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(54) **TOWEL DISPENSER**

**HANDTUCHSPENDER**

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(73) Proprietor: **KENNEDY HYGIENE PRODUCTS LTD**  
**Uckfield**

**East Sussex TN22 1YA (GB)**

(72) Inventor: **MACLEOD, William**

**Sussex BN12 4RU (GB)**

(74) Representative: **Thompson, Trevor George**

**Karsen Limited**

**1 Fore Street**

**London EC2Y 9DT (GB)**

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## Description

**[0001]** The present invention relates to a towel dispenser. More particularly, the present invention relates to a paper towel dispenser.

**[0002]** It is known to provide first and second rolls of towel for dispensing from a paper towel dispenser. When the first roll is exhausted, the second roll may be automatically transferred onto a support roller for dispensing. When the dispenser is serviced, the second roll is generally moved to the first roll position and a replacement second roll inserted.

**[0003]** US 6,314,850 discloses a paper towel dispensing apparatus having a rotatable member for loading towel from a second roll onto a support roller when towel from a first roll is depleted. A clip is provided at each end of the rotatable member to secure the towel from the second roll in position and, upon depletion of the towel from the first roll, the rotatable member is brought into contact with the support roller and rotated to supply towel from the second roll to the support roller. A spring is provided at each end of the support roller to bias the rotatable member against the support roller. However, it can prove difficult to secure the towel on the rotatable member using the spring-loaded clips. If it is not properly positioned, the towel may rip as the rotatable member rotates, preventing the towel from being transferred successfully onto the support roller. Moreover, if the springs for biasing the rotatable member towards the support roller are not matched, the towel may not be uniformly pressed against the support roller and it may skew in relation to the support roller leading to fouling of the apparatus.

**[0004]** US 6,826,985 discloses a paper towel dispensing apparatus for dispensing towel from first and second rolls from a support roller. The apparatus comprises a dispensing roller and a transfer roller for supplying towel to the support roller. Towel from the first roll is supplied to the support roller via the transfer roller. A channel extends through the dispensing roller for receiving a lead end of towel from the second roll and a series of raised portions provided on the dispensing roller contact the towel carried by the transfer roller and prevent rotation of the dispensing roller until the towel from a first roll is depleted. When the towel from the first roll is depleted, the dispensing roller is brought into contact with the transfer roller and rotated, thereby loading the towel from the second roll onto the transfer roller. However, loading the towel from the second roll through the channel in the dispensing roller may be time consuming. Moreover, if towel from the first roll rips, feeding the end of the towel onto the support roller may prove difficult as the raised portions on the dispensing roller restrict access.

**[0005]** A further limitation of known paper towel dispensers is that they typically dispense a sheet of towel having a length corresponding to the circumference of the support roller during each operational cycle. A cutter blade is actuated to cut the paper towel each time the support roller completes a single complete revolution. To

allow a length of towel of adequate length to be dispensed, the diameter of the support roller has to be relatively large thereby increasing the size of the towel dispenser.

**[0006]** It is known from PCT/US95/02506, published as WO9523677, to provide a drive roller and a cutting blade

support member on a frame. The cutting blade support member is mounted behind the drive roller and a V-shaped slot is provided in the drive roller for receiving a cutting blade mounted on the support member. A spur gear is attached to the cutting blade support member and meshes with a drive gear attached to the drive roller. The ratio of the drive gear to the spur gear is such that for every two rotations of the drive roller the cutting blade support member rotates once with the cutting blade being inserted into the V-shaped slot to cut the paper towel. The arrangement of the cutting blade and the drive roller externally of the drive roller results in a relatively large towel dispenser.

**[0007]** The pre-characterising features of claim 1 of the present application are known from EP 0933054.

**[0008]** The present invention, at least in preferred embodiments, attempts to overcome or ameliorate at least some of the problems associated with the prior art dispensers.

**[0009]** Viewed from a first aspect, the present invention relates to a paper towel dispensing apparatus for dispensing paper towel from a first roll, the apparatus comprising:

a housing having a cover;

a rotatable support roller for supporting the towel to be dispensed; and

a towel biasing device coupled to said cover, the towel biasing device being displaced to a first position for biasing towel against the support roller when the cover is closed; and the towel biasing device being displaced to a second position for facilitating the loading of towel when the cover is opened;

the apparatus further comprising a towel transfer mechanism for transferring towel from a second roll onto the support roller, the towel biasing device comprising a towel biasing member pivotable about a first axis substantially parallel to a rotational axis of the support roller, wherein the towel biasing device is operable to bias towel from the second roll against the support roller; and

the towel transfer mechanism comprising a floating member for cooperating with the towel from the first roll to control the towel biasing device; characterised in that a pathway is provided between the floating member and the towel biasing device for receiving towel from the second roll ready for transfer onto the support roller when the towel from the first roll is depleted.

**[0010]** By coupling the towel biasing device to the cov-

er, it may automatically be displaced to said first position when the cover is closed. Likewise, the towel biasing device may automatically be displaced to said second position when the cover is opened. The towel biasing device is preferably positioned adjacent the support roller when in said first position; and is preferably displaced from the support roller when in said second position.

**[0011]** It will be appreciated that the movement of the towel biasing device to either said first position or said second position could be performed manually. For example, the towel biasing device may be coupled to the cover such that it is displaced to said second position by the action of opening the cover, but returning the towel biasing device to the first position is performed manually before the cover is closed. Conversely, the towel biasing device could be manually moved to the second position after the cover has been opened, but the towel biasing device coupled to the cover such that it is returned to the first position by the action of closing the cover. However the towel biasing device is coupled to the cover such that it is moved to the first and second positions by the action of closing and opening the cover respectively.

**[0012]** The towel is typically provided between the support roller and the towel biasing device for dispensing. At least in preferred embodiments, when the dispensing apparatus is serviced, the cover is opened and the towel biasing device displaced to said second position to facilitate the positioning of towel between the support roller and the towel biasing device. The cover is then closed and may thereby return the towel biasing device to its first position adjacent to the support roller and may bias the towel against the support roller.

**[0013]** The towel biasing device could be mounted on one or more arms coupled to the cover. Preferably, however, the towel biasing device is mounted on the cover.

**[0014]** The towel biasing device comprises a towel biasing member, such as an elongate member or plate, for engaging the towel and biasing the towel against the support roller. The biasing member is pivotably mounted. The biasing member is pivotable about an axis substantially parallel to a rotational axis of the support roller. A spring could be provided for biasing the biasing member towards the support roller. Alternatively, the biasing member may be biased towards the support roller by gravity.

**[0015]** The towel transfer mechanism comprises a movable control member for cooperating with the towel from the first roll. The control member is referred to hereafter as a floating member but the terms are interchangeable. The floating member could be slidably mounted, for example in a pair of elongate channels. Preferably, however, the floating member is pivotably mounted. The floating member is preferably pivotable about an axis substantially parallel to the rotational axis of the support roller. A pathway for receiving towel is provided between the floating member and the towel biasing device. The pathway preferably extends at least substantially across

the width of the support member. In use, a length of towel from the second roll may be located in said pathway ready for transfer onto the support roller when the towel from the first roll is depleted.

**[0016]** The floating member operatively controls actuation of the towel biasing device. The movement of the floating member, for example upon depletion of the towel from the first roll, preferably actuates the towel biasing device to bias towel onto the support roller.

**[0017]** A first side of the floating member is preferably provided with at least one projection for engaging the towel from the first roll. The at least one projection is preferably at least one fin or rib. A corresponding recess is preferably provided in the support roller for receiving the or each projection. The recess is preferably an annular groove or an aperture. A second side of the floating member is preferably suitable for supporting the towel from the second roll. The second side of the floating member preferably faces the towel biasing device.

**[0018]** In use, the at least one projection contacts the towel from the first roll on the support roller and is prevented from locating in the corresponding recess (or recesses) provided in the support roller. When the towel from the first roll is depleted, the at least one projection locates in the recess in the support roller and the floating member moves towards the support roller. The resulting movement of the floating member may actuate the towel biasing device. Preferably, the movement of the floating member allows the biasing member to bias the towel from the second roll against the support roller. Thus, towel from the second roll may be transferred onto the support roller by the towel biasing device.

**[0019]** The support roller is preferably rotated by applying a pulling force to the end of the towel being dispensed. A manual drive, such as a wheel or handle, may be provided for rotating the support roller. The manual drive may be used to rotate the support roller to draw towel from the second roll through the dispensing apparatus once it has been transferred onto the support roller by the transfer mechanism. Alternatively, or in addition, a spring element may be provided automatically to rotate the support wheel once the towel from the second roll has been transferred.

**[0020]** The dispensing apparatus preferably comprises a tensioning arm for maintaining the towel under tension. The tensioning arm is preferably suitable for engaging the towel between the biasing member and the roll of towel. The tensioning arm may form part of the towel biasing device.

**[0021]** The cover is preferably pivotably mounted. Preferably, the cover is pivotable about an axis substantially coincident with the axis about which the first roll or the second roll is rotatable. If the towel biasing device is mounted on the cover this arrangement is advantageous since it reduces the likelihood of the towel biasing device fouling on the second roll of towel when the cover is opened or closed. Preferably, a portion of the cover may be received inside the housing of the dispensing appa-

ratus when the cover is pivoted to an open position.

**[0022]** The paper towel dispensing apparatus preferably comprises a cutter blade for cutting the towel from said first and second rolls. The cutter blade could be fixedly mounted, for example on the housing. Preferably, however, the cutter blade is movable to a cutting position. The cutter blade may be slidably or pivotably mounted. The rotation of the support roller preferably actuates the cutter blade and moves it to said cutting position.

