet spool 59 is rotatable about the principal axis 61, either by movement of the lever 19 from the rest position 19(A) to the projecting position 19(B), or by rotation of the key inserted into the hexagonal recess 21.

[0057] The slotted member 37 has an elongate spindle 40 defining a slot 38 through which the strap 10 passes. The slotted member 37 also has a ribbed portion 49 on the spindle 40, and a second attaching formation in the form of a second annular groove formation 42. The ribbed portion 49 is provided between the second annular groove formation 42 and the spindle 40.

[0058] A transmission arrangement in the form of a flexible elongate linkage 53 extends between the ratchet spool 59 and the slotted member 37, thereby linking the ratchet spool 59 to the slotted member 37.

[0059] As shown in Figure 7, the elongate linkage 53 comprises an elongate portion 55, a first connecting member 57A is provided at one end of the elongate portion 55. A second connecting member 57B is provided at the opposite end of the elongate portion 55. 58

[0060] The main part 20 defines a through bore 20A, which opens into the first annular groove formation 58. The first connecting member 57A is received in the through bore 20A to connect the elongate linkage 53 to the ratchet spool 59. The second connecting member 57B is received in a hole (not shown) defined by the second annular groove formation 42 of the slotted member 37.

[0061] One end of the flexible elongate linkage is attached to the ratchet spool 59. The opposite end of the flexible elongate linkage 53 is attached to the slotted member 37. The flexible elongate linkage 53 is in the form of a wire rope, and is wound around the first and

second annular groove formations 58, 42, as discussed in more detail below.

[0062] Movement of the lever 19 from the rest position 19(A) (Figures 3 and 15) to the projecting position 19(B) (Figures 4 and 16) winds the flexible elongate linkage 53 from the slotted member 37 onto the ratchet spool 59. This causes rotation of the slotted member 37, to effect winding of the strap 10 around the spindle 40. When the hook 14 is engaged with the pallet 3, tension is developed in the strap 10 by the winding of the strap 10 around the spindle 40.

[0063] The slotted member 37 is rotatably held in the body 4 by three bearings 41, two of which (designated 41A) receive respective opposite ends of the spindle 40, adjacent the slot 38. Another of the bearings 41B receives the end 39 of the slotted member 37 adjacent the second annular groove formation 42.

[0064] A second return element in the form of a second coil spring 48 encircles the ribbed portion 49 of the slotted member 37 (see Figures 2, 3 and 4).

[0065] The opposite ends of the second coil spring 48 respectively engage the body 4 and the ribbed portion 49, thereby urging the slotted member 37 to the position shown in Figures 2 and 3 in which the strap 10 is not wound around the spindle 40 and can pass through the slot 38.

[0066] Referring to Figures 8 to 18, the lever 19 has a first resilient arm 73 to which the drive pawl 72 is attached. The body 4 carries a latching pawl 74 (see Figures 15 to 18) on a second resilient arm 75.

[0067] When the lever 19 is moved from the rest position 19(A) to the projecting position 19(B), the drive pawl 72 engages one of the ratchet teeth 60 to rotate the ratchet spool 59. This winds the flexible elongate linkage 53 onto the first annular groove formation 58 of the ratchet spool 59, thereby rotating the slotted member 37 to wind the strap 10 around spindle 40.

[0068] As the ratchet spool 59 is rotated by the lever 19, the resilient arm 75 deforms so that the latching pawl 74 can move out of the way of the ratchet teeth 60. This allows the ratchet teeth 60 to move across the latching pawl 72 as the ratchet spool 59 rotates.

[0069] When the lever 19 reaches the projecting position 19(B), the latching pawl 74 engages one of the ratchet teeth 60.

[0070] The lever 19 can then be returned to the rest position. The resilient arm 73 deforms so that the drive pawl 72 can move out of the way of the ratchet teeth 60, to allow the ratchet teeth 60 to move across the drive pawl 72. As the lever 19 returns to the rest position, the engagement of the latching pawl 74 with one of the ratchet teeth 60 prevents movement of the ratchet spool 59.

[0071] The lever 19 can be oscillated between the rest and projection positions to cause the ratchet spool 59 (as indicated by the double headed arrows in Figures 4 and 16) to wind the flexible elongate linkage 53 into the first annular groove formation 58 from the second annular groove formation 42. This rotates the spindle 40 to wind the strap 10 on to the slotted member 37, thereby tensioning the strap 10 against the pallet 3.

[0072] If the user believes that employing the lever 19 to rotate the ratchet spool 59 takes too long, the user can, instead, employ an electric driving tool having a hex key.

[0073] The hex key can be inserted into the hexagonal recess 21, and the tool then operated to rotate the ratchet spool 59. By employing an electric tool, the ratchet spool 59 can be rotated much more quickly than employing the lever 19.

[0074] Referring to Figures 8 to 14, a slider 101 is inserted through an aperture 102 in the outer face 103 of the lever 19. The slider 101 has an angled corner 104 matching one side 105 of a V-shaped end to the aperture 102 to facilitate insertion of the slider 101.

[0075] The first resilient arm 73, carrying the drive pawl 72, is divided by a long slot 98. The divided ends 99 are a snap-fit into a block 100 formed integrally within the lever 19.

[0076] The slider 101 is provided with a head 106 on a neck 107 passing through the slot 98 in the arm 73, the divided ends 99 of the arm 73 being inserted either side of the neck on the already inserted slider and then into the block 100.

[0077] The head 106 has lateral projections 108 engaging ramps 109 on each side of the slot 98 when the slider is moved towards the drive pawl 72 to disengage the drive pawl from the ratchet 60.

[0078] With the slider in the position shown in Figures 8, 12 and 15 and also in Figure 16, the drive pawl 72 is in engagement with the ratchet teeth 60, thus enabling the lever 19 to be swung repeatedly between the rest and projecting positions 19(A) and 19(B) to rotate the ratchet spool 59.

[0079] The position 19(B) is determined by the drive pawl 72 meeting a fixed stop 110 (see Figure 16) on the body 4 projecting up through an arcuate slot 111 in the lower flank 64 of the lever 19, the actual contact being between the stop and a small heel 112 projecting downwards from the drive pawl 72.

[0080] The stop 110 is at one end of a radius plate 113. When the slider 101 is moved to the position shown in Figures 14 and 17, the lateral projections 108 of the head 106 engage the ramps 109 on the resilient arm 73.

[0081] This engagement between the ramps 109 and the lateral projections 108 causes the resilient arm 73 to flex as shown in Figure 17 and disengage the drive pawl 72 from the ratchet

teeth 60.

[0082] The lever 19 can then be moved towards a position 19(C) shown in Figure 18 causing two things to happen:

firstly, the leading edge 114 of the slider 101 meets a fixed abutment 115 on the base of the chassis spaced from the fixed stop 110 to urge the slider back towards its inoperative position; and

secondly, the cam surfaces 116 on the lever 19 flex the second resilient arm 75 to disengage the latching pawl 74 from the ratchet.

[0083] The consequence of this latter interaction is that the second coil spring 48 around the rib portion 49 rotates the slotted member 37 to rewind the wire rope 53 on to the second annular groove formation 42 from the first annular groove formation 58.

[0084] This interaction also has the effect of unwinding the strap 10 from around the spindle 40 to release the tension in the strap 10, thus allowing the hook 14 to be pulled clear from the pallet 3.

[0085] When the strap 10 has been completely unwound from spindle 40, the strap 10 is then free to be rewound on to the drum 12 by the spring acting thereon.

[0086] Finally, when the lever 19 is released by the user, the first coil spring 67 returns the lever to the position shown in Figures 3 and 15.

[0087] In the ratchet spool 59 shown in Figures 5 to 7, the hexagonal recess 21 is defined in the centre of the upper face 22 of the main part 20 of the ratchet spool 59. Alternatively, the hexagonal recess could be defined in a drive member, as explained below.

[0088] Another ratchet spool, generally designated 77, is shown in Figures 19, 20 and 21. The ratchet spool 77 can be used in place of the ratchet spool 59 in the winding assembly 16. The ratchet spool 77 is an embodiment of the invention.

