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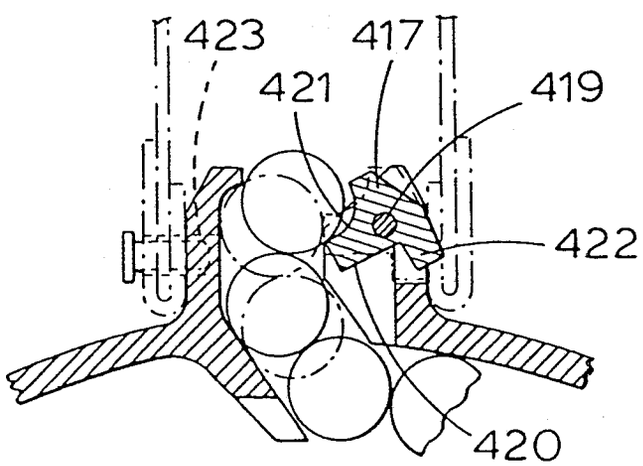
(54) Drum magazine for a gun.

(57) A drum magazine for a gun has a circularly cross-sectioned housing (40) with a feed throat (415) extending from the housing for releasing cartridges and concentric sprockets (42, 43, 44) having serrations nesting cartridges. A torsion spring (46) is arranged to rotatingly drive the sprockets and feed ramps (434, 441, 455, 455', 471, 471') are provided for assisting the cartridges to traverse from the sprockets to the feed throat (415).

The feed throat has two lips and one of the lips (417) is pivotally biassed to act as a one way valve such that in one position cartridges are prevented from being ejected in a direction perpendicular to the housing axis and yet cartridges may be inserted into the housing in a direction perpendicular to the housing axis.



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DRUM MAGAZINE FOR A GUN

This invention relates to a drum magazine for a gun.

Known drum magazines tend to suffer from friction losses caused by friction between the cartridges in the magazine and the internal surfaces of the magazine. Although it might be expected that there would be rolling friction with the cartridges, in fact, there is no rolling friction, but simply sliding friction.

One known drum magazine is the Thompson which is capable of holding up to fifty rounds and is described in "The World's Sub-machine Guns (Machine Pistols)", Volume 1 by Thomas B. Nelson, International Small Arms Publishers, Cologne, West Germany, first edition, second printing June 1964, pages 51 to 53. In the Thompson magazine there is a spiral guide in which the cartridges are arranged in, effectively, rows and the cartridges are swept out of a feed throat by six radial, rotating, arms driven by a spring which sweep all of the cartridges simultaneously around the rows. The friction in such a magazine is very great and it has been found that it is not practical to provide more than two spiral rows. However, it is possible to increase the capacity of such a magazine by increasing the drum diameter without increasing the number of rows, but the magazine then becomes undesirably bulky.

In an attempt to reduce the friction losses, a further known magazine is the Soumi drum magazine, described in the forementioned book at pages 562 - 565 and shown in Figures 1 and 2 of the accompanying drawings. In the Soumi magazine, a circular, pan-like housing 1' is provided having a rotatable base plate 2' upon which the cartridges sit in paths 3', 4' defined by concentric guides 5', 6' and the inner surface of the housing 1' respectively and a bridge 7' linking the paths 3', 4'; the guides 5', 6' and bridge 7' being rotatable with the base plate 2'. The housing

has a throat 8', a feed ramp 9' and a stop 10' with which a lug 11' mounted on the guide 5' co-operates. A coil spring (not shown) beneath a rotor 12' drives the rotor and an associated pivotal pusher 13'. The cartridges are referenced 15' and the cartridge adjacent the lug 11' is referenced 16'.

In operation, the spring drives the rotor 12' and pusher 13' which applies pressure in the direction of arrow-headed line A, through all of the cartridges up to the lug 11' so that it is the pressure on cartridge 16' which drives the guides 5', 6' and the base plate 2'. The pressure on lug 11' thus urges the cartridges up the ramp 9' and through the feed throat 8'. There is, thus, frictional resistance between the cartridges in the outer row pushing outwardly against guide 1', although the inner row of cartridges is rotatably carried by the base plate 2' for the first partial revolution until the cartridges in the outer row are ejected through the throat 8' and this frictional resistance is less than that associated with the Thompson magazine. The friction is less than with the Thompson magazine because the guides 5', 6' that form the inside and outside diameter of the innermost row of ammunition moves with the ammunition for the first revolution. During that revolution, the outer row is driven out of the feed throat, but its inside diameter guide moves with it so that the outer row has only one half the sliding friction contact of the Thompson type and the inner row has none at all. When, however, the lug 11' engages the stop 10', the bridge 7' from the inner path 3' to the outer path 4' is in alignment with the feed throat 8' and the base plate 2' no longer rotates so that the inner row of cartridges abrade against the stationary guide surfaces, thereby producing a high friction force which is similar to that of the Thompson magazine. Additionally,

because the pusher 13' exerts pressure on the last cartridge 15' in the magazine to drive all the other cartridges and because the cartridges are circularly arranged, the cartridges are forced outwardly against the guide surfaces, thereby increasing friction. It has, again, been found impractical to increase the number of paths to improve the capacity of such a magazine and if increased capacity is sought it is, once again, necessary to increase the drum diameter undesirably.

A further disadvantage of the forementioned drum magazines is that they can only readily be filled with cartridges by removing the circular planar cover, since they can only be filled through the feed throat by sliding cartridges between the feed lips in the axial direction of the housing.