**[0023]** The cutter blade preferably comprises a tip which extends, when the cutter blade is in the cutting position, at least in part in a direction opposite to the direction of rotation of the support roller when the towel is dispensed. The tip of the cutter blade is therefore disposed against movement of the towel as it is dispensed, which assists in the cutting of the towel. Preferably, the cutter blade has a curved cross-sectional profile to orient the tip rearwardly relative to the direction of rotation of the support roller when the cutter blade is actuated. The tip may be formed at a distal end of the cutter blade such that it is displaced from said support roller. The cutter blade preferably comprises a plurality of said tips.

**[0024]** The cutter blade may be mounted on the housing, but it is preferably mounted in the support roller. Preferably, at least a portion of the cutter blade extends outwardly beyond the outer circumference of the support roller when it is in said cutting position. The cutter blade preferably extends substantially radially outwardly when it is in said cutting position. A stop or guide member is preferably provided to limit the travel of the cutter blade so as not to pivot beyond said radial position. Preferably, the cutter blade is retractable at least substantially into an interior of the support roller.

**[0025]** The cutter blade is preferably actuated each time the support roller completes a plurality of whole revolutions. The cutter blade may be actuated each time the support roller completes two (2), three (3) or four (4) revolutions. This is advantageous since the length of towel dispensed may be larger than the circumference of the support roller. For example, if the cutter blade is actuated each time the support roller completes two revolutions, the length of towel dispensed will be twice the circumference of the support roller. Thus, the diameter of the support roller may be smaller than those of prior art dispensers.

**[0026]** A cutter blade actuator is preferably provided. The actuator preferably comprises a gear train. The gear train preferably couples the support roller to an axle on which at least one cam is mounted. The cutter blade is preferably provided with at least one cam follower for following said at least one cam.

**[0027]** Viewed from a further aspect, the present invention relates to a method of servicing a paper towel dispensing apparatus as described herein, the method comprising the steps of:

(a) moving the cover to an open position and thereby displacing the towel biasing device to said second

position displaced from the support roller;

(b) loading the towel dispensing apparatus with a first roll of towel and/or a second roll of towel;

(c) positioning a lead end of the towel to be dispensed over the rotatable support roller; and

(d) moving the cover to a closed position and thereby returning the towel biasing device to said first position proximal the support roller.

**[0028]** Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying Figures, in which:

Figure 1 shows an exploded perspective view of a paper towel dispenser in accordance with a first preferred embodiment of the present invention;

Figure 2 shows a perspective view of the support roller assembly according to the first embodiment with the cutter in a retracted position;

Figure 3 shows a perspective view of the support roller assembly according to the first embodiment with the cutter in an extended position;

Figures 4A and 4B show cross-sectional views along sections A-A and B-B of Figure 2 with the cutter blades in a retracted position;

Figures 5A and 5B show cross-sectional views along sections A'-A' and B'-B' of Figure 3 with the cutter blades in an extended position;

Figure 6 shows schematically the path of paper towel from a first roll and a second roll with the cover closed;

Figure 7 shows schematically the supply of paper towel from the first roll and the second roll with the cover open;

Figures 8A and 8B show cross-sectional views of a second embodiment of the present invention with the cutter blades in a retracted position, the cross-sectional views being along sections equivalent to sections A-A and B-B illustrated in Figure 2 in respect of the first embodiment; and

Figures 9A and 9B show cross-sectional views of the second embodiment with the cutter blades in an extended position, the cross-sectional views being along sections equivalent to sections A'-A' and B'-B' illustrated in Figure 3 in respect of the first embodiment.

**[0029]** An exploded perspective view of a paper towel dispenser 1 for dispensing paper towel T' from a first roll 3 and towel T" from a second roll 5 in accordance with a first embodiment of the present invention is shown in Figure 1. The dispenser 1 comprises a support roller assembly 7, a towel guide assembly 9, a front tension plate 11, a floating plate 13 and a towel loading assembly 15.

**[0030]** A dispenser cover 17 is provided for covering the support roller assembly 7 and the first and second rolls 3, 5. The cover 17 is pivotably mounted on a back plate 19 and may be opened to facilitate servicing of the

dispenser 1. First and second side panels 21, 23 are provided to complete the dispenser housing. A rotary knob 25 is provided in the first side panel 21 to allow the support roller assembly 7 to be driven manually.

**[0031]** The cover 17 is pivotable about an axis substantially parallel with the axis about which the second roll rotates. This arrangement could be modified such that the cover 17 pivots about an axis substantially coincident with the axis about which the second roll rotates and arranged such that a portion of the cover 17 locates between the second roll 5 and the back plate 19 when the cover is open. A lock (not shown) is provided for securing the cover to prevent unauthorised access.

**[0032]** The second roll 5 is rotatably mounted on roll carrier arms 27, 29 mounted on the back plate 19. The first roll 3 is supported on a curved section 31 of the base of the dispenser 1. The centre of the first and second rolls 3, 5 may be open to allow the rolls 3, 5 to be carried on an axle mounted on said first and second roll carriers. Alternatively, the rolls 3, 5 may have a central tube, for example made of cardboard, supported at each end. As described herein, towel is dispensed from the first roll 3 and then, once the first roll 3 is depleted, from the second roll 5. As such, the second roll 5 may be considered as a reserve roll of towel. When the dispenser 1 is serviced, the partially used second roll 5 is generally transferred to the back of the dispenser 1 and effectively becomes the first roll 3.

**[0033]** As shown in Figure 2, the support roller assembly 7 is mounted on first and second side members 33, 35. The support roller assembly 7 comprises a support roller 37 for supporting towel T to be dispensed, a cutter blade assembly 39, a gear train 41 and a central axle 43. The support roller 37 has a rubberised outer surface for frictionally engaging the towel, and is drivably rotated when a user pulls on the end of the towel T to extract towel from the dispenser 1 or rotates the knob 25. The cutter blade assembly 39 comprises a pair of transverse cutter blades 45 for cutting at least partway across the width of the towel T. A cutter blade actuator 47 is provided inside the support roller 37 for actuating the cutter blades 45.

**[0034]** The cutter blades 45 are pivotably mounted on pivot pins 49 located in mounting apertures (not shown) provided in the sidewalls of the support roller 37. The mounting apertures for the pivot pins 49 are radially inset from the outer surface of the support roller 37. The cutter blades 45 are movable between a retracted position (shown in Figure 2) and an extended position (shown in Figure 3) for cutting the paper towel carried by the support roller 37. When in said retracted position, the cutter blades 45 are disposed substantially completely within the support roller 37; and, when in said extended position, the cutter blades 45 extend substantially radially outwardly and at least the tips thereof project beyond the circumference of the support roller 37. One or more stops may be provided to limit the travel of the cutter blades 45, for example to prevent them pivoting beyond a radial

direction when in said extended position.

**[0035]** Cross-sectional views of the support roller 37 at section A-A of Figure 2 and section A'-A' of Figure 3 are shown in Figures 4A and 5A respectively. Similarly, cross-sectional views of the support roller 37 at section B-B of Figure 2 and section B'-B' of Figure 3 are shown in Figures 4B and 5B.

**[0036]** The cutter blade actuator 47 comprises first and second cams 51, 53 mounted on the central axle 43; a first cam follower 55 coupled to the cutter blades 45 for following the first cam 51; and a pivotably mounted retracting member 57 having a second cam follower 59 for following the second cam 53. The first cam 51 cooperates with the first cam follower 55 to displace the cutter blades 45 to said extended position, as shown in Figure 5A. Conversely, the second cam 53 cooperates with the second cam follower 59 to pivot the retracting member 57 and cause the cutter blades 45 to retract, as shown in Figure 4B.

**[0037]** When the central axle 43 is oriented such that the first cam 51 engages the first cam follower 55, the retracting member 57 locates in a recess provided in the cutter blade assembly 39 so as not to interfere with the movement of the cutter blades 45, as shown in Figure 5B. Likewise, when the central axle 43 is oriented such that the retracting member 57 engages the cutter blade assembly 39 to retract the cutter blades 45, the first cam 51 is offset from the first cam follower 55 so as not to interfere with the movement of the blades 45, as shown in Figure 4A.

**[0038]** The central axle 43 is coupled to the support roller 27 via the gear train 41. The gear train 41 comprises a first gear wheel 59 connected directly to the support roller 37. The first gear wheel 59 meshes with a second gear wheel 61 mounted on a second axle 63. The first and second gear wheels 59, 61 have a 1:1 gear ratio so that the support roller 37 and the second axle 63 rotate at the same speed. A third gear wheel 65 is mounted on the second axle 63. The rotation of the second axle 63 drives the third gear wheel 65 which meshes with a fourth gear wheel 67 mounted on the central axle 43. The third and fourth gears 65, 67 have a gear ratio of 3:2. Thus, the central axle 43 completes three revolutions for every two revolutions of the support roller 37.

**[0039]** A series of annular grooves 69 are provided in the outer surface of the support roller 37. An exit guide 71 comprising a plurality of curved lifting members 73 is provided below the support roller 37. The lifting members 73 extend into the annular grooves 69 to lift the towel off of the support roller 37 and to guide it out of the dispenser 1.

**[0040]** A curved supply guide (not shown) may be provided at the rear of the support roller assembly 7 for guiding towel from the first roll 3 onto the support roller 37. The supply guide may be located proximal the outer surface of the support roller 37 to prevent the towel entering the area behind the support roller 37.