[0089] The ratchet spool 77 includes many of the features of the ratchet spool 59. These features have been designated in Figures 19, 20 and 21 with the same reference numerals as the corresponding features shown in Figures 1 to 18.

[0090] In the ratchet spool 77, the main part 20 defines a through hole 78 (shown with broken lines in Figure 20). The base portion 25 defines a central aperture 79 aligned with the through hole 78. A drive member in the form of a bolt 80 extends through the hole 78 and the aperture 79.

[0091] The bolt 80 has a head 82 defining the hexagonal recess 21. The bolt 80 has a threaded shaft 84, and is secured to the main part 20 by a nut 86 threaded onto the shaft 84. Thus, the hexagonal recess 21 is defined within the main part 20 by the bolt 80 secured thereto.

[0092] When the bolt 80 is secured to the ratchet spool 77, a suitable hex key can be inserted in the hexagonal recess 21 to rotate the bolt 80 and, thereby, rotate the ratchet spool 77. This winds the flexible elongate linkage 53 onto the first annular groove formation 58 of the ratchet spool 59, thereby rotating the slotted member 37 to wind the strap 10 around spindle 40.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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- EP1289850A1 [0004]
- EP1628889A1 [0005]

PATENTKRAV

1. Skraldespole (77) til anvendelse i en opviklingsanordning (16), hvilken skraldespole (77) kan rotere omkring en hovedakse (61), og hvor skraldespolen (77) omfatter:

en hoveddel (20);

en flerhed af skraldetænder (60), der er anbragt periferisk omkring hoveddelen (20), hvor tænderne (60) kan gå i indgreb med et skraldearrangement (18) med henblik på at drive skraldespolen (77) i en drivretning omkring hovedaksen (61); og

en drivformation (21) med henblik på at drive skraldespolen (77) i drivretningen;

hvor hoveddelen (20) definerer et gennemgangshul (78), og skraldespolen (77) indbefatter et drivelement (80), der strækker sig gennem hullet (78);

kendetegnet ved, at drivelementet (80) har en aksel (84) og et hoved (82), hvor hovedet (82) definerer drivformationen (21), og skraldespolen (77) yderligere indbefatter et fastgørelseselement (86), der er anbragt på drivelementet (80) til fastgørelse af drivelementet (80) til hoveddelen (20);

hvor akslen (84) og fastgørelseselementet (86) er gevindskåret, hvor fastgørelseselementet (86) påskrues drivelementets (80) aksel (84) med henblik på at fastgøre drivelementet (80) til hoveddelen (20).

2. Skraldespole (77) ifølge krav 1, der indbefatter en første fastgørelsesformation (58) til fastgørelse af et overførselsarrangement (53) til skraldespolen (77).

3. Skraldespole (77) ifølge krav 2, hvor den første fastgørelsesformation (58) omfatter en første ringformet rilleformation (58), der defineres af hoveddelen (20), hvor den første ringformede rilleformation (58) strækker sig periferisk omkring hoveddelen (20).

4. Skraldespole (77) ifølge krav 1, 2 eller 3, hvor skraldetænderne (60) er anbragt med mellemrum periferisk omkring hoveddelen (20) og strækker sig radialt fra hoveddelen (20).

5. Skraldespole (77) ifølge et hvilket som helst foregående krav, hvor hoveddelen (20) omfatter en fortandet del (27) og en basisdel (25), hvor basisdelen (25) er tilvejebragt i den ene ende af den fortandede del (27), og den første fastgørelsesformation (58) er defineret mellem den fortandede del (27) og basisdelen (25), hvor skraldetænderne (60) er tilvejebragt på den fortandede del (27).

6. Skraldespole (77) ifølge krav 5, hvor basisdelen (25) definerer en midteråbning (79), der flugter med gennemgangshullet (78).

7. Opviklingsanordning (16), der omfatter:

en skraldespole (77) ifølge krav 1;

et tilspændingsarrangement (37), gennem hvilket der kan strække sig et langstrakt tilspændingselement (10);

et overførselsarrangement (53) mellem skraldespolen (77) og tilspændingsarrangementet (37);

hvor skraldespolen (77) har en første fastgørelsesformation (58) til fastgørelse af overførselsarrangementet (53) til skraldespolen (77), og tilspændingsarrangementet (37) har en anden fastgørelsesformation (42) til fastgørelse af overførselsarrangementet (53) til tilspændingsarrangementet (37); og

hvor rotation af skraldespolen (77) i drivretningen overføres, af overførselsarrangementet (53), til tilspændingsarrangementet (37) med henblik på at drive tilspændingsarrangementet (37) roterbart i en opviklingsretning med henblik på at opvikle det langstrakte tilspændingselement (10) omkring tilspændingsarrangementet (37).

8. Opviklingsanordning (16) ifølge krav 7, hvor overførselsarrangementet (53) omfatter en fleksibel langstrakt ledforbindelse (53).

9. Opviklingsanordning (16) ifølge krav 7 eller 8, hvor den første fastgørelsesformation (58) omfatter en første ringformet rilleformation (58), der defineres af hoveddelen (20), hvor den første ringformede rilleformation (58) strækker sig periferisk omkring hoveddelen (20).

10. Opviklingsanordning (16) ifølge krav 9, hvor ledforbindelsen (53) modtages i den første ringformede rilleformation (58), når skraldespolen (77) roteres i drivretningen, hvor ledforbindelsen (53) opvikles omkring den første ringformede rilleformation (58), når skraldespolen (77) roteres i drivretningen.

11. Opviklingsanordning (16) ifølge krav 9 eller 10, hvor den første fastgørelsesformation (58) indbefatter en gennemgående udboring (20A), der defineres af hoveddelen (20), hvor udboringen (20A) munder ud i den første ringformede rilleformation (58), og overførselsarrangementet (53) modtages i udboringen (20A) med henblik på at fastgøre overførselsarrangementet (53) til skraldespolen (77).

12. Opviklingsanordning (16) ifølge krav 9, 10 eller 11, hvor den anden fastgørelsesformation (42) omfatter en anden ringformet rilleformation (42), hvor ledforbindelsen (53) kan udstrækkes omkring den anden ringformede rilleformation (42).

13. Opviklingsanordning (16) ifølge et hvilket som helst af kravene 7 til 12, hvor skraldearrangementet (18) omfatter et betjeningselement (19) og en pal (72) til indgreb med skraldetænderne (60), hvor betjeningselementet (19) kan bevæges fra en ikke-operativ position til en operativ position, og bevægelse af betjeningselementet (19) fra den ikke-operative position til den operative position får betjeningselementet (19) til at fremkalde bevægelse af palen (72) ind i indgreb med skraldetænderne (60).

14. Opviklingsanordning (16) ifølge krav 13, hvor betjeningselementet (19) omfatter en løftearm (19), der drejeligt kan bevæges omkring hovedaksen (61).

15. Låg, der omfatter:

en krop (4);

et langstrakt tilspændingselement (10) inden i kroppen (4), hvor det langstrakte tilspændingselement (10) kan bevæges mellem en indtrukket tilstand, i hvilken det langstrakte tilspændingselement (10) er indtrukket i kroppen (4), og en udstrakt tilstand, i hvilken det langstrakte tilspændingselement (10) strækker sig ud fra kroppen (4); og

en opviklingsanordning (16) ifølge et hvilket som helst af kravene 7 til 14, der kan fungere på det langstrakte tilspændingselement (10).