The present invention seeks to provide a drum magazine of compact dimensions and of relatively large capacity which exhibits less friction to cartridge movement than the drum magazines described above.

According to one aspect of this invention there is provided a drum magazine for a gun including a housing having a peripheral wall defining a circularly cross-section interior, a feed throat extending through the said wall for releasing cartridges from the housing characterised in that said feed throat provides an opening in said peripheral wall, said opening having a first side and a second side with an outer extremity of said first side of said opening being provided with a fixed lip extending over the feed throat and said second side of said opening being provided with a spring biassed movable lip biassed in a direction outwardly of the magazine, the spacing between the lips being dimensioned so that a cartridge leaving the feed throat can only be slid therefrom in the direction of the housing axis and in no other direction when the magazine is mounted on a gun.

Preferably the movable lip is a pivotal lip which has an axis about which said pivotal lip moves which is substantially parallel with an axis of said magazine for enabling a cartridge pressed on the outer surface of said pivotal lip to rotate the pivotal lip toward the feed throat to permit access of the cartridge to the feed throat in a direction substantially perpendicular to the housing axis.

Advantageously the pivotal lip has a tail portion which, when the magazine is in a gun receiver, prevents the pivotal lip from rotating.

Preferably the fixed lip is tapered in a direction to permit the nose of a cartridge to be directed upwardly away from the feed throat.

Preferably including a neck partially bounding the feed throat in which holes are spaced on one side thereof in the direction of the housing axis, and a cover of the housing having a radial key thereon, whereby the combination of holes and key are arranged to hold the magazine on a gun receiver.

In a currently preferred embodiment there is provided at least two rotatable concentric sprocket means, an outer periphery of the sprocket means each having a plurality of serrations arranged to nest a plurality of cartridges, the serrations of the inner sprocket means being spaced from the inner surface of the next adjacent outer sprocket means by substantially the same distance as the serrations of the outermost sprocket means are from the housing interior peripheral wall a cartridge feed aperture in each sprocket means except the innermost for permitting cartridges to pass from the inner sprocket means to the outer sprocket means and feed ramp means arranged to guide cartridges from each of the sprocket means to the feed throat, the feed ramp means comprising a ramp extending from the feed throat for scooping cartridges from the outermost sprocket means and a further ramp on one major side of the cartridge feed aperture in the sprocket means extending inwardly for scooping cartridges from the adjacent inner sprocket means, and another ramp on the other major side of the cartridge feed aperture in the sprocket means for guiding the cartridges along said further ramp, a guide being provided on the said ramp and said further ramp to tilt a cartridge passing therealong whereby cartridges pass along the ramps in an inclined, nose-up condition.

According to a further aspect of this invention there is provided a detachable cartridge drum magazine for a gun including a housing having a peripheral wall defining a circularly cross-section interior, a feed throat extending through the said wall for releasing cartridges from the housing to provide an opening in said peripheral wall, characterised by said opening having a first side and a second side with an outer extremity of said first side of said opening being provided with a movable lip which is pivotally biassed toward a closed position to act as a one way valve, and said second side of said opening being provided with a fixed lip partially extending over the feed throat, means for

preventing a cartridge being ejected from between the fixed lip and the movable lip except by sliding in the axial direction of the housing when the magazine is mounted on a gun, and said preventing means permitting said movable lip to be pivoted against said bias to an open valve position to permit cartridges to be fed into the feed throat in a direction perpendicular to the housing axis.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which

Figure 3A shows in partial section a schematic view of a drum magazine in accordance with this invention,

Figure 3B is a cross-section along double arrow-headed line 3B-3B of Figure 3A, with the pusher removed,

Figure 3C is a view in the direction of double arrow-headed line 3C-3C of Figure 3B showing the arrangement of the stops for the intermediate and outer sprockets but with the cartridges removed,

Figure 4 is a view similar to Figure 3A but with the parts in different positions,

Figure 5A is a view similar to Figure 3A but with the parts in a different position,

Figure 5B is a detail of the encircled portion arrowed 5B in Figure 5A drawn to a larger scale and incorporating, in phantom lines, a part of the magazine well of the gun,

Figure 6 is a view similar to Figure 3A but with the parts in a different position,

Figure 7A is a view similar to Figure 3A but with the parts in a different position,

Figure 7B is a view along double arrow-headed line 7B-7B of Figure 7A,

Figure 8A is a top view of the housing,

Figure 8B is a view in the direction of arrow-headed line 8B of Figure 8A,

Figure 8C is a cross-sectional view along double arrow-headed line 8C - 8C of Figure 8B,

Figure 9A is a side view of an outer sprocket,

Figure 9B is a cross-sectional view along double arrow-headed line 9B - 9B of Figure 9A,

Figure 9C is a view in the direction of arrow-headed line 9C in Figure 9A,

Figure 10A is a side view of an intermediate sprocket,

Figure 10B is a view in the direction of arrow-headed line 10B of Figure 10A,

Figure 10C is a view in the direction of arrow-headed line 10C of Figure 10A,

Figure 11A is a plan view of an inner sprocket,

Figure 11B is a view along double arrow-headed line 11B - 11B of Figure 11A,

Figure 12A is a top plan view of a cover,

Figure 12B is a cross-sectional view along double arrow-headed lines 12B - 12B of Figure 12A,

Figure 12C is a view in the direction of arrow headed-line 12C of Figure 12A, and

Figure 13 is a partial view of an alternative last round stop actuator.