**[0041]** The towel guide assembly 9 comprises a guide

roller 75 and a set of three elongate guide fingers 77. The guide roller 63 defines a curved surface over which the towel T is drawn as it exits the dispenser 1. The guide fingers 77 are curved to match the profile of the support roller 37 and, in use, help to retain the towel in contact with the surface of the support roller 37. Furthermore, the tips of the guide fingers 77 cooperate with the floating plate 13 to bias it towards the support roller 37, as described in more detail below.

**[0042]** The front tension plate 11 has four mounting pins 79 which locate in corresponding mounting apertures 81 provided in the side members 33, 35. The mounting apertures 81 could be elongated to enable the front tension plate 11 to be moved relative to the support roller 27.

**[0043]** The floating plate 13 is pivotably mounted at an upper end of the front tension plate 11. The floating plate 13 has a plurality of ribs 83 locatable in the annular grooves 69 provided in the support roller 37. The ribs 83 have a concave introductory portion to facilitate lifting of the floating plate 13 when an end of the towel is initially advanced with the support roller 37. When a length of towel is carried by the support roller 37, the ribs 83 rest on the towel and the floating plate 13 is supported in a raised position, as shown in Figure 6. When there is no towel on the support roller 37, the ribs 83 locate in the annular grooves 69 and the floating plate 13 is displaced towards the support roller 37.

**[0044]** The loading plate assembly 15 comprises a loading plate 85 and a biasing member 87 operable to bias the towel towards the support roller 37. The biasing member 87 is pivotably mounted; or it could comprise a resilient member or a spring element for biasing the towel towards the support roller 37. The loading plate 85 is mounted on the cover 17 of the dispenser 1 and is moved into an operating position when the cover 17 is closed, as shown in Figure 6. The biasing member 87 is pivotably mounted on the loading plate 85 so as to pivot about an axis substantially parallel to the rotational axis of the support roller 37. In use, when the cover 17 is in a closed position, a free end of the biasing member 87 engages the towel T to bias it towards the support roller 37. Conversely, when the cover 17 is in an open position, the loading plate assembly 15 is located distal from the support roller 37, as shown in Figure 7.

**[0045]** The towel T' is initially dispensed from the bottom of the first roll 3 onto the support roller 37. The ribs 83 of the floating member 13 rest on an upper surface of the towel T' as it is carried by the support roller 37 and maintain the floating member 13 and the biasing member 87 in raised positions. The towel T' travels between the guide fingers 77 and the support roller 37 and over the guide roller 75. The lifting members 73 of the exit guide 71 lift the towel T' off of the support roller 37 and ensure that it does not encircle the support roller 37. The lead end of the towel T' from the first roll 3 extends out of the base of the dispenser 1 a sufficient distance to enable it to be gripped by a user.

**[0046]** The second roll 5 is located above the support roller assembly 7 and towel T" is fed from the bottom of the second roll 5 between the floating member 13 and the towel loading assembly 15. The lead end of the towel T" from the second roll 5 extends over the front tension plate 11. When towel T' from the first roll 3 is on the support roller 37, the floating member 13 and the biasing member 87 are in raised positions and the towel T" from the second roll 5 is not biased onto the support roller 27.

**[0047]** To operate the dispenser 1, a user pulls on the lead end of the towel T' supplied from the first roll 3. The towel T' engages the rubberised surface of the support roller 37 and causes the support roller 37 to rotate. The rotation of the support roller 37 rotates the first gear 59 which, via the gear train 41, rotates the central axle 43. The first cam follower 55 tracks the first cam 51 as the central axle 43 rotates thereby displacing the cutter blades 45 to their extended position each time the support roller 27 undergoes two complete revolutions (the central axle having completed three complete revolutions).

**[0048]** The movement of the cutter blades 45 to the extended position combined with the continued pulling action of the user on the towel T' causes the towel T' to be cut at least partially across its width. The cut length of towel T' may be withdrawn from the dispenser 1. A spring may be provided automatically to continue the rotation of the support roller 27 and expose a length of the towel to be gripped by another user. The rotary knob 25 is provided for rotating the support roller 27 and manually advancing the towel. A lever or other drive mechanism could equally be provided for manually rotating the support roller 27.

**[0049]** The continued rotation of the central axle 43 causes the second cam 53 to pivot the retracting member 57 which in turn pivots the cutter blades 45 to their retracted position.

**[0050]** The dispensing cycle is repeated until the towel T' on the first roll 3 is depleted, thereby exposing the annular grooves 69 on the support roller 37. The floating member 13 is biased by the guide fingers 77 towards the support roller 37 and, when the supply of towel T' is exhausted, the ribs 83 locate in the annular grooves 69. The biasing member 87 is then allowed to bias the towel T" from the second roll 5 against the surface of the support roller 37. The support roller 37 is then rotated using the rotary knob 25 to advance the towel T" from the second roll 5. The towel T" from the second roll 5 is drawn under the floating member 13 lifting the ribs 83 out of the annular grooves 69. The guide fingers 77 bias the floating member 13 against the towel T" thereby ensuring that the towel remains in close contact with the support roller 37. The lead end of the towel T" on the second roll 5 is drawn back between the floating member 13 and the biasing member 87 and is then dispensed over the exit guide 75. The towel T" from the second roll 5 may be dispensed in the same manner as described above for the first roll 3.

**[0051]** The dispenser 1 is serviced periodically. The

cover 17 is unlocked and moved to its open position thereby displacing the towel loading assembly 15 away from the floating member 13. Thus, opening the cover 17 displaces the towel loading assembly 15 away from the support roller 27 and exposes the front tension plate 11 and the floating member or plate 13.

**[0052]** If there is towel T" remaining on the second roll 5, the second roll 5 is removed from the roll carrier arms 27 and moved to the back of the dispenser 1. Thus, the second roll 5 becomes the first roll 3. Advantageously, the second roll 5 may be moved to the back of the dispenser 1 without removing the towel T from the support roller 27.

**[0053]** A new second roll 5 is then mounted on the carrier arms 27. The lead end of the towel T" from the replacement second roll 5 is placed over the upper surface of the floating member 3 and positioned over the front tension plate 11, as shown in Figure 7. The cover 17 may then be returned to its closed position thereby locating the towel loading assembly 15 above the floating member 13.

**[0054]** If both the first and second rolls 3, 5 are depleted when the towel dispenser is serviced, a length of towel from the replacement first roll 3 may be supplied over the support roller 37 by lifting the floating member 13. This process may be facilitated by repositioning the front tension plate 11 by moving it away from the support roller 27.

**[0055]** A second preferred embodiment of the present invention is substantially identical to the first embodiment, with the exception that the profile of the cutter blades 45 is altered. The second preferred embodiment is illustrated in Figures 8A, 8B, 9A and 9B which show cross-sectional views equivalent to those illustrated in Figures 4A, 4B, 5A and 5B respectively for the first embodiment. Like reference numerals have been used to reference like components in the second embodiment.

**[0056]** The cutter blades 45 of the second embodiment comprise a plurality of tips 46 which extend, when the cutter blades 45 are in the extended position, at least in part in a direction opposite to the direction of rotation of the support roller 37 as the towel T is dispensed. The cutter blades 45 have a curved cross-sectional profile such that, when actuated, the tips 46 are inclined in a rearwards direction relative to the direction of rotation of the support roller 37. As such, the distal ends of the cutter blades 45 face towards the paper towel carried by the support roller 37 as it is dispensed. This increases the effectiveness of the cutter blades 45 in cutting the paper towel.

**[0057]** Figures 8A and 8B show the cutter blades 45 in a retracted position. As for the first embodiment, when the cutter blades 45 are in the retracted position, the cutter blades 45 are disposed substantially completely within the support roller 37. Conversely, when in an extended position (as shown in Figures 9A and 9B), the cutter blades 45 extend radially outwardly and at least the tips thereof project beyond the circumference of the support roller 37.

**[0058]** The means by which the cutter blades 45 of the second embodiment are actuated are identical to that in the first embodiment. In particular, a cutter blade actuator 47 is provided which comprises first and second cams 51, 53 mounted on a central axle 43; a first cam follower 55 coupled to the cutter blades 45 for following the first cam 51; and a pivotally mounted retracting member 57 having a second cam follower 59 for following the second cam 53. These features operate in a manner identical to that for the first embodiment, enabling the cutter blades 45 to be extended towards the extended position and retracted towards the retracted position.

**[0059]** It will be appreciated that various changes and modifications may be made to the embodiments described herein without departing from the scope of the present invention, as defined by the appended claims. For example, although the towel loading assembly 15 is mounted directly on the cover 17 in the preferred embodiment, the towel loading assembly 15 could equally be mounted on support members, such as movable arms, coupled to the cover 17.

**[0060]** The coupling of the towel biasing device to the cover of the apparatus could simplify loading of replacement towel since it could be located over the tension plate and automatically biased against the support roller when the cover is closed.

**[0061]** Although the present invention has been described with reference to dispensing paper towel, it will be appreciated that the apparatus may be used to dispense other sheet materials.