DRAWINGS

Drawing

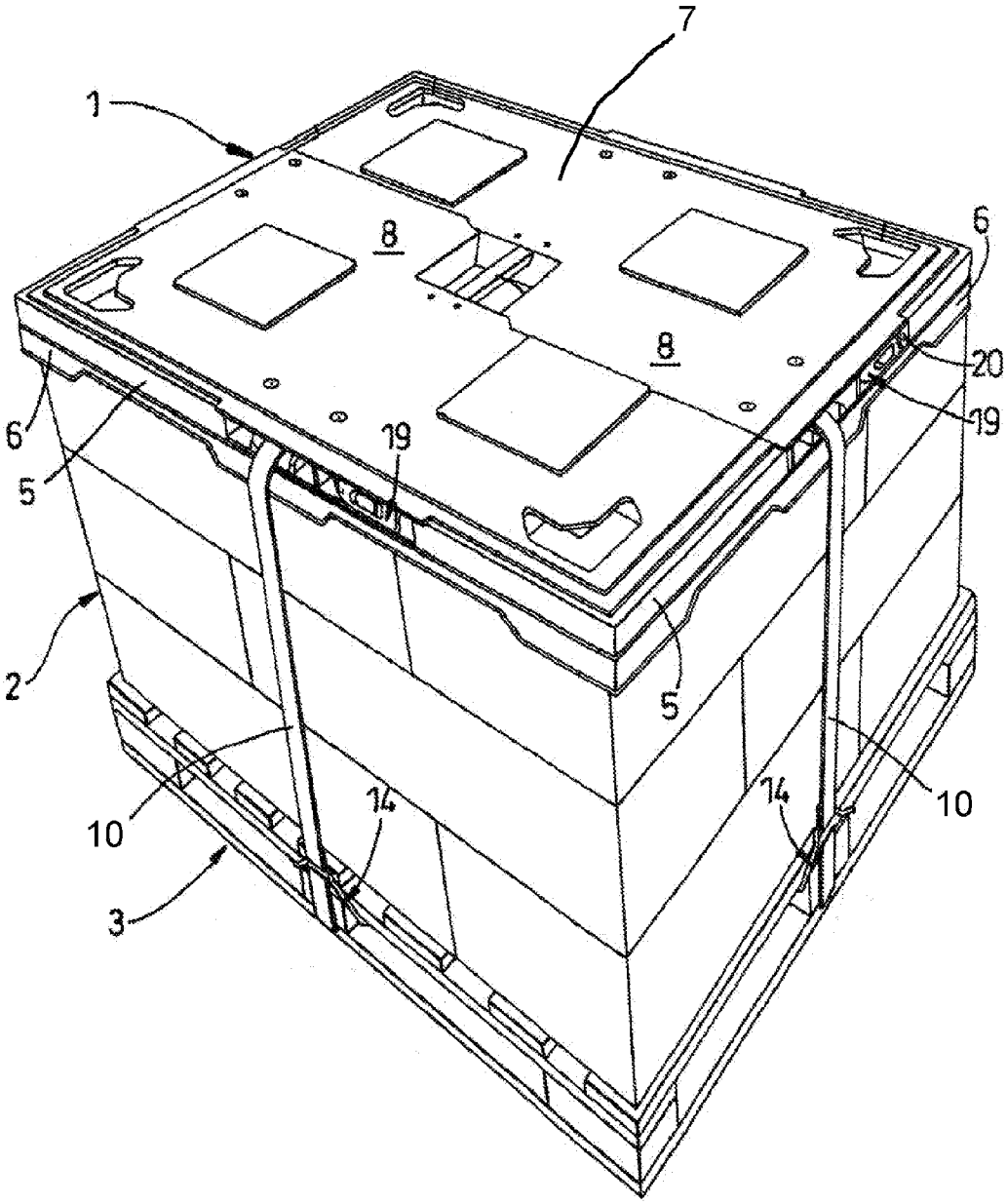


Fig 1

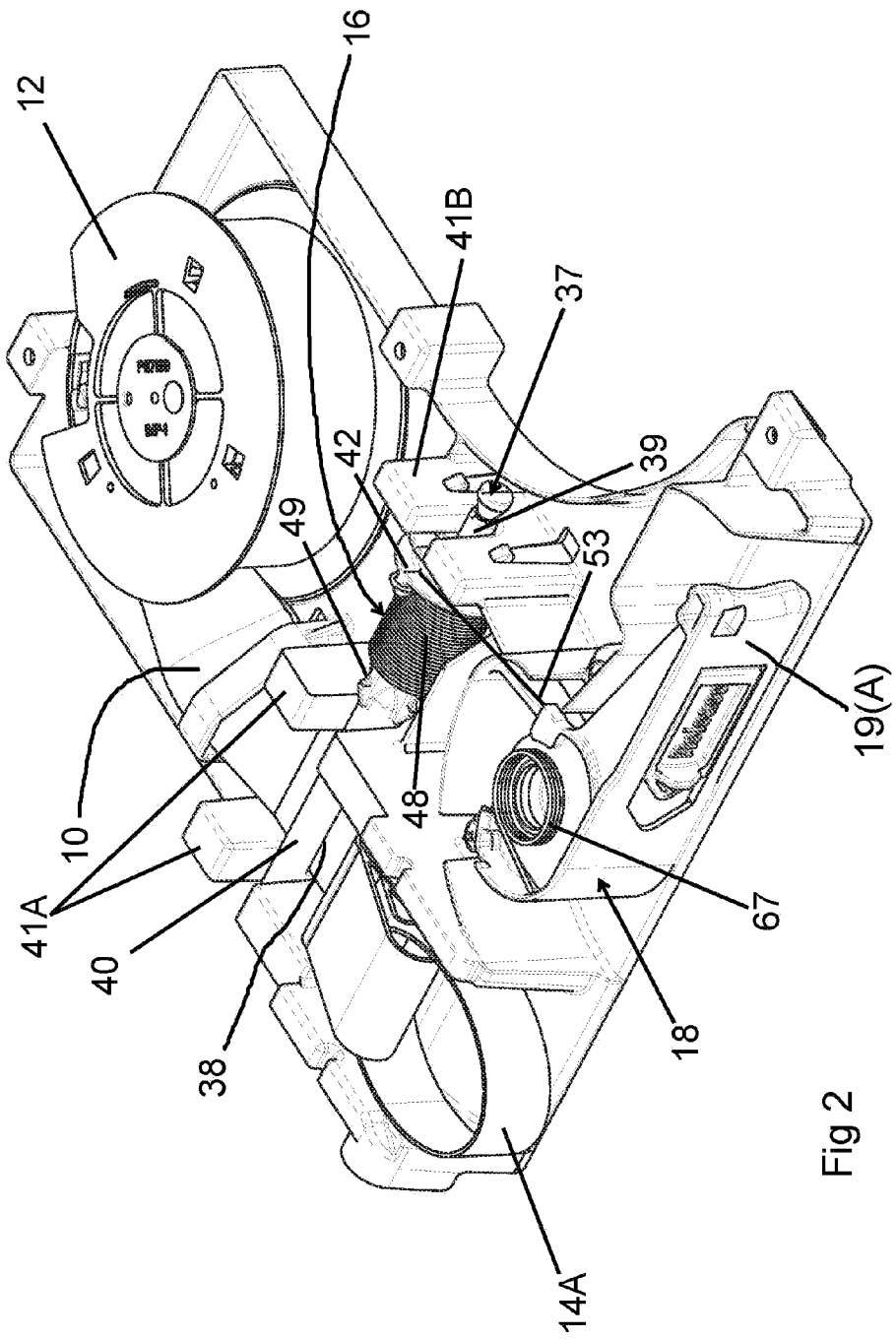


Fig 2