In the Figures 3A - 13 like references denote like parts.

In the Figures 3A, 4, 5A, 6 and 7A the cartridges are denoted by the prefix C so it will be seen from Figure 3A that in the fully loaded position the magazine holds 100 cartridges.

The drum magazine shown in Figures 3A to 7B has a circularly cross-sectioned, pan-shaped housing 40 having a cover 41 within which is concentrically mounted an outer sprocket 42, an intermediate sprocket 43, and an inner sprocket 44. The drum, cover and each of the sprockets are made from moulded plastics and each

of the sprockets is spool-shaped having a central tubular body and at each end of the body is a radially extending flange each having a like number of serrations around the outer periphery for holding cartridges. The serrations in the flanges adjacent a base 404 of the housing have a greater radial extent than the serrations in the arms adjacent the cover 41 to allow for the taper of a cartridge and so that the cartridge axes are approximately parallel to the axis of the housing. The inner sprocket 44 has serrations to hold each of cartridges C1 - C24, the intermediate sprocket 43 has a serration to hold each of cartridges C27 - C57 and the outer sprocket 42 has a serration to hold each of cartridges C60 - C98. In the assembled position, shown in Figures 3A - 7B, the sprockets are located in the housing 40 so that feed ramps 434, 441 on the housing, 455, 455' on the outer sprocket, and 471, 471' on the intermediate sprocket adopt the positions shown in Figure 3A and the feed ramp 434 extends to the base of cartridge C98, the feed ramp 455' extends to the base of cartridge C58 and the feed ramp 471' extends to the base of cartridge C25. In this way the feed ramps are effective to scoop up the cartridges in the sprockets with which the ramps are associated and the ramps 441, 455', 471' act as guides for the cartridges. Mounted to be fixed on the axis of the housing 1 is a nylon spindle 45 secured to the housing and cover respectively by screws 400,401. The spindle has an ear 402 to which is secured one end of a sheet metal clock-type torsion spring 46, the other end of the spring 46 being secured to an aperture 403 in the inner sprocket 44.

As best shown in Figures 7B and in phantom lines in Figure 11A, a pusher 47 is mounted on the inner sprocket 44. The pusher 47 has a spindle 405 positioned between the arms of the inner sprocket and pivotally mounted on the spindle 405 is a U-shaped arm 406 with the limbs of the U-shape within the confines of the inner sprocket flanges and adjacent a respective flange.

The free ends of the U-shape are secured to the spindle 405 and a rod 407 having the approximate shape of a cartridge is welded to the base of the U-shape. The rod 407 has a tail 408 which is locatable in a serration of the inner sprocket and a bevelled top portion 409 (as viewed in Figure 7B) remote from the tail 408 to facilitate a bolt of the gun to which the magazine is secured to ride over the rod 407. Connected to the spindle 405 between the U-shaped arm 406 and the wing of the inner sprocket adjacent the cover 41 is a last round stop actuator 48 comprising a spring arm 413 which is biassed toward the cover 41 and a button 414 which may contact a mechanism within a gun receiver to which the magazine is mounted so that when the last cartridge from the magazine is fired the bolt mechanism can be held in the cocked position. It is in the event that the last round stop actuator fails to operate the mechanism within the gun receiver that the bevelled portion 409 is provided so that the bolt will strike the pusher obliquely to the bevel. The tail 408 of the pusher is extended so that it may co-operate with a sprocket latch, as will be described later herein.

The housing 40 has a feed throat 415 defined by a neck 416 having longitudinal sides in the axial direction of the housing and which is arranged to be located in the magazine well of a gun. The neck 416 has, on its right hand side (as viewed in Figures 3A and 4 - 7A), a pivotal lip 417 and on its left hand side an arcuate, fixed lip 418 extending over the feed throat. Referring particularly to Figure 5B, the neck of the magazine is shown located in a well of a gun (the well being shown in phantom lines). The pivoting lip 417 is mounted on an axle 419 and has an arm 420 with an arcuate upper surface 421, generally the same radius as a cartridge, and a tail 422 of such a length that, when the magazine is inserted into the well of a gun, the tail prevents rotation of the lip 417 so that it is not possible for the lip 417 to adopt the position shown in solid line in Figure 5B when .

mounted in the gun well. The lip 417 is biassed by a spring (not shown) so that the bottom of the lip (as viewed in Figure 5B) is normally horizontal, as shown in phantom lines. The distance between the lips 417 and 418 is arranged so that with the lip 417 spring biassed in a clockwise direction (as shown in Figure 4 for example and in Figure 5B in phantom lines) it is not possible for a cartridge to be removed from above the lips so the cartridges may not fall out of the magazine. When the magazine is removed from the gun the cartridge may, however, be unloaded from the magazine in a direction perpendicular to the cartridge longitudinal axis by depressing lip 417. In use, the cartridges are axially slid from the magazine by a bolt of the gun. A latching mechanism is provided to secure the magazine to the well of the gun and, conveniently, such a mechanism comprises a pair of pins which may be slidably mounted through one of the walls of the magazine well into co-operating holes in the neck 416 of the housing, these holes being referenced 423 in Figure 8A and one of the pins being shown in phantom lines in Figure 5B.