## Claims

1. A paper towel dispensing apparatus (1) for dispensing paper towel (T) from a first roll (3), the apparatus comprising:

a housing having a cover (17);  
a rotatable support roller (37) for supporting the towel (T) to be dispensed; and  
a towel biasing device coupled to said cover (17), the towel biasing device being displaced to a first position for biasing towel against the support roller (37) when the cover (17) is closed; and the towel biasing device being displaced to a second position for facilitating the loading of towel when the cover (17) is opened;  
the apparatus further comprising a towel transfer mechanism for transferring towel from a second roll (5) onto the support roller (37), the towel biasing device comprising a towel biasing member (87) pivotable about a first axis substantially parallel to a rotational axis of the support roller (37), wherein the towel biasing device is operable to bias towel from the second roll (5) against the support roller (37); and  
the towel transfer mechanism comprising a

- floating member (13) for cooperating with the towel (T) from the first roll (3) to control the towel biasing device;  
**characterised in that** a pathway is provided between the floating member (13) and the towel biasing device for receiving towel from the second roll (5) ready for transfer onto the support roller (37) when the towel from the first roll (3) is depleted.
2. A paper towel dispensing apparatus (1) as claimed in claim 1, wherein the towel biasing device is mounted on the cover (17).
  3. A paper towel dispensing apparatus (1) as claimed in claim 1 or claim 2, wherein the towel biasing device comprises an elongate member (87) for biasing the towel against the support roller (37).
  4. A paper towel dispensing apparatus (1) as claimed in claim 1, 2 or 3, wherein a first side of the floating member (13) is provided with at least one projection for engaging the towel from the first roll (3), the at least one projection being locatable in at least one corresponding recess in the support roller (37) when the towel from the first roll (3) is depleted.
  5. A paper towel dispensing apparatus (1) as claimed in claim 4, wherein the floating member (13) has a second side for supporting the towel from the second roll (5).
  6. A paper towel dispensing apparatus (1) as claimed in any one of the preceding claims, wherein the floating member (13) is pivotably mounted.
  7. A paper towel dispensing apparatus (1) as claimed in claim 6, wherein the floating member (13) is pivotable about a second axis substantially parallel to the rotational axis of the support roller (37).
  8. A paper towel dispensing apparatus (1) as claimed in any one of the preceding claims, wherein the towel biasing device further comprises a tensioning arm.
  9. A paper towel dispensing apparatus (1) as claimed in any one of the preceding claims further comprising a cutter blade for cutting the towel (T) from said first and second rolls (3, 5).
  10. A paper towel dispensing apparatus (1) as claimed in claim 9, wherein said cutter blade is mounted on the support roller (37).
  11. A paper towel dispensing apparatus (1) as claimed in claim 10, wherein said cutter blade (45) is retractable at least substantially into an interior of the support roller (37).

12. A paper towel dispensing apparatus (1) as claimed in claim 9, 10 or 11, wherein said cutter blade (45) is actuated each time the support roller (37) completes a predetermined number of revolutions.
13. A paper towel dispensing apparatus (1) according to any one of claims 9 to 12, wherein the cutter blade (45) comprises a tip which extends, when the cutter blade (45) is in a cutting position, at least in part in a direction opposite to a direction of rotation of the support roller (37) when the towel (T) is dispensed.
14. A paper towel dispensing apparatus (1) according to claim 13, wherein the tip is formed by a curved section (31) of the cutter blade (45).
15. A method of servicing a paper towel dispensing apparatus (1) as claimed in any one of the preceding claims, the method comprising the steps of:
  - (a) moving the cover (17) to an open position and thereby displacing the towel biasing device to said second position displaced from the support roller (37);
  - (b) loading the towel dispensing apparatus (1) with a first roll (3) of towel (T) and/or a second roll (5) of towel (T);
  - (c) positioning a lead end of the towel to be dispensed over the rotatable support roller (37); and
  - (d) moving the cover (17) to a closed position and thereby returning the towel biasing device to said first position proximal the support roller (37).

## Patentansprüche

1. Papiertuchausgabevorrichtung (1) zum Ausgeben eines Papiertuchs (T) von einer ersten Rolle (3), wobei die Vorrichtung aufweist:
 

ein Gehäuse mit einer Abdeckung (17);  
 eine drehbare Tragwalze (37) zum Tragen des Tuchs (T), das auszugeben ist; und  
 eine Tuchvorspannvorrichtung, die mit der Abdeckung (17) verbunden ist, wobei die Tuchvorspannvorrichtung an eine erste Position verschoben wird, um das Tuch gegen die Tragwalze (37) vorzuspannen, wenn die Abdeckung (17) geschlossen ist; und wobei die Tuchvorspannvorrichtung an eine zweite Position verschoben wird, um das Laden des Tuchs zu erleichtern, wenn die Abdeckung (17) geöffnet ist; wobei die Vorrichtung ferner einen Tuchübertragungsmechanismus aufweist, um das Tuch von einer zweiten Rolle (5) auf die Tragwalze (37) zu übertragen, wobei die Tuchspannvorrichtung

- ein Tuchvorspannelement (87) aufweist, das um eine erste Achse geschwenkt werden kann, die im Wesentlichen parallel zu einer Drehachse der Tragwalze (37) ist, wobei die Tuchvorspannvorrichtung dazu dient, das Tuch von der zweiten Rolle (5) gegen die Tragwalze (37) vorzuspannen; und wobei der Tuchübertragungsmechanismus ein gleitendes Element (13) aufweist, um mit dem Tuch (T) ab der ersten Rolle (3) zusammenzuwirken, um die Tuchvorspannvorrichtung zu steuern;
- dadurch gekennzeichnet, dass** sich ein Pfad zwischen dem gleitenden Element (13) und der Tuchvorspannvorrichtung befindet, um ein Tuch von der zweiten Rolle (5) zu empfangen, das für die Übertragung auf die Tragwalze (37) bereit ist, wenn das Tuch der ersten Rolle (3) aufgebraucht ist.
2. Papiertuchausgabevorrichtung (1) nach Anspruch 1, wobei die Tuchvorspannvorrichtung auf der Abdeckung (17) befestigt ist.
  3. Papiertuchausgabevorrichtung (1) nach Anspruch 1 oder 2, wobei die Tuchvorspannvorrichtung ein Verlängerungselement (87) aufweist, um das Tuch gegen die Tragwalze (37) vorzuspannen.
  4. Papiertuchausgabevorrichtung (1) nach Anspruch 1, 2 oder 3, wobei eine erste Seite des gleitenden Elements (13) mit zumindest einem Vorsprung versehen ist, um das Tuch von der ersten Rolle (3) einzurasten, wobei sich der zumindest eine Vorsprung in zumindest einer entsprechenden Vertiefung in der Tragwalze (37) befinden kann, wenn das Tuch der ersten Rolle (3) aufgebraucht ist.
  5. Papiertuchausgabevorrichtung (1) nach Anspruch 4, wobei das gleitende Element (13) eine zweite Seite aufweist, um das Tuch von der zweiten Rolle (5) zu tragen.
  6. Papiertuchausgabevorrichtung (1) nach einem der vorgenannten Ansprüche, wobei das gleitende Element (13) schwenkbar befestigt ist.
  7. Papiertuchausgabevorrichtung (1) nach Anspruch 6, wobei das gleitende Element (13) um eine zweite Achse geschwenkt werden kann, die im Wesentlichen zu der Drehachse der Tragwalze (37) parallel ist.
  8. Papiertuchausgabevorrichtung (1) nach einem der vorgenannten Ansprüche, wobei die Tuchvorspannvorrichtung ferner einen Verspannungsarm aufweist.
  9. Papiertuchausgabevorrichtung (1) nach einem der vorgenannten Ansprüche, ferner aufweisend eine Schneidklinge zum Schneiden des Tuchs (T) der ersten und zweiten Rollen (3, 5).
  10. Papiertuchausgabevorrichtung (1) nach Anspruch 9, wobei die Schneidklinge auf der Tragwalze (37) befestigt ist.
  11. Papiertuchausgabevorrichtung (1) nach Anspruch 10, wobei die Schneidklinge (45) zumindest größtenteils in ein Inneres der Tragwalze (37) zurückziehbar ist.
  12. Papiertuchausgabevorrichtung (1) nach Anspruch 9, 10 oder 11, wobei die Schneidklinge (45) jedes Mal betätigt wird, wenn die Tragwalze (37) eine vorgegebene Anzahl von Umdrehungen vollführt hat.
  13. Papiertuchausgabevorrichtung (1) nach einem der Ansprüche 9 bis 12, wobei die Schneidklinge (45) eine Spitze aufweist, die, wenn sich die Schneidklinge (45) in einer Schneidposition befindet, zumindest teilweise in eine Richtung verläuft, die einer Drehrichtung der Tragwalze (37), wenn das Tuch (T) ausgegeben wird, entspricht.
  14. Papiertuchausgabevorrichtung (1) nach Anspruch 13, wobei die Spitze durch einen gebogenen Abschnitt (31) der Schneidklinge (45) gebildet wird.
  15. Verfahren zum Warten einer Papiertuchausgabevorrichtung (1) nach einem der vorgenannten Ansprüche, wobei das Verfahren die folgenden Schritte aufweist:
    - (a) Bewegen der Abdeckung (17) auf eine geöffnete Position und dadurch Verschieben der Tuchvorspannvorrichtung auf die zweite Position, die von der Tragwalze (37) verschoben ist;
    - (b) Beladen der Tuchausgabevorrichtung (1) mit einer ersten Rolle (3) des Tuchs (T) und/oder einer zweiten Rolle (5) des Tuchs (T);
    - (c) Positionieren eines Anfangsstücks des auszugebenden Tuchs über der drehbaren Tragwalze (37); und
    - (d) Bewegen der Abdeckung (17) auf eine geschlossene Position und dadurch Rückkehr der Tuchausgabevorrichtung auf die erste Position in der Nähe der Tragwalze (37).