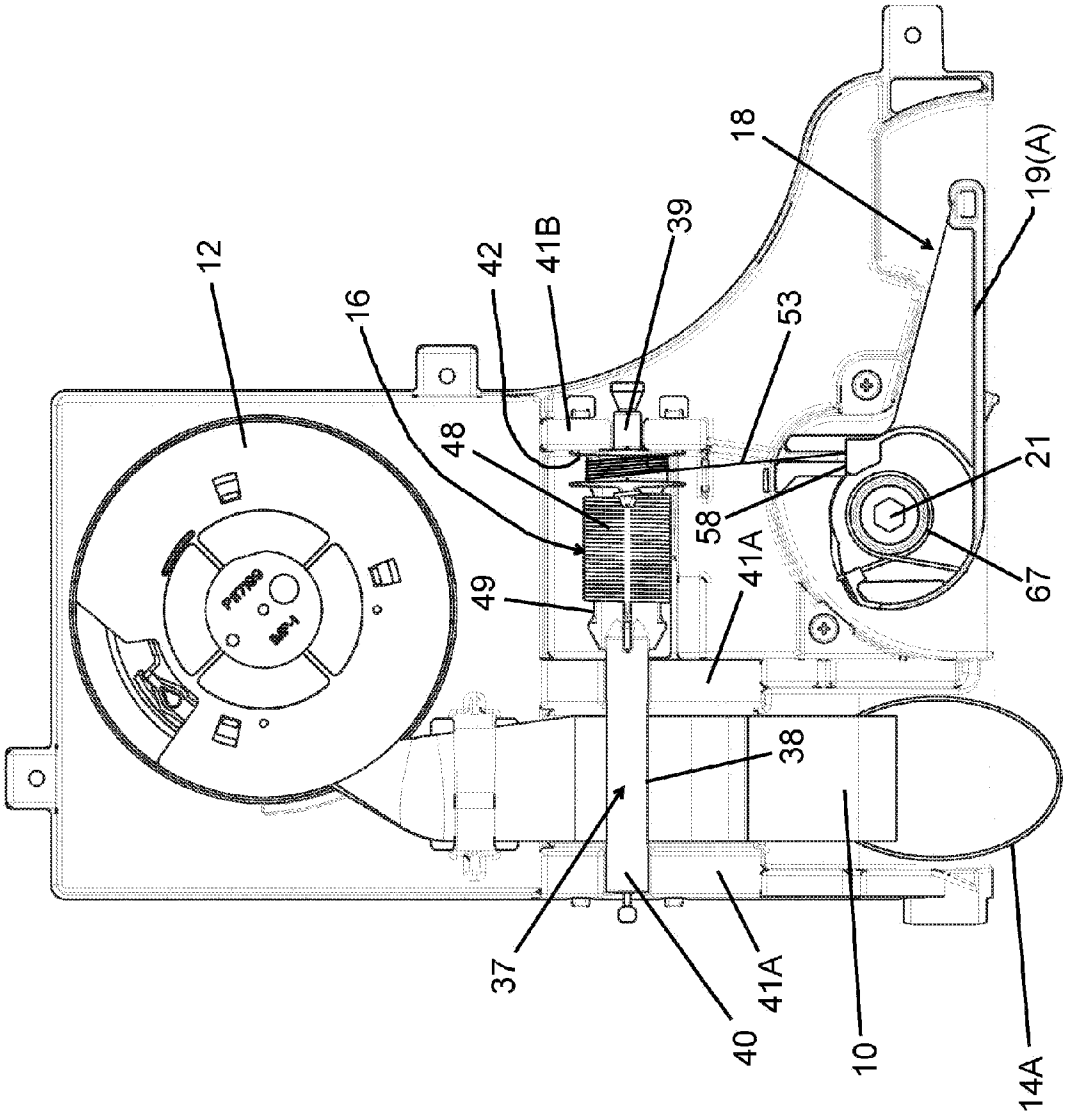


Fig 3

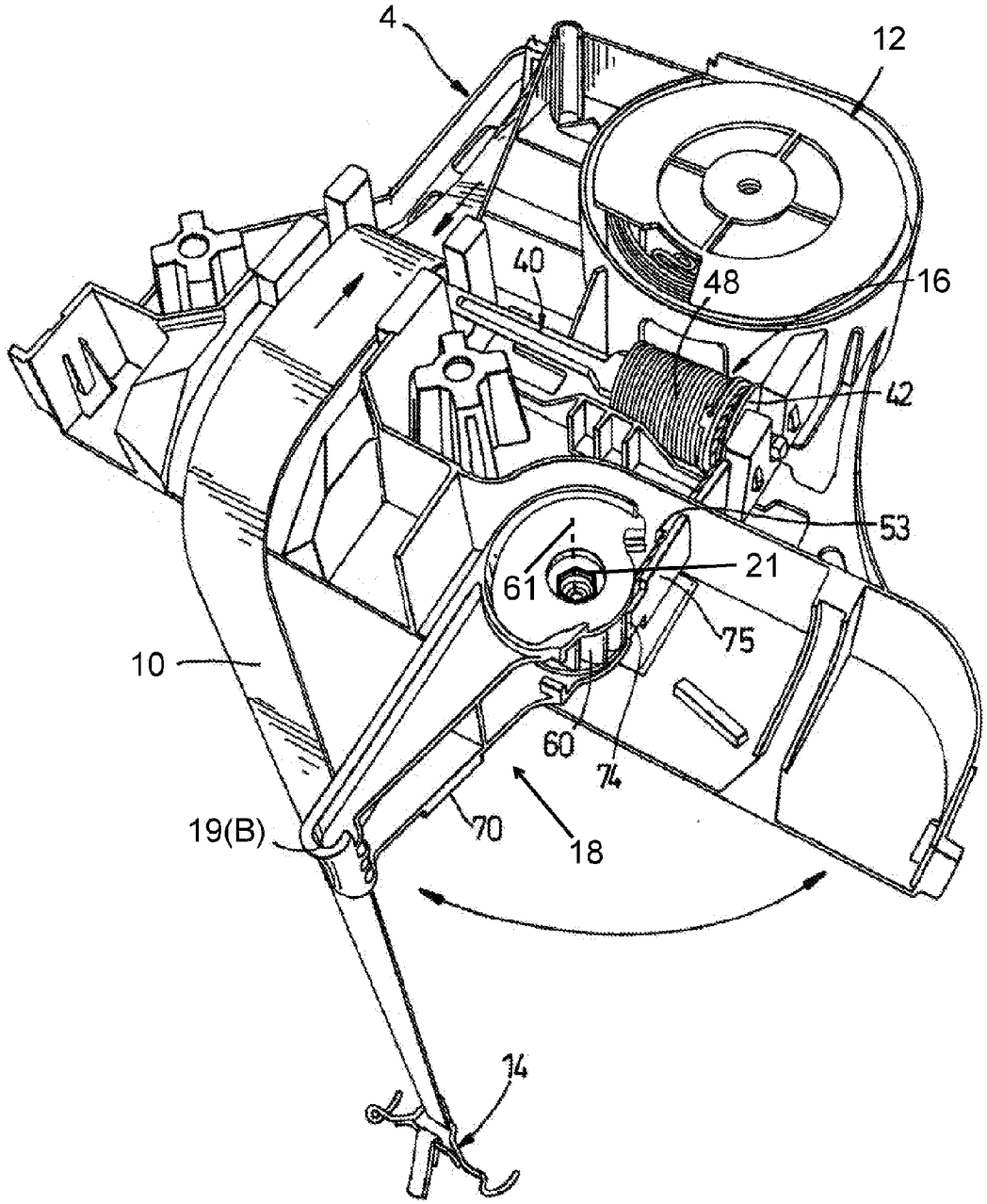
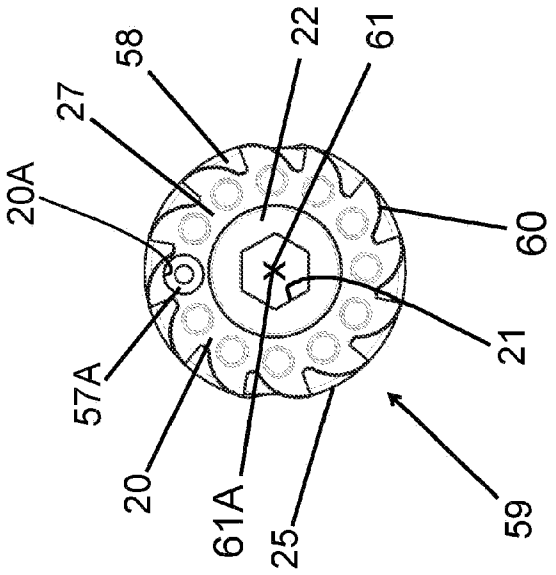