The pan-shaped housing 40, shown in Figure 8A, 8B and 8C has an open top 424 to which the cover 41 is connected by internally screw threaded bosses 425 and located by pins 426 on each side of the neck 416. The housing 40 has a large internal diameter portion 427 for accommodating the body of the cartridge in the outer sprocket and a reduced internal diameter portion 428 in the region of the nose (bullet) portion of the cartridge and the portion 428 is connected to a base 429. The base has a circular protrusion 430, the interior of which acts as a bearing surface upon which the outer sprocket 42 and intermediate sprocket 43 rotate. In this respect, the concentric protrusion 430 has a radially outer side 444 to concentrically locate the outer sprocket 42 and an inner side 445 to locate the intermediate sprocket 43 in a concentric fashion. The base 429 is dished to

provide an inner boss 431 providing a bearing surface 432 and a concentric guide surface 433 for the inner sprocket 44. On the axis of the drum in the boss 431 is a hole for the screw 400. The fixed lip 418, as best seen in Figure 8A, is tapered inwardly of the housing so as to permit cartridges which are trapped by the lips 417, 418 to be tilted such that the bullet is angled upwardly, the relieved portion of the fixed lip 418 permitting the cartridge body to rise slightly higher than the region of the cartridge toward the cannelore. This allows the cartridge to assume an ever increasing upward angle as it is driven in operation forwardly by the bolt so that it can enter the chamber smoothly without the base or cannelore end being forced downwardly. Such action is in distinction to the usual feed path of conventional magazines where, as the cartridge is driven forwardly, the bullet end is forced upwardly as it enters a feed ramp and the base end goes downwardly. This is because the forward corner of the conventional feed lip contacts the center, body, portion of the cartridge and acts as a fulcrum so that as the bullet end rises the base end is forced downward, thus causing the other cartridges in the magazine to be pushed downward in the magazine. In magazines of large capacity such reversing action (driving the bulk of the cartridges backwardly) requires substantial short term energy and has the undesirable effect of retarding bolt motion.

On the side of the feed throat 415 adjacent the fixed lip 418 is a feed ramp 434 having at its outer side a notch 435 to accommodate the serrations of the outer sprocket and at the inner side of the feed ramp 434 is a web guide 436 for the cartridges. Also provided on the same side of the throat as the fixed lip is a stop 437 for the outer sprocket. The pivoting lip 417 is located in a cutout defined by side walls 438 and 439 and a bottom part 440, the side wall 439 having an internal ramp portion 441 which also

acts as a guide for feed ramp 434. A hole 442 in both side walls 438, 439 is for the axle 419 of the pivoting lip 417. Both sides of the feed throat 415 have notches 443 which, in operation, abut against respective stop pins in the well of the gun to limit the extent of insertion of the magazine into the receiver.

As shown in Figure 8B, the internal diameter portion 428 has a recess 446 for co-operating with a latch 447 provided on the outer sprocket. Alternatively, instead of a recess, an aperture could be provided.

Referring now to Figures 9A, 9B and 9C, the outer sprocket 42 has a tubular body 448 with flanges 449, 450 each having a like number of serrations 451 in which are located, between the flanges 449, 450 cartridges. For reasons discussed earlier, the serrations in flange 449 have a greater radial extent than those in flange 450. The body 448 has a reduced diameter portion 452 which sits within the internal diameter portion 428 of the housing and a concentric bearing surface 453 which engages the internal side of the protrusion 430. The body 448 has a feed aperture 454 to permit cartridges from the intermediate and inner sprockets to pass therethrough. The feed aperture 454 has feed ramps 455, 455' and a guide ramp 456 arranged to tilt the cartridge so that the bullet portion is inclined outwardly of the feed aperture 454. Located in the reduced diameter portion 452 is a stop 457 presenting a stop surface 458 for contacting the stop 437 of the housing and a further stop surface 459 for co-operating with a stop on the intermediate sprocket. The wall of the portion 452 has an aperture 460 shaped to house the latch 447 and to form a lip 461 against which a claw on a latch 462, connected to the intermediate spool, co-operates. Transversely to the aperture 460 is a hole 463 in a boss for a pin pivotally locating the latch 447. The reduced diameter portion 452 is arranged to locate the neck of a cartridge so as to maintain the cartridge with the required amount of tilt in the magazine. The latch 447 is bent into the shape of a dog leg so that it is able to overlap the latch 462.

The intermediate sprocket 43, shown in Figures 10A, 10B and 10C, is similar to the outer sprocket 42 and has a body 464 with a reduced diameter portion 465 and serrated flanges 466 and 467 between which cartridges are held. The radial extent of the serrations in flange 466 is greater than that of those in flange 467 for the reason discussed earlier. The end face of the reduced diameter portion 465 has a bearing surface 468 for rotating on the surface 430 of the housing and a recessed annular part 469, the inner periphery of which acts as a concentric guide surface to abut the inner side 445 of the housing. The intermediate sprocket has a feed aperture 470 having feed ramps 471, 471' and in which is disposed a cartridge 499 that is tilted by a guide ramp 472, as described in relation to the outer sprocket 42. The guide ramp 471' extends interiorally of the body 464. A stop 473 having a stop surface 474 for contacting the stop 459 on the outer sprocket 42 is provided on the reduced diameter portion 465 and in the side wall of the reduced diameter portion 465 is an aperture 475 for the latch 462 and a hole 476 is provided in a boss for a pin locating the latch 462.