#### Revendications

1. Appareil de distribution de serviette en papier (1) pour distribuer une serviette en papier (T) à partir d'un premier rouleau (3), l'appareil comprenant :

- un boîtier ayant un couvercle (17) ;  
 un rouleau de support rotatif (37) pour supporter la serviette (T) à distribuer ; et  
 un dispositif de sollicitation de serviette couplé audit couvercle (17), le dispositif de sollicitation de serviette étant déplacé dans une première position pour solliciter la serviette contre le rouleau de support (37) lorsque le couvercle (17) est fermé ; et le dispositif de sollicitation de serviette étant déplacé dans une seconde position pour faciliter le chargement de la serviette lorsque le couvercle (17) est ouvert ;  
 l'appareil comprenant en outre un mécanisme de transfert de serviette pour transférer la serviette du second rouleau (5) sur le rouleau de support (37), le dispositif de sollicitation de serviette comprenant un élément de sollicitation de serviette (87) pouvant pivoter autour d'un premier axe sensiblement parallèle à un axe de rotation du rouleau de support (37), dans lequel le dispositif de sollicitation de serviette peut fonctionner pour solliciter la serviette du second rouleau (5) contre le rouleau de support (37) ; et un mécanisme de transfert de serviette comprenant un élément flottant (13) pour coopérer avec la serviette (T) du premier rouleau (3) afin de commander le dispositif de sollicitation de serviette ;  
**caractérisé en ce qu'une** voie de passage est prévue entre l'élément flottant (13) et le dispositif de sollicitation de serviette pour recevoir la serviette du second rouleau (5) prête pour le transfert sur le rouleau de support (37) lorsque la serviette du premier rouleau (3) est épuisée.
2. Appareil de distribution de serviette en papier (1) selon la revendication 1, dans lequel le dispositif de sollicitation de serviette est monté sur le couvercle (17).
  3. Appareil de distribution de serviette en papier (1) selon la revendication 1 ou la revendication 2, dans lequel le dispositif de sollicitation de serviette comprend un élément allongé (87) pour solliciter la serviette contre le rouleau de support (37).
  4. Appareil de distribution de serviette en papier (1) selon la revendication 1, 2 ou 3, dans lequel un premier côté de l'élément flottant (13) est prévu avec au moins une saillie pour mettre en prise la serviette du premier rouleau (3), la au moins une saillie pouvant être positionnée dans au moins un évidement correspondant dans le rouleau de support (37) lorsque la serviette du premier rouleau (3) est épuisée.
  5. Appareil de distribution de serviette en papier (1) selon la revendication 4, dans lequel l'élément flottant (13) a un second côté pour supporter la serviette du second rouleau (5).
  6. Appareil de distribution de serviette en papier (1) selon l'une quelconque des revendications précédentes, dans lequel l'élément flottant (13) est monté de manière pivotante.
  7. Appareil de distribution de serviette en papier (1) selon la revendication 6, dans lequel l'élément flottant (13) peut pivoter autour d'un second axe sensiblement parallèle à l'axe de rotation du rouleau de support (37).
  8. Appareil de distribution de serviette en papier (1) selon l'une quelconque des revendications précédentes, dans lequel le dispositif de sollicitation de serviette comprend en outre un bras de tension.
  9. Appareil de distribution de serviette en papier (1) selon l'une quelconque des revendications précédentes, comprenant en outre une lame de dispositif de coupe pour couper la serviette (T) desdits premier et second rouleaux (3, 5).
  10. Appareil de distribution de serviette en papier (1) selon la revendication 9, dans lequel ladite lame de dispositif de coupe est montée sur le rouleau de support (37).
  11. Appareil de distribution de serviette en papier (1) selon la revendication 10, dans lequel ladite lame de dispositif de coupe (45) est rétractable au moins sensiblement dans un intérieur du rouleau de support (37).
  12. Appareil de distribution de serviette en papier (1) selon la revendication 9, 10 ou 11, dans lequel ladite lame de dispositif de coupe (45) est actionnée chaque fois que le rouleau de support (37) termine un nombre de révolutions prédéterminé.
  13. Appareil de distribution de serviette en papier (1) selon l'une quelconque des revendications 9 à 12, dans lequel la lame de dispositif de coupe (45) comprend une pointe qui s'étend, lorsque la lame de dispositif de coupe (45) est dans une position de coupe, au moins en partie dans une direction opposée à une direction de rotation du rouleau de support (37) lorsque la serviette (T) est distribuée.
  14. Appareil de distribution de serviette en papier (1) selon la revendication 13, dans lequel la pointe est formée par une section incurvée (31) de la lame de dispositif de coupe (45).
  15. Procédé pour se servir d'un appareil de distribution de serviette en papier (1) selon l'une quelconque des revendications précédentes, le procédé com-

prenant les étapes consistant à :

- (a) déplacer le couvercle (17) dans une position ouverte et déplacer ainsi le dispositif de sollicitation de serviette dans ladite seconde position déplacée par rapport au rouleau de support (37) ; 5
- (b) charger l'appareil de distribution de serviette (1) avec un premier rouleau (3) de serviette (T) et/ou un second rouleau (5) de serviette (T) ; 10
- (c) positionner une extrémité d'attaque de la serviette à distribuer sur le rouleau de support (37) rotatif ; et
- (d) déplacer le couvercle (17) dans une position fermée et ramener ainsi le dispositif de sollicitation de serviette dans ladite première position à proximité du rouleau de support (37). 15

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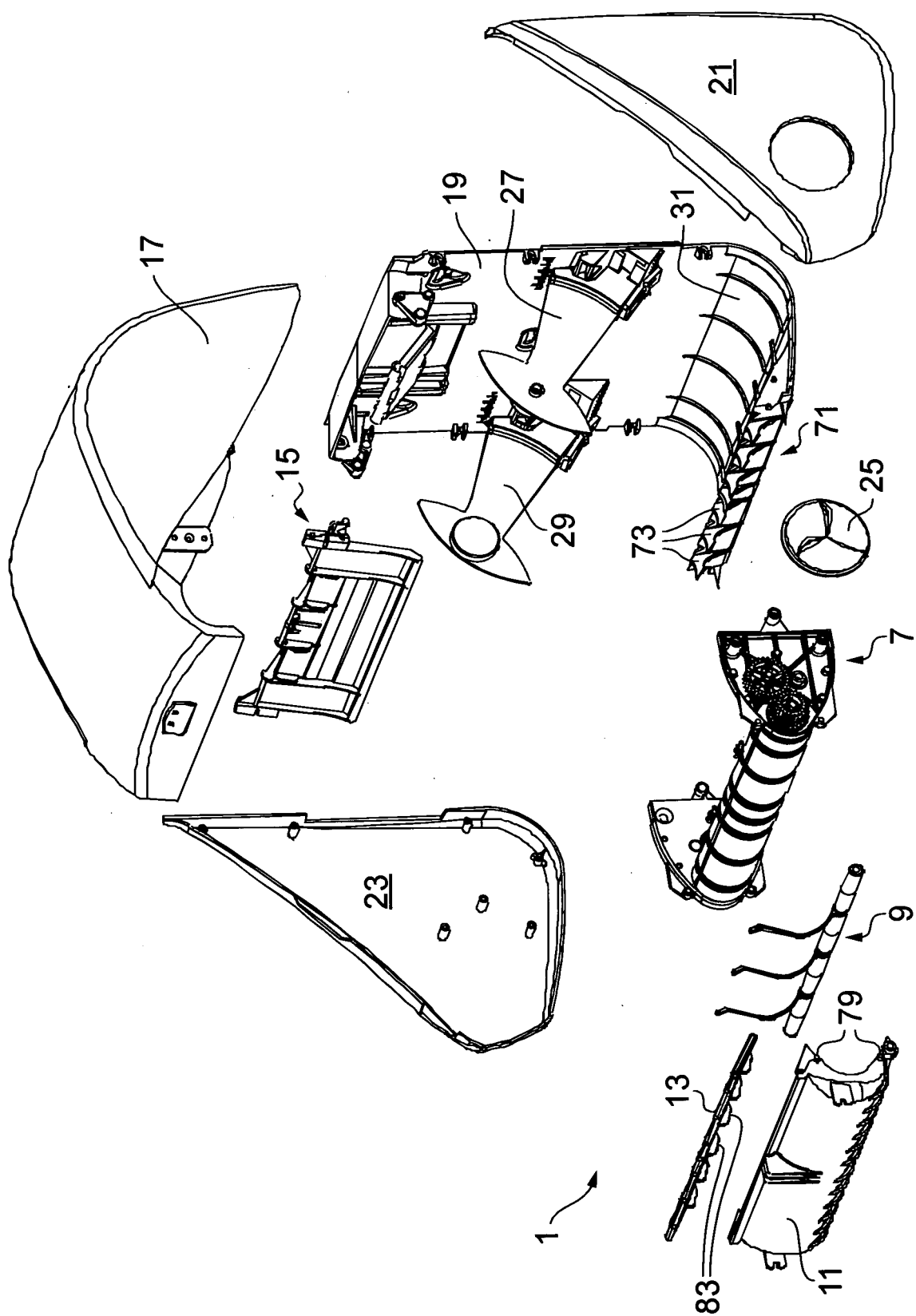