Fig 4

Fig 6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61
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20A
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57A
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61A
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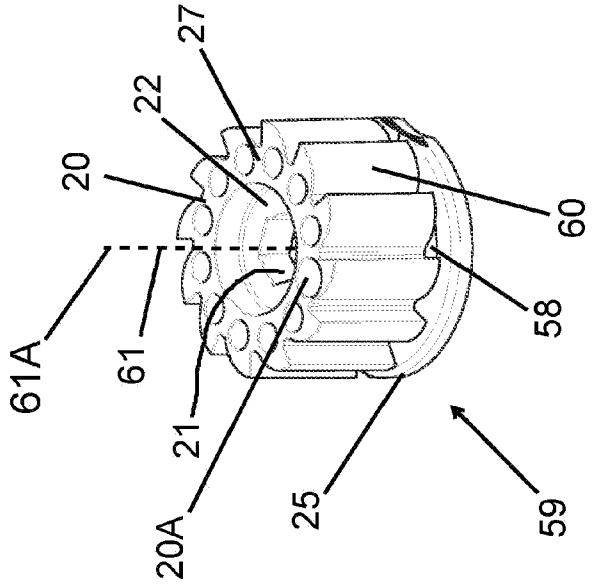
Fig 5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61A
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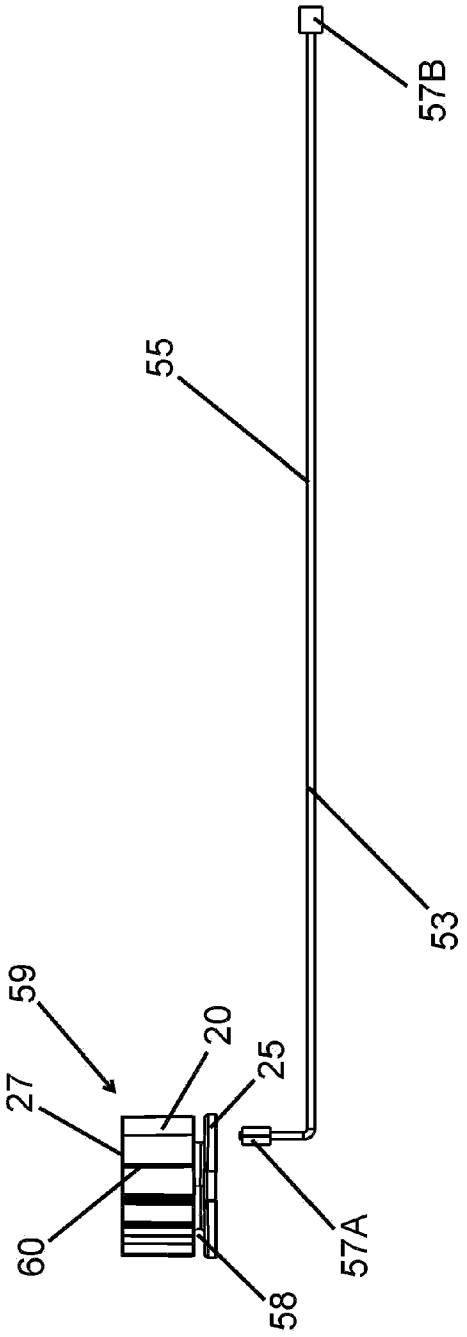


Fig 7

Fig 8

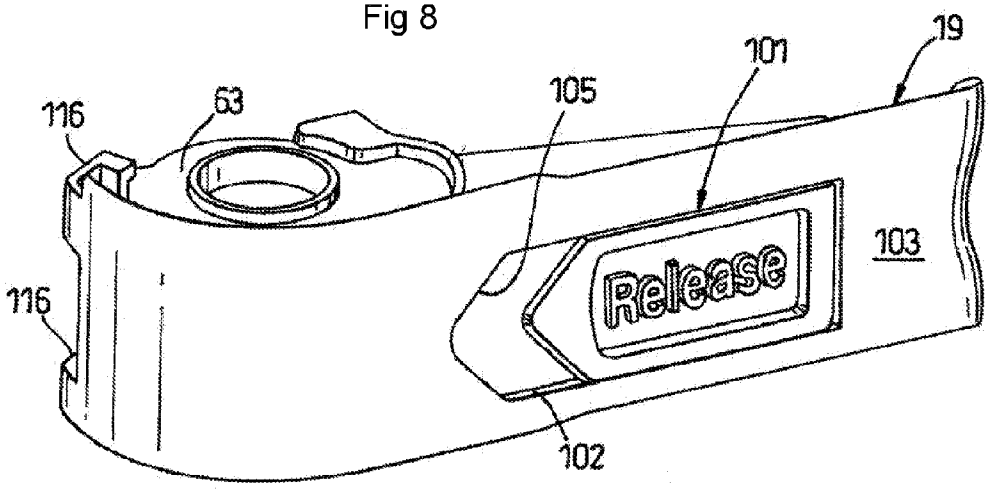


Fig 9

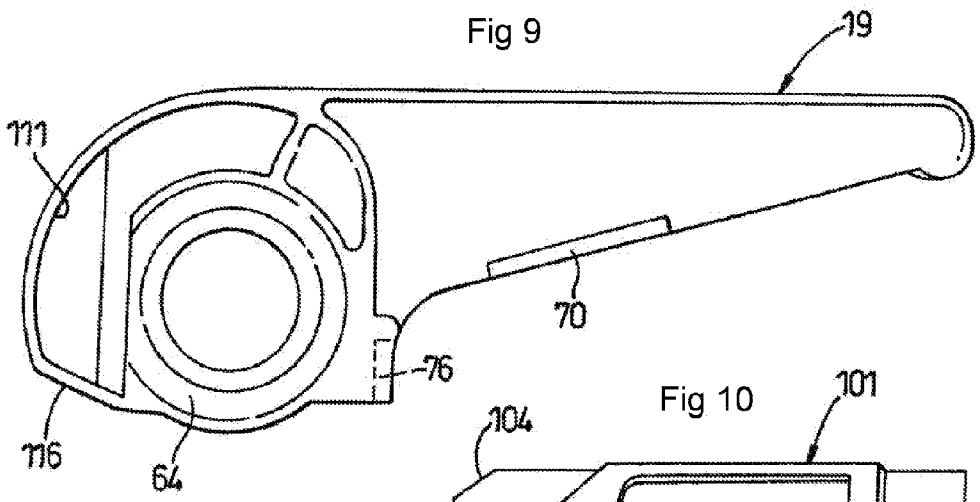
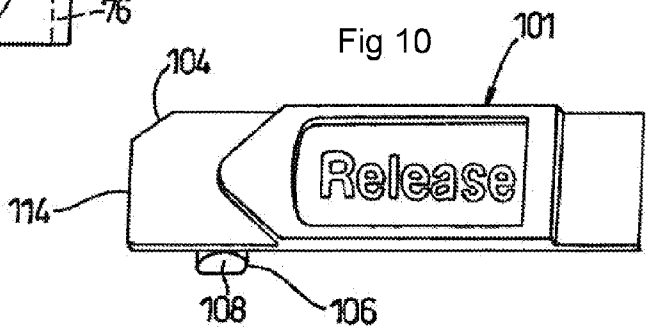


Fig 10



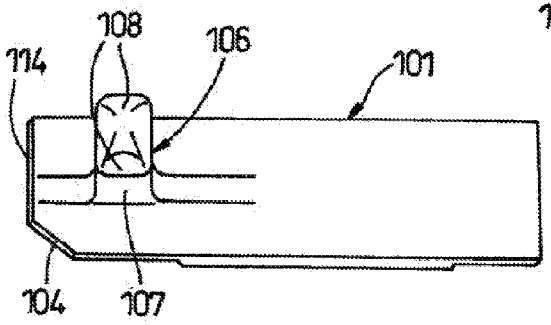
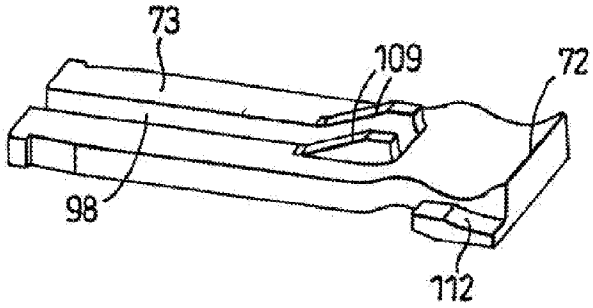