The inner sprocket 44, shown in Figures 11A and 11B, has a body 477' with serrated side flanges 477, 478 and the body 477' has the rectangular aperture 403 within which one end of the spring 46 is located. The radial extent of the serrations in flange 477 is greater than that in the flange 478 to tilt the cartridge (shown in phantom lines). In the position between which cartridges C1 and C25 (shown in phantom lines) are located is a notch 479 in the arm 477 within which the rod 407 of the pusher is locatable. A hole 480 is provided in each of the arms 477 and 478 for the spindle 405 of the pusher.

The latches 447 and 462 are both formed from strip material and, as best shown in Figure 4, both mounted on a respective pivot 481 and both biassed by a respective torsion spring 482, one end of which engages with an edge of slot 460, 475 respectively and the other end of which is bent into an L-shape and engages a tang 483, 484 respectively of the latches 447 and 462. At the end of the latches 447, 462, remote from the tangs, is a finger 485, 486 respectively and a protruding ear 487, 488 respectively; the ear 487 engaging with a lip 489 on the recess 446

of the housing 40 and the ear 488 being arranged to engage with the lip 461 on the outer sprocket 42 (as shown in Figure 6). The fingers 485 and 486 are both shaped to be inserted between cartridges C28 and C29 and between cartridges C2 and C3 respectively and to bear against cartridges C28 and C2 respectively. The tangs 483 and 484 have a radius portion which is arranged to be engaged by cartridge C26 and the rod 407 of the pusher 47 respectively.

Referring now to Figures 12A, 12B and 12C, the cover 41 is a moulding made from clear plastics having a circular shape with six holes 490 located in protrusions of the cover for securing the cover to the housing 40. The cover has an axial hole 491 formed with notches 492 which act as a keyway for the spindle 45 and prevent the spindle 45 from rotating. The region surrounding the hole 491 is dished to provide a recess for the head of screw 401 and the underside of the cover has concentric ring slots 493, 494 for the flanges 450, 467 of the outer and intermediate sprockets respectively. To facilitate the provision of the slots 493, 494 the cover is locally thickened. Shown symmetrically about the horizontal axis in Figure 12A is a key 410 formed from ribs 411 with a root radius 412 between the ribs and the planar part of the cover. The cover has a neck 495 corresponding in part to the neck 416 of the housing and positioned partially down the neck and extending toward the hole 491 is a guide cover 496 which is

chamfered toward the cover outer surface (as best shown in Figure 7B) to guide the actuator 48 in and out of the housing. The region 497 on each side of the ribs 411 is relieved to provide an improved depth of the ribs 411 upon which a keyway on the gun receiver may engage and because of slots 493 and 494, arcuate apertures 498 are formed. The guide cover 496 is recessed to provide a slot 496' of such depth that the cover 496 clears a normally provided last round stop in the gun receiver. The confluence of the relieved portion 497 and the thickened portion of the cover has a bevelled edge 497' to ease the location of the magazine onto the receiver keyway. The neck 495 is of such a length that it partially covers a top most cartridge to prevent the cartridge from moving rearwardly. Holes 490' are provided on the neck 495 within which the pins 426 on the housing are located and a protruding pin 491' extending on the underside of the cover forms part of the feed ramp for the cartridges. A water drain hole 492' is provided on the inside surface of the cover.

In the position shown in Figure 3A, the latches 447 and 462 are held downwardly by cartridges C64 and C30 respectively and the fingers 485 and 486 respectively are, thus, forced between cartridges C28, C29 and C2, C3 respectively. The action and purpose of the fingers 485 and 486 will be described later.

In operation, the spring 46 drives the sprockets in an anti-clockwise direction (as viewed in the Figures 3A, 4, 5A and 6) so that starting with the magazine fully loaded, as shown in Figure 3A, cartridge C2 pushes on finger 486 which, because latch 462 is connected by pivot 481 to the intermediate sprocket 43, causes sprocket 43 to rotate in an anti-clockwise direction. The turning effort of intermediate sprocket 43 is, thus, applied to cartridge C28 which, in turn, applies a pressure through finger 485 of latch 447 to the outer sprocket 42 which, thus, also is rotated in an anti-clockwise direction.

The rotation of the outer sprocket 42 causes cartridge C98, located in a serration of the flanges 449, 450, to push against cartridges C99 and C100 and the cartridge C100 is prevented from being ejected from the throat 415 of the magazine by the lips 418, 417. It will, thus, be seen that the dimension between the lips 417, 418 is extremely important.

When the magazine is inserted into a gun magazine well (as shown in Figure 5B) the magazine is held in position by pins (shown in phantom lines) which locate in the holes 423. Assuming that the bolt has been cocked, then on releasing the gun trigger the bolt moves forwardly toward the barrel and a stripping lug associated with the bolt slidingly removes the cartridge C100 from the lips 417, 418 in a direction perpendicular to the plane of the Figure 3A, i.e., in a direction from right to left in Figure 3B which is also in the direction of the housing axis. The cartridge C100 is, thus, pushed from the magazine into the chambers. Due to continued force being exercised by the spring 46 on the sprockets, so the sprockets rotate in an anti-clockwise direction and cartridge C99 is moved upwardly to be held by the lips 417, 418 and cartridge C98 is, thus, scooped out of the serrations in flanges 449, 450 by the ramps 434. This action continues until the outer sprocket 42 has given up all of its cartridges C98 - C60 and the stop surface 458 on outer sprocket 42 contacts stop 437 on the housing 40 (as shown in Figure 3C). The positions of the stops 437 and 457 are such that the feed ramps 434 and 441 on the housing align with feed ramps 455' and 455 respectively of the outer sprocket 42. Whilst the outer sprocket was rotating and when cartridges C64, C63, C62 are de-nested and move up the ramp 434, so the latch 447, which has heretofore been held depressed by cartridges C64, C63, C62 is released and is biassed by spring 482 so that the ear 487 abraids the internal

diameter portion 427 of the housing and continued rotation is such that when the stop surface 458 abuts stop 437 so the ear 487 engages lip 489 and the outer sprocket 42 is prevented from rotating clockwise. The parts of the magazine are, thus, in the position shown in Figure 4.