FIG. 1

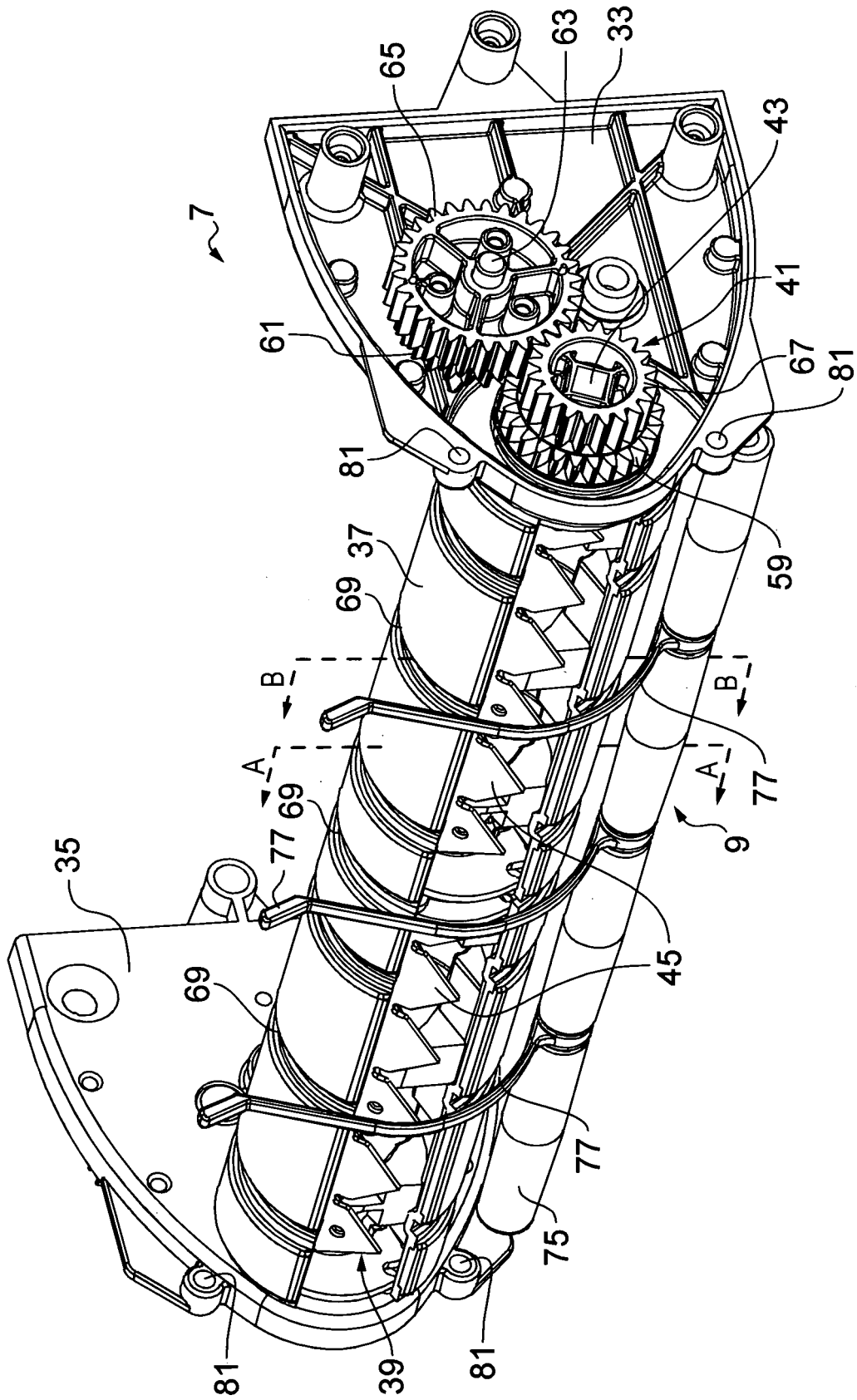


FIG. 2

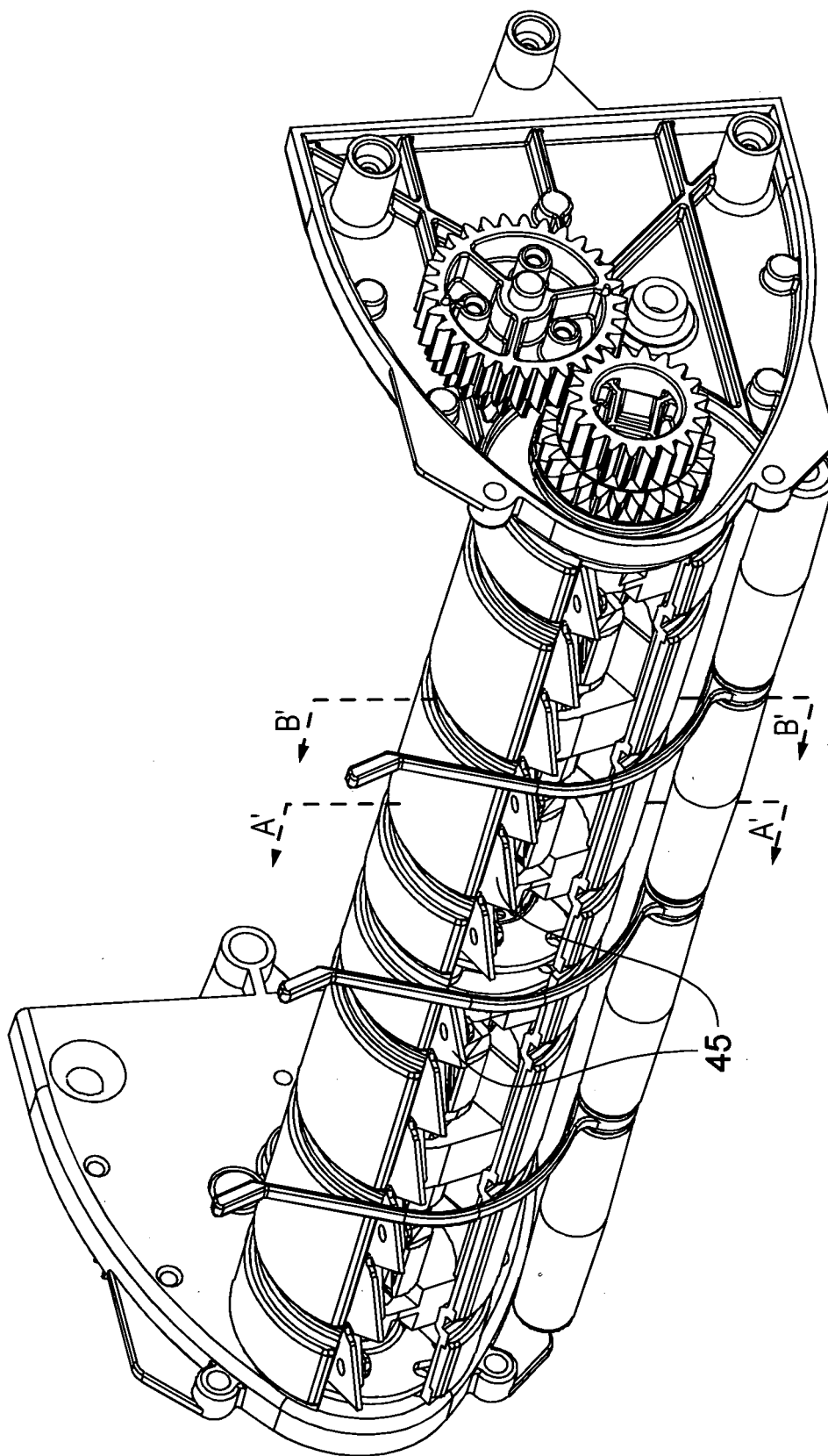


FIG. 3

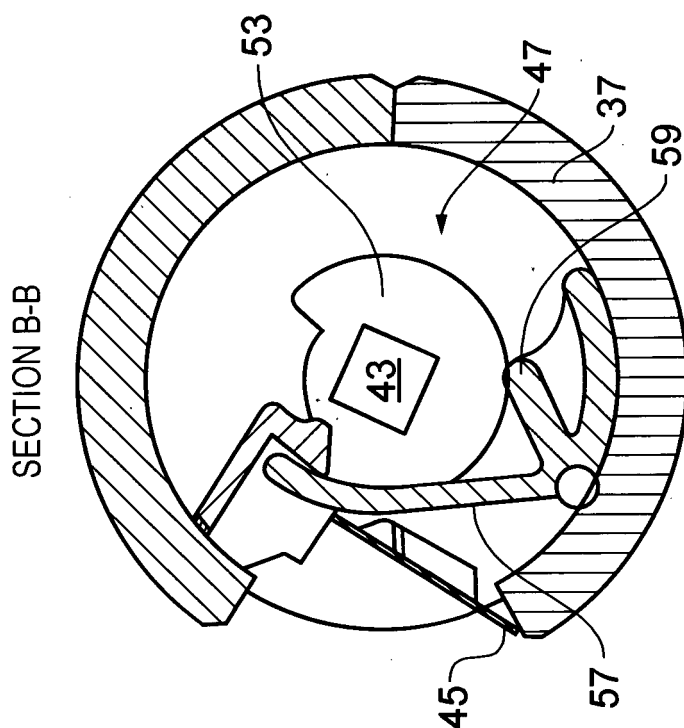


FIG. 4B

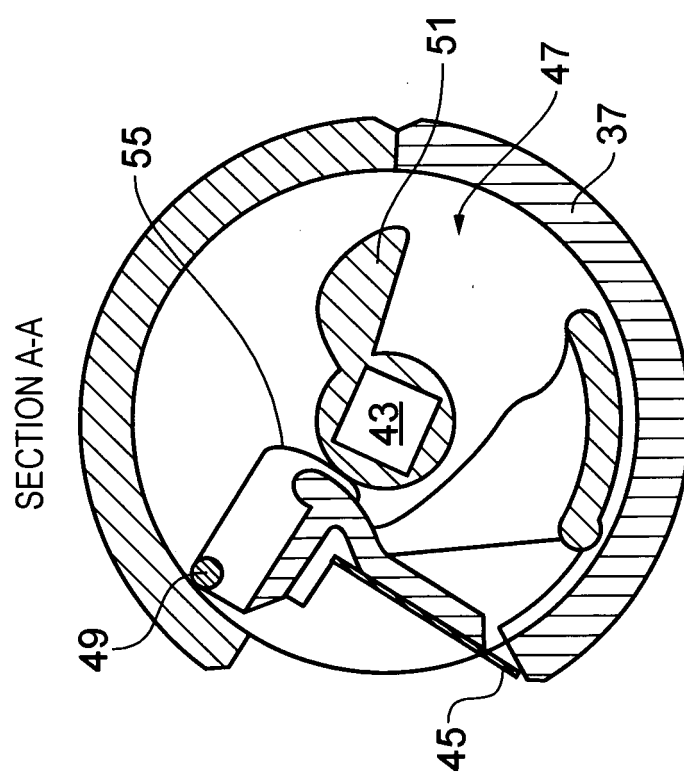


FIG. 4A

SECTION B'-B'