Fig 11

Fig 12



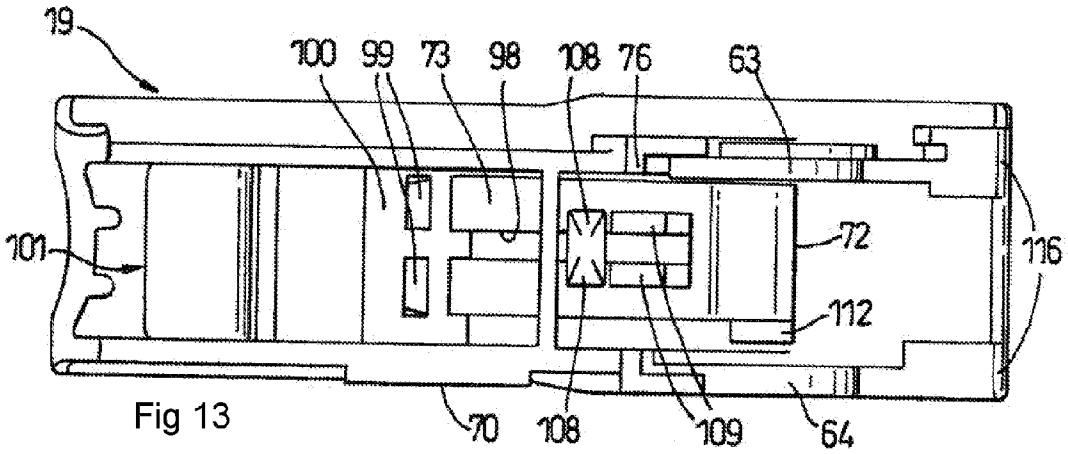


Fig 13

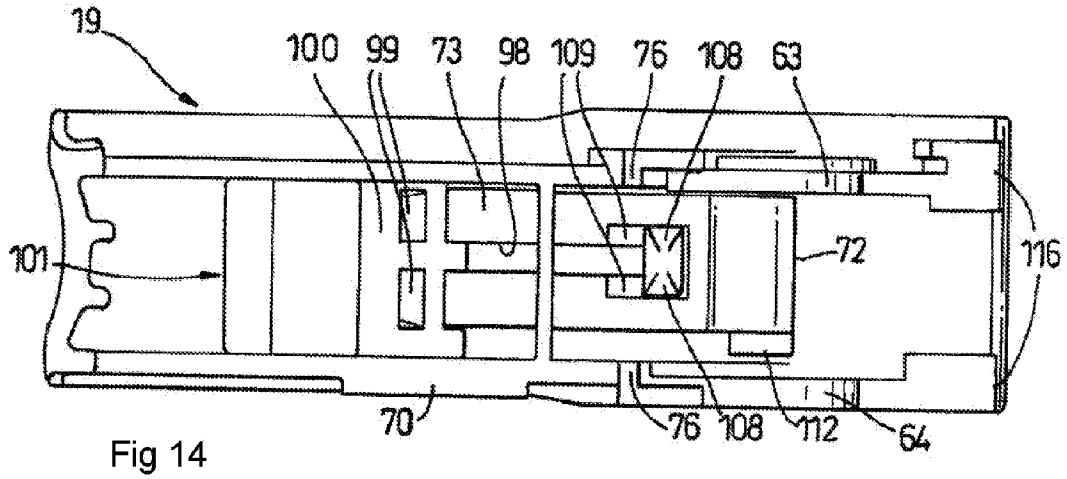
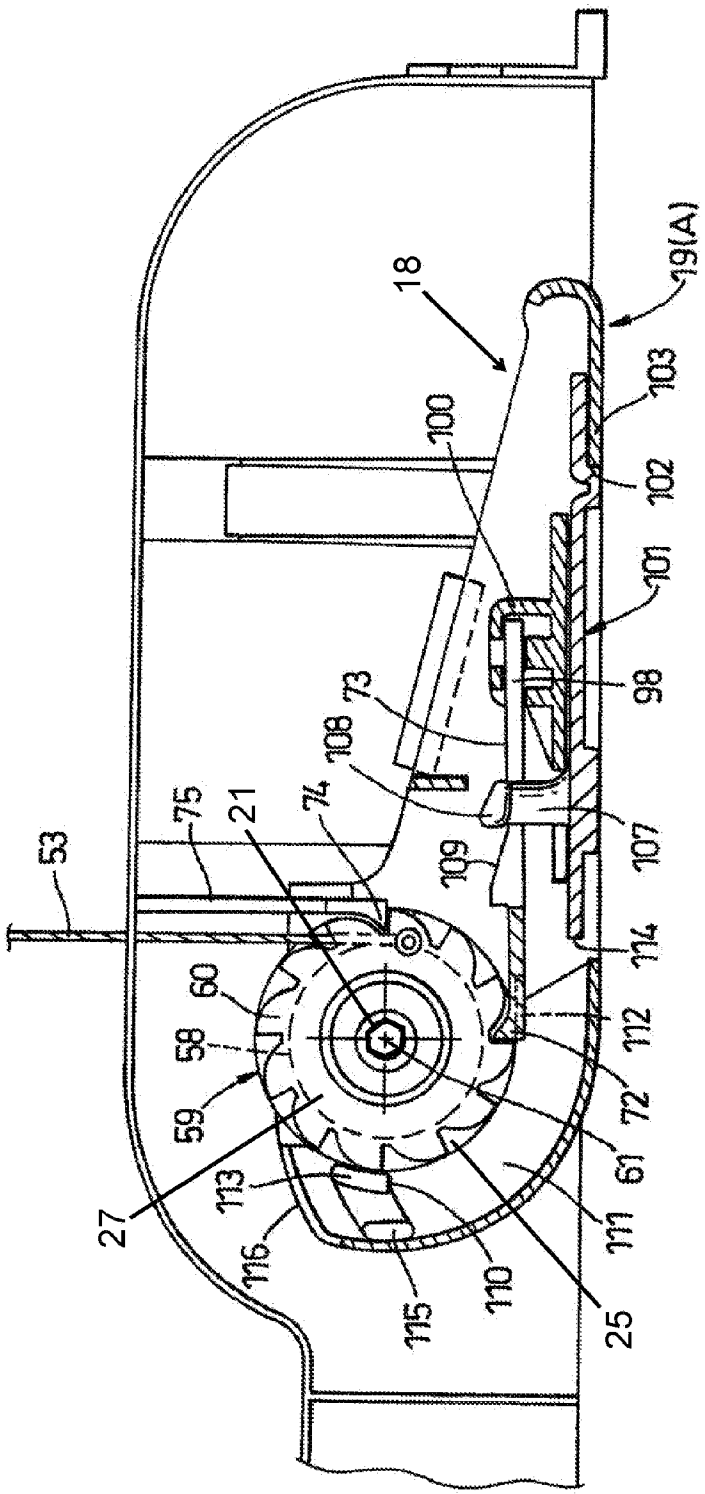