Continued feeding of the cartridges from the feed lips causes those cartridges on the intermediate sprocket 43 to be expended and the arrangement to adopt the position shown in Figure 5A with the cartridge C30 being scooped by ramp 455' to move up the feed ramps 455', 455. Continued rotation of the inner sprocket 44 causes the stop surface 474 of stop 473 on the intermediate sprocket 43 to abut the stop surface 459 on the outer sprocket (as shown in Figure 3C) and the feed ramps 471', 471 of the intermediate sprocket 43 to align with the feed ramps 455', 455 respectively of the outer sprocket 42 (as shown in Figure 6) and the latch 462 is spring biassed so that the ear 488 engages with the lip 461 on the outer sprocket 42.

Continued release of the cartridges causes further rotation of the inner sprocket 44 so the cartridges C24 - C1 pass up the feed ramps 471', 471, 455', 455, 434 and 441 and because there are no further cartridges to push cartridges C6 - C1 up the feed ramps so the rod 407 of the pusher 47 is scooped up by the feed ramp 471' to push these cartridges up to the feed lips, the length of the arm 406 being such that the rod is able to extend to the feed lips 417, 418 (as shown in Figures 7A and 7B). Connected at one side of the arm 406 is the last round stop actuator 48 and as the pusher 47 extends up the feed ramp so the spring arm 413, which is biassed against the guide cover 496 on the cover 41, moves with the arm upwardly and outwardly through the slot 496' in the cover. Until the pusher starts to move, the last round stop actuator 48 is mounted alongside the U-shaped arm 406 of the pusher. The action of the last round stop actuator button 414 is to move a bolt latch in the gun to latch the bolt assembly in

an open position so that when the next magazine is inserted in the gun the bolt is already cocked.

To load the magazine, cartridges are inserted through the feed throat 415 in a direction perpendicular to the housing axis so that the cartridges are inserted into the upper surface 421 of the spring biassed pivoting lip 417 and downward pressure on the cartridges causes the pusher 407 to be partially depressed and the lip 417 to be rotated to the position shown in solid lines in Figure 5B. After loading six cartridges the pusher 47 is laid in its rest position on the inner sprocket and the insertion of further cartridges cause the cartridge C1 to be nested in the first of the serrations on the inner sprocket 44. The action of depressing the pusher 47 is, of course, against the force exerted by spring 46 and as the cartridges C1 - C24 are nested in their associated serrations so the inner sprocket 44 is rotated in a clockwise direction. When cartridge C30 is inserted in to the feed lips the pusher tail 408 contacts tang 484 on the latch 462 and thereby rotates the latch 462 so that the ear 488 is dis-engaged from the lip 461. The intermediate sprocket 43 is, thus, free to rotate in a clockwise direction and, with the insertion of cartridges C31 and C32, adopts the position shown in Figure 5A. Referring to Figure 5A, the insertion of cartridges C31 and C32 causes cartridges C28, C29 to depress the latch 462 so that the finger 486 is inserted between the cartridges C2, C3 (see Figure 4). Continued clockwise rotation of the intermediate spool 43 and inner spool 44 causes the latch 462 to be fully depressed by cartridges C30, C29, C28 and the finger 486 to be firmly pushed between cartridges C2, C3, and to bear against cartridge C2.

The function of the finger 486 is as follows:

With the parts shown in the positions of Figure 5A the spring

46 exerts a pressure through cartridges C24, C25 and C26, causing cartridge C26 to be forced against the inner wall of the outer sprocket 42, thus resulting in undesirable friction. However, with the downward pressure of cartridge C30 on the latch 462, as shown in Figure 4, so finger 486 pulls cartridge C2 and, thus, the inner sprocket 44 in a clockwise direction relative to the intermediate sprocket 43. In this manner, the pressure from spring 46 upon cartridges C24, C25, and C26 is released and the cartridges C25, C26 have a small amount of freedom within the feed ramps 471' and 471 and the forementioned undesirable friction is removed.

Continued feeding of cartridges into the feed throat 415 causes both inner sprocket 44 and intermediate sprocket 43 to be rotated in a clockwise direction until cartridge C26 is rotated so that it abuts the tang 483 on latch 447. The latch 447 is, thus, rotated against the bias of its associated spring 482 so that the ear 487 is moved out of abutting contact with the lip 489 and, thus, permitting the outer sprocket 42 to rotate in a clockwise direction. The position shown in Figure 4 is where the cartridge C26 is about to abut the tang 483. Continued filling with cartridges is such that the cartridges C64, C63, C62 force the finger 485 of latch 447 to pull the cartridge C28 in a clockwise direction and, hence, the intermediate sprocket 43 is moved in a clockwise direction relative to the outer sprocket 42 and the cartridges C57, C58 and C59 are freed from a tight fit against one another, in similar manner to the action of finger 486 upon cartridges C24, C25 and C26. Thus, the cartridges C58 and C59 have a small degree of freedom within the feed ramps 455' and 455 and undesirable friction between C59 and the inner wall of the housing 40 is eliminated. Thus, all of the cartridges in the magazine are loosely held in the serrations or feed ramps and frictional forces are reduced to a minimum. The magazine is

completely filled by inserting cartridges up to C100 and the magazine is then in the position shown in Figure 3A.