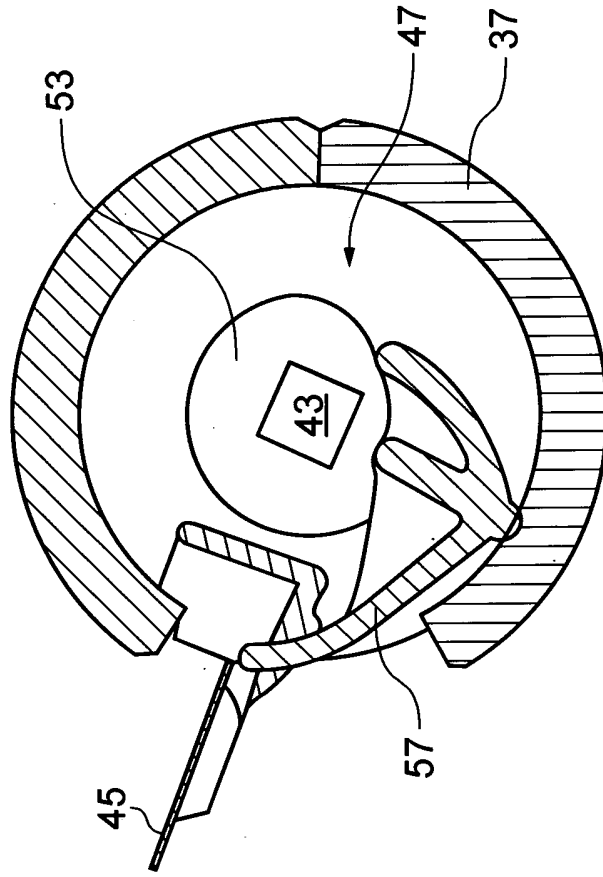


FIG. 5B

SECTION A'-A'