Fig 14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19(A)
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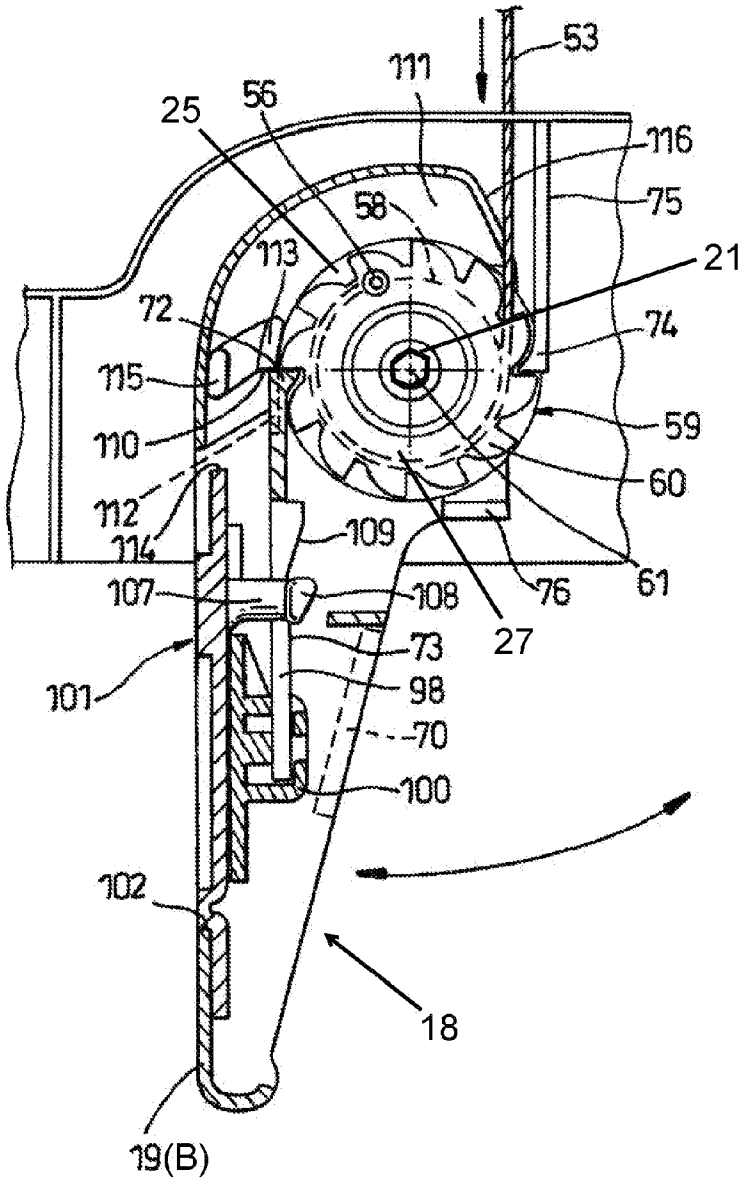
Fig 15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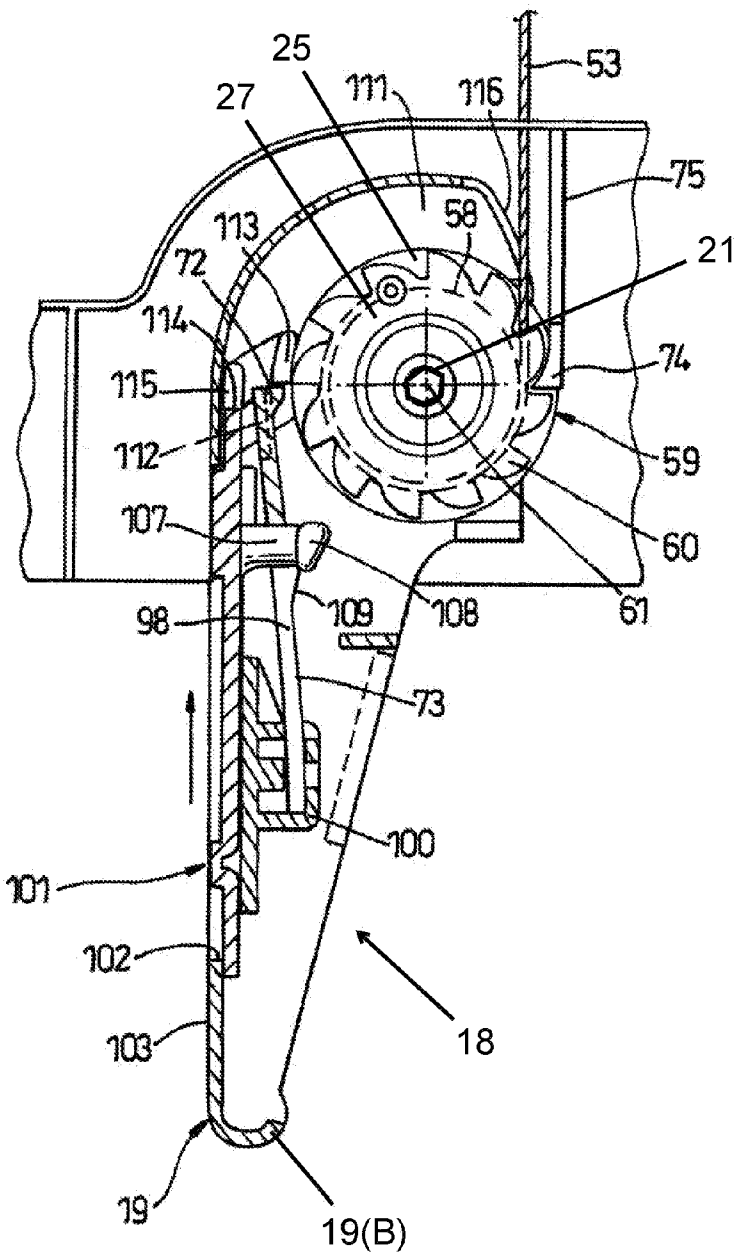
19(B)

Fig 16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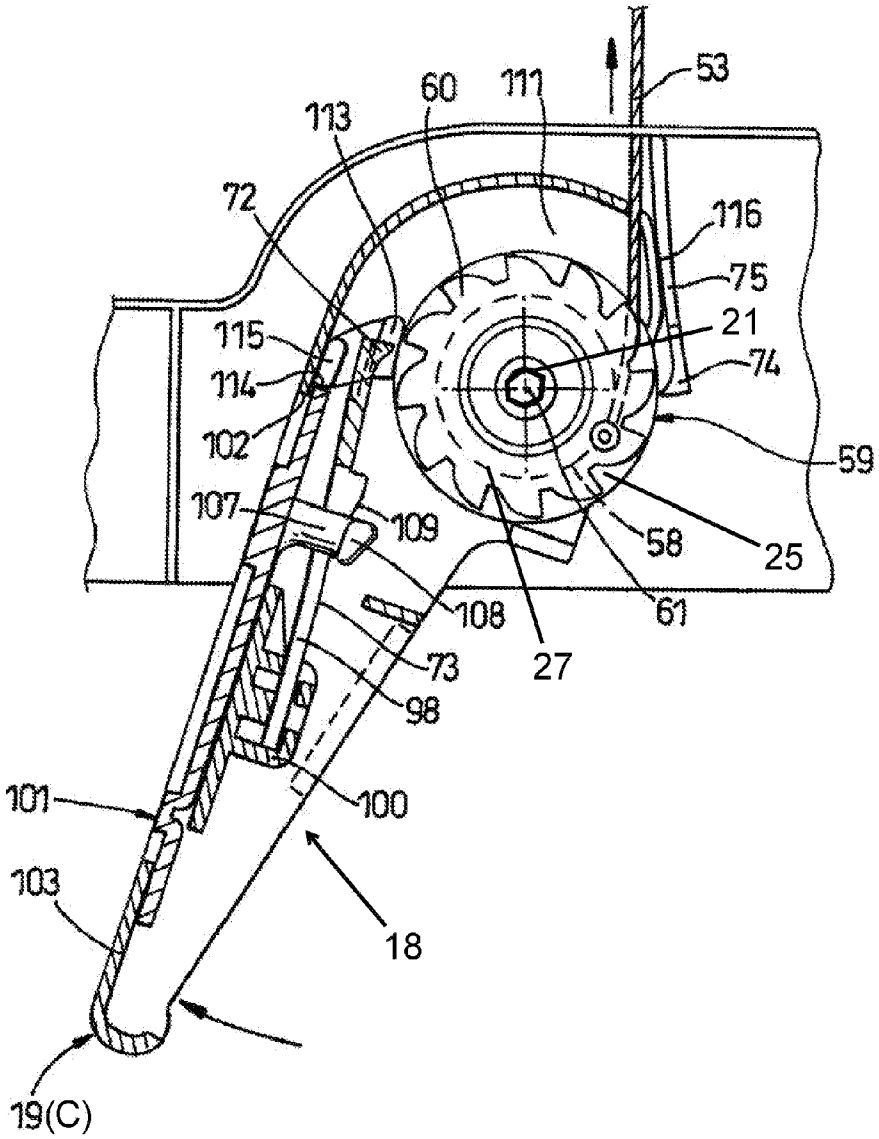
19(B)