It is to be understood that the provision of the latches 447 and 462 is not necessary to the working of the invention, although they are considered to be extremely desirable for the dual function they each perform. In this respect, the ears 487, 488, in conjunction with lips 489, 461 respectively, prevent rotation of sprockets 42, 43 respectively to permit the magazine to be loaded through the feed throat 415. Secondly, the fingers 485, 486 of the latches permit drive from the intermediate sprocket to the outer sprocket to be through the latch 447 and from the inner sprocket to the intermediate sprocket through the latch 462 respectively, thereby enabling all of the cartridges in the magazine except cartridges C100, C99 to have a small amount of freedom of movement within the magazine. Having described the function and operation of the latches, it will be realised by those skilled in the art that latches having similar functions, although possibly requiring differing components to perform each of the two functions could be designed, with advantage, for use with the Soumi-type magazine.

Referring now to Figure 13, there is shown an alternative form of last round stop actuator in which a compression spring 413' and plunger 414' are inserted in a bore of the rod 407. The action of the plunger 414' is such that as the rod 407 moves up the feed ramp so the plunger 414' is extended by the force of spring 413' and when the arm 406 is fully extended so the plunger 414' abuts the last round stop mechanism in the gun receiver.

CLAIMS:

1. A drum magazine for a gun including a housing (40) having a peripheral wall (427) defining a circularly cross-section interior, a feed throat (415) extending through the said wall for releasing cartridges from the housing characterised in that said feed throat (415) provides an opening in said peripheral wall (427), said opening having a first side and a second side with an outer extremity of said first side of said opening being provided with a fixed lip (418) extending over the feed throat and said second side of said opening being provided with a spring biassed movable lip (417) biassed in a direction outwardly of the magazine, the spacing between the lips being dimensioned so that a cartridge leaving the feed throat can only be slid therefrom in the direction of the housing axis and in no other direction when the magazine is mounted on a gun.

2. A drum magazine as claimed in claim 1, characterised in that the movable lip is a pivotal lip (417) which has an axis about which said pivotal lip moves which is substantially parallel with an axis of said magazine for enabling a cartridge pressed on the outer surface of said pivotal lip to rotate the pivotal lip toward the feed throat to permit access of the cartridge to the feed throat in a direction substantially perpendicular to the housing axis.

3. A drum magazine as claimed in claim 2, characterised in that the pivotal lip (417) has a tail portion (422) which, when the magazine is in a gun receiver, prevents the pivotal lip from rotating.

4. A drum magazine as claimed in any preceding claim, characterised in that the fixed lip (418) is tapered in a direction to permit the nose of a cartridge to be directed upwardly away from the feed throat.

5. A drum magazine as claimed in any preceding claim, characterised by further including a neck (416) partially bounding the feed throat in which holes (423) are spaced on one side thereof in the direction of the housing axis, and a cover (41) of the housing having a radial key (410) thereon, whereby the combination of holes and key are arranged to hold the magazine on a gun receiver.

6. A drum magazine as claimed in any preceding claim, characterised in that there is provided at least two rotatable concentric sprocket means (42, 43, 44), an outer periphery of the sprocket means each having a plurality of serrations (451) arranged to nest a plurality of

cartridges, the serrations of the inner sprocket means (44) being spaced from the inner surface of the next adjacent outer sprocket means (43) by substantially the same distance as the serrations of the outermost sprocket means (42) are from the housing interior peripheral wall (427), a cartridge feed aperture (454, 470) in each sprocket means except the innermost for permitting cartridges to pass from the inner sprocket means (44) to the outer sprocket means (42) and feed ramp means (434, 441, 455, 455', 471, 471') arranged to guide cartridges from each of the sprocket means to the feed throat (415), the feed ramp means comprising a ramp (434) extending from the feed throat (415) for scooping cartridges from the outermost sprocket means (42) and a further ramp (455', 471') on one major side of the cartridge feed aperture in the sprocket means extending inwardly for scooping cartridges from the adjacent inner sprocket means, and another ramp (455, 471) on the other major side of the cartridge feed aperture in the sprocket means for guiding the cartridges along said further ramp, a guide being provided on the said ramp and said further ramp to tilt a cartridge passing therealong whereby cartridges pass along the ramps in an inclined, nose-up condition.

7. A detachable cartridge drum magazine for a gun including a housing (40) having a peripheral wall (427) defining a circularly cross-section interior, a feed throat (415) extending through the said wall for releasing cartridges from the housing to provide an opening in said peripheral wall, characterised by said opening having a first side and a second side with an outer extremity of said first side of said opening being provided with a movable lip (417) which is pivotally biassed toward a closed position to act as a one way valve, and said second side of said opening being provided with a fixed lip (418) partially extending over the feed throat (415), means (422) for preventing a cartridge being ejected from between the fixed lip and the movable lip except by sliding in the axial direction of the housing when the magazine is mounted on a gun, and said preventing means (422) permitting said movable lip (417) to be pivoted against said bias to an open valve position to permit cartridges to be fed into the feed throat in a direction perpendicular to the housing axis.