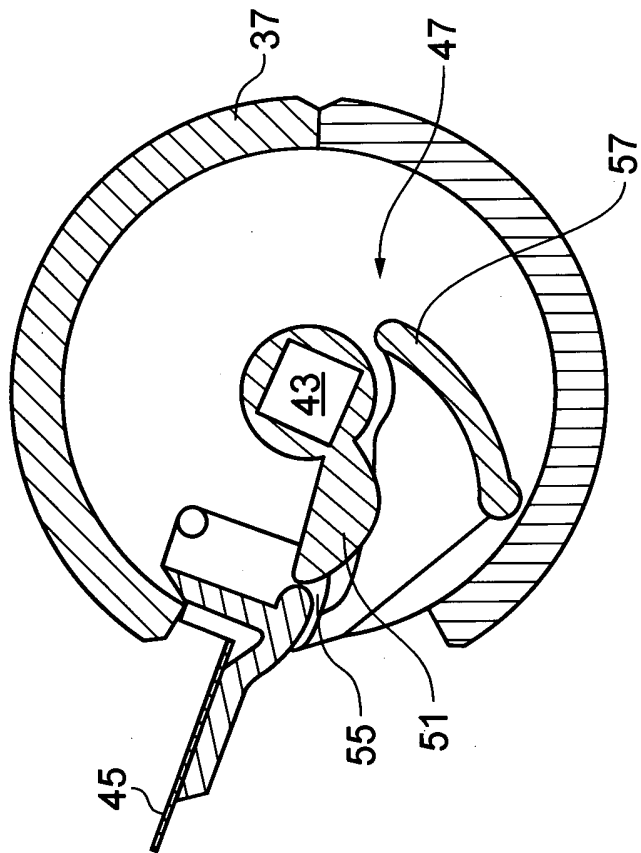


FIG. 5A

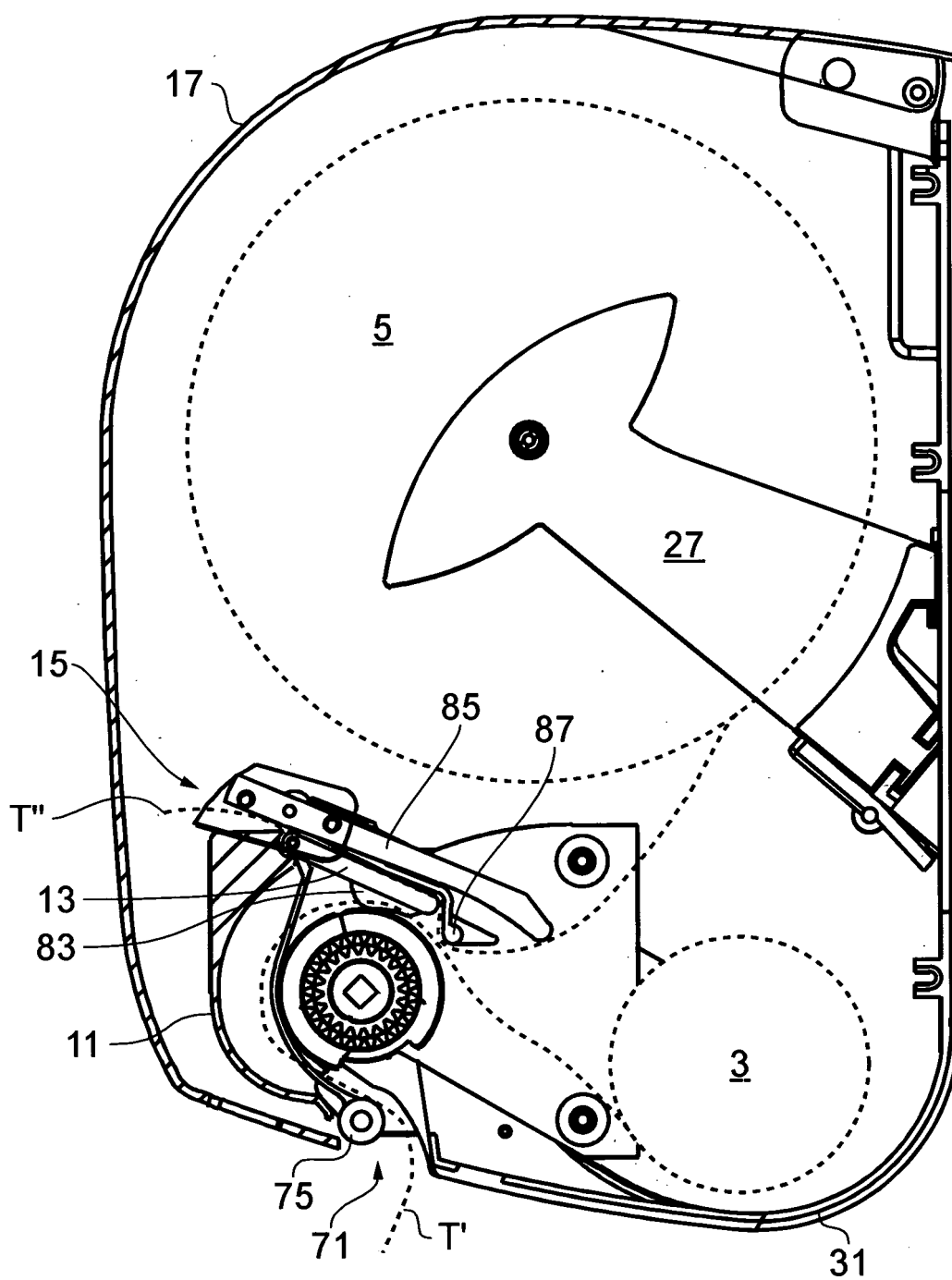


FIG. 6

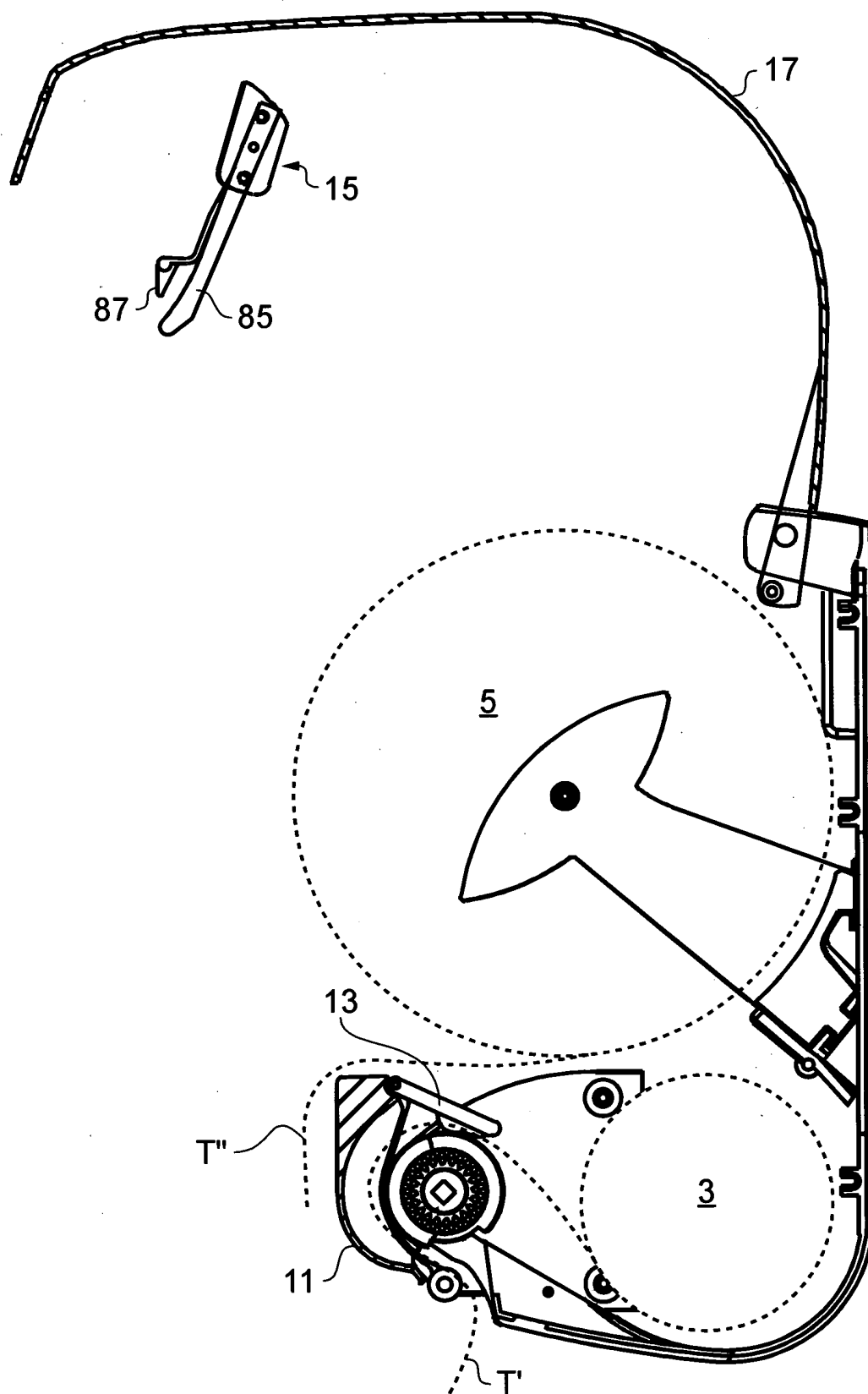


FIG. 7

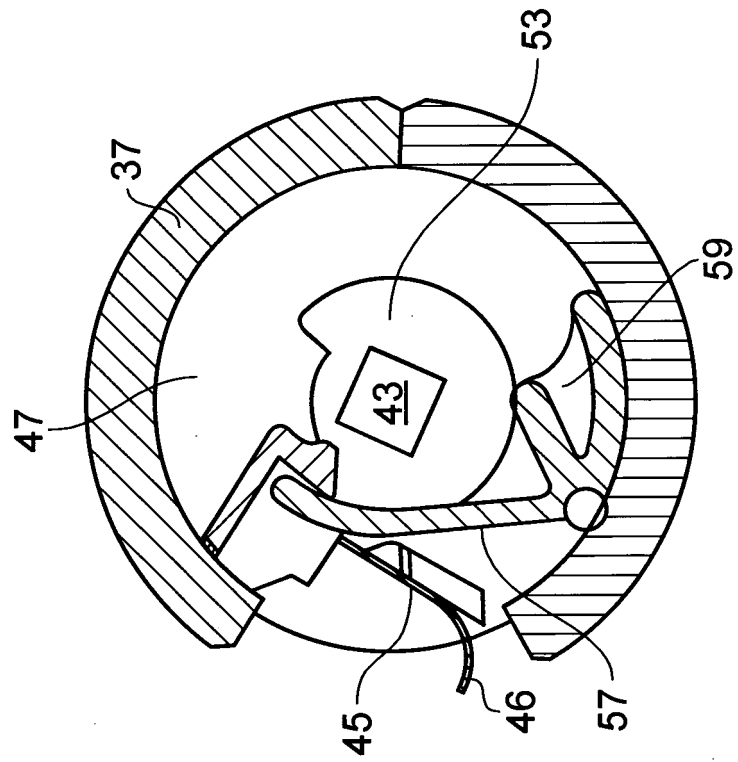


FIG. 8B

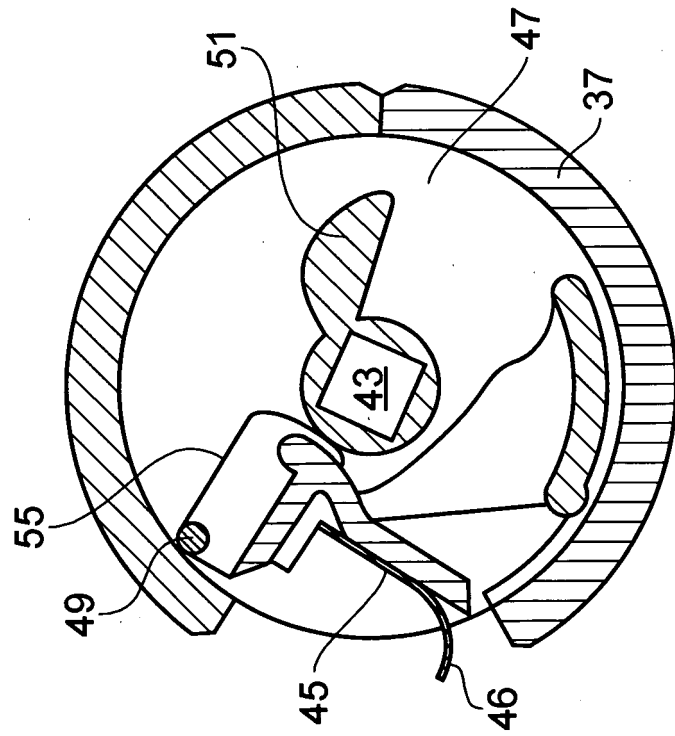


FIG. 8A

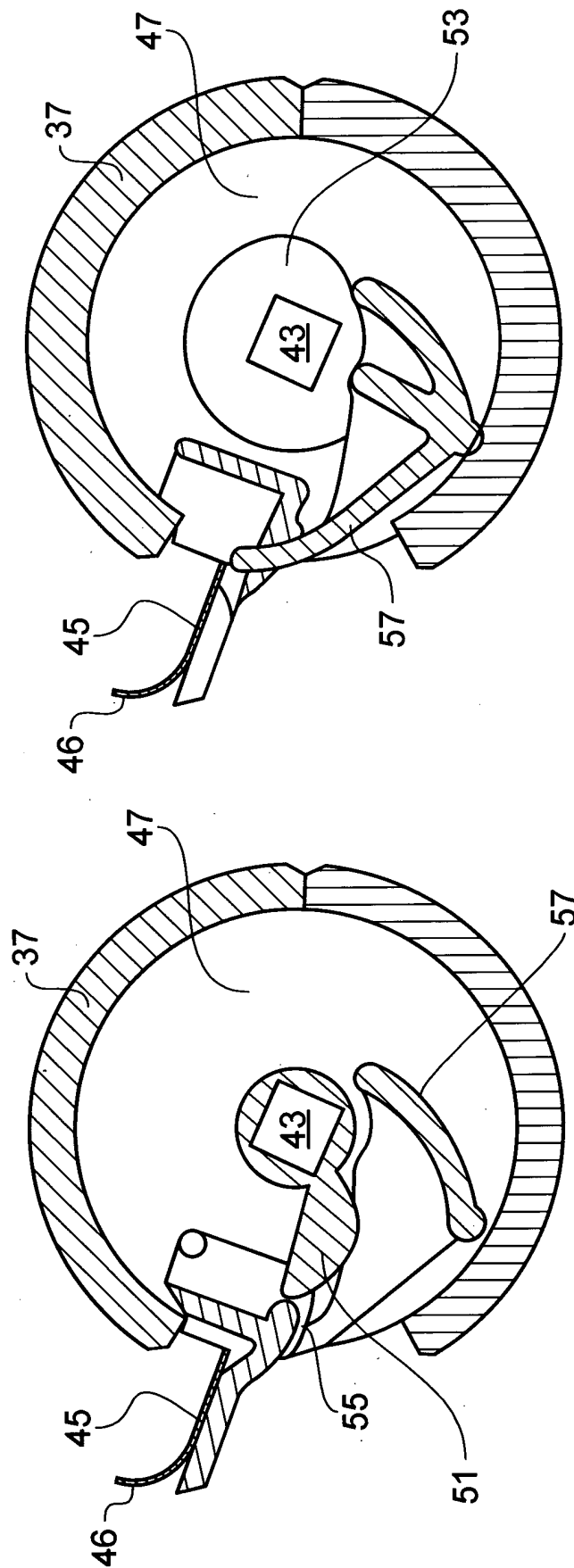


FIG. 9B

FIG. 9A

**REFERENCES CITED IN THE DESCRIPTION**

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