Fig 17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19(C)

Fig 18

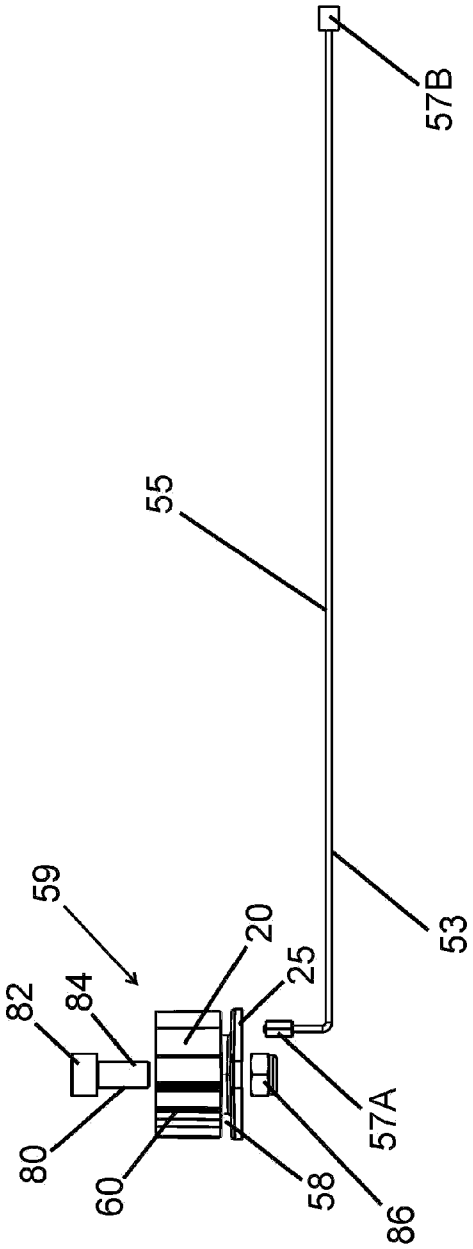


Fig 19

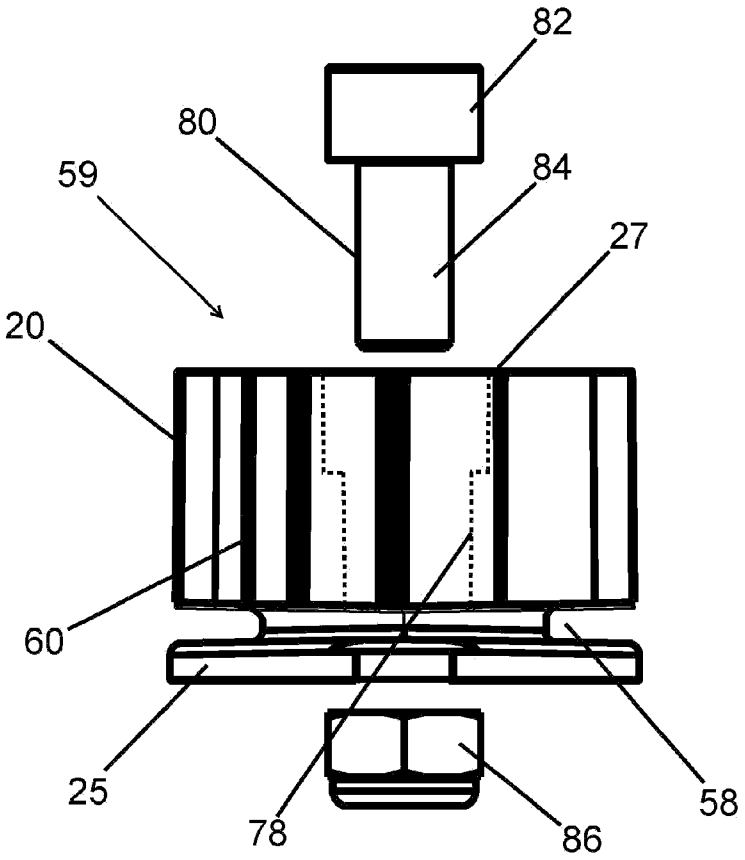
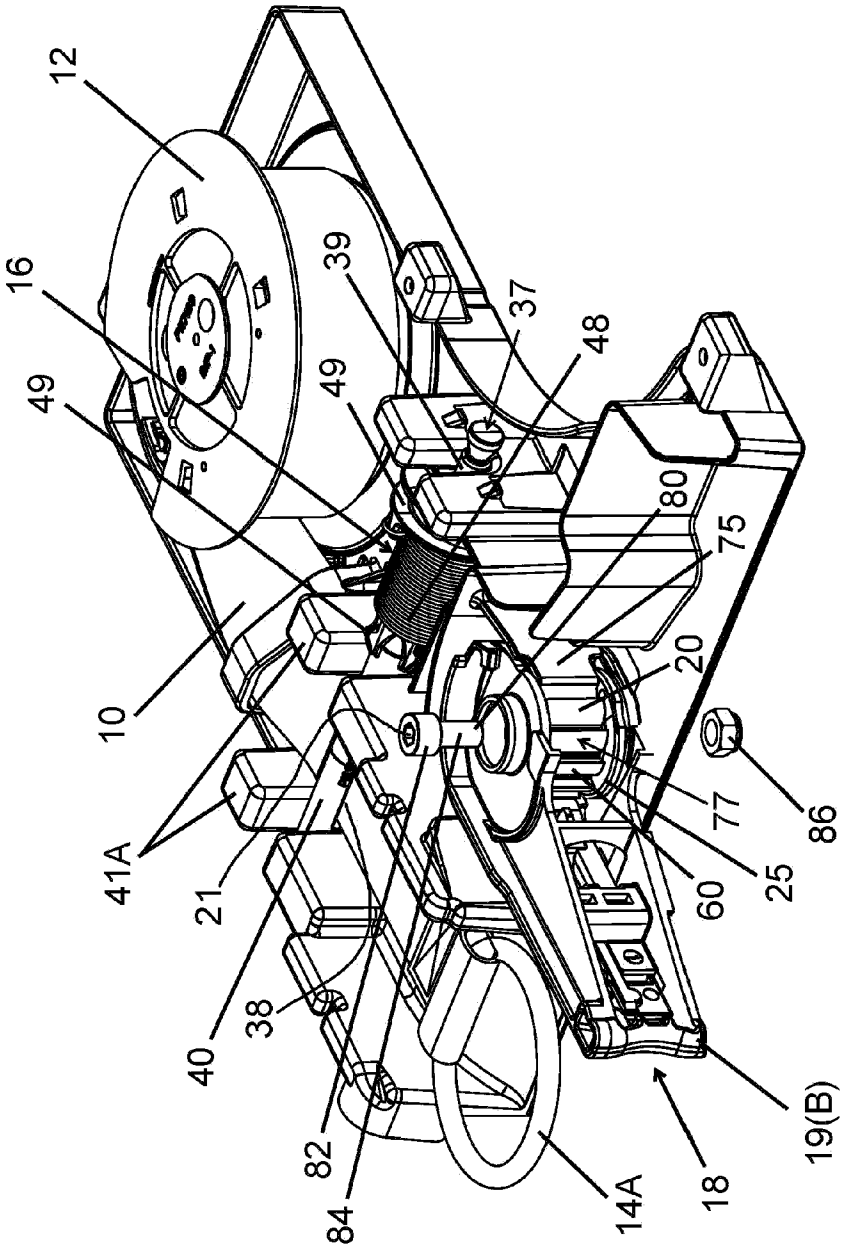


Fig 20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41A
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77
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38
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82
84
14A
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19(B)

Fig 21