8. A drum magazine as claimed in claim 7, characterised in that the pivotal lip (417) has a tail portion (422) forming said preventing means which, when the magazine is in a gun receiver, prevents the pivotal lip from rotating.

9. A drum magazine as claimed in claim 7 or 8, characterised in that the fixed lip (418) is tapered in a direction to permit the nose of the cartridge to be directed upwardly away from the feed throat (415).

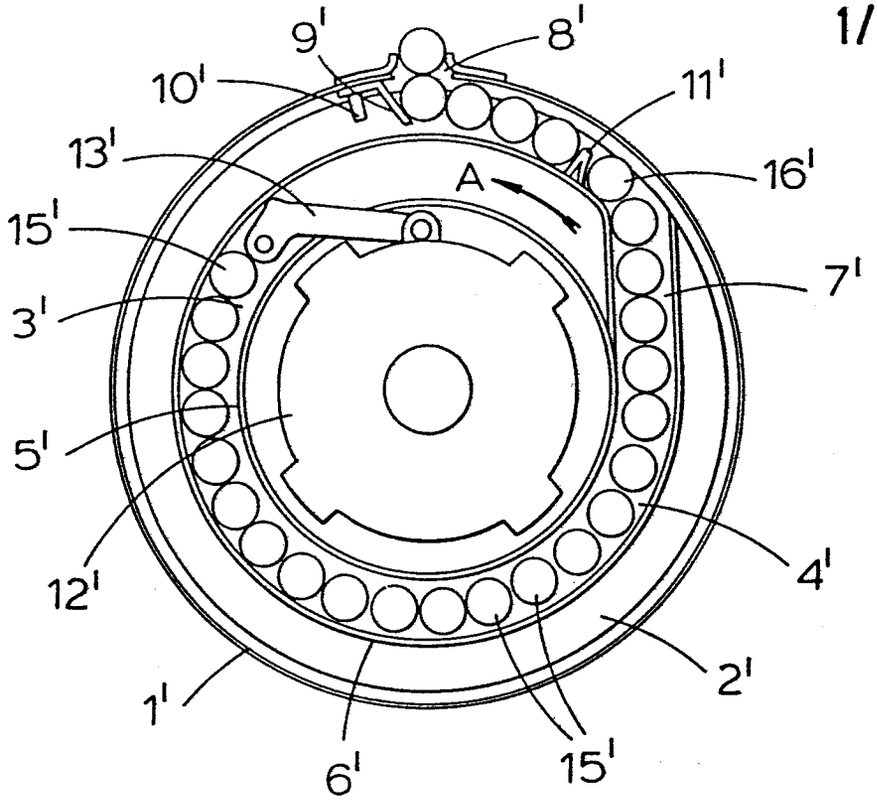

Fig.1

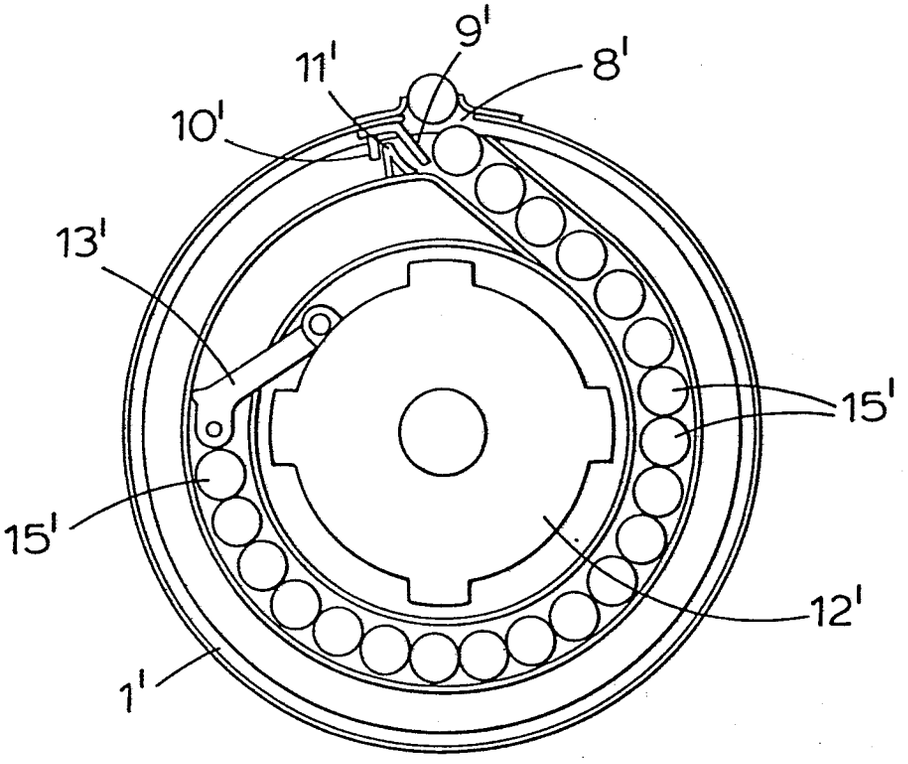

Fig.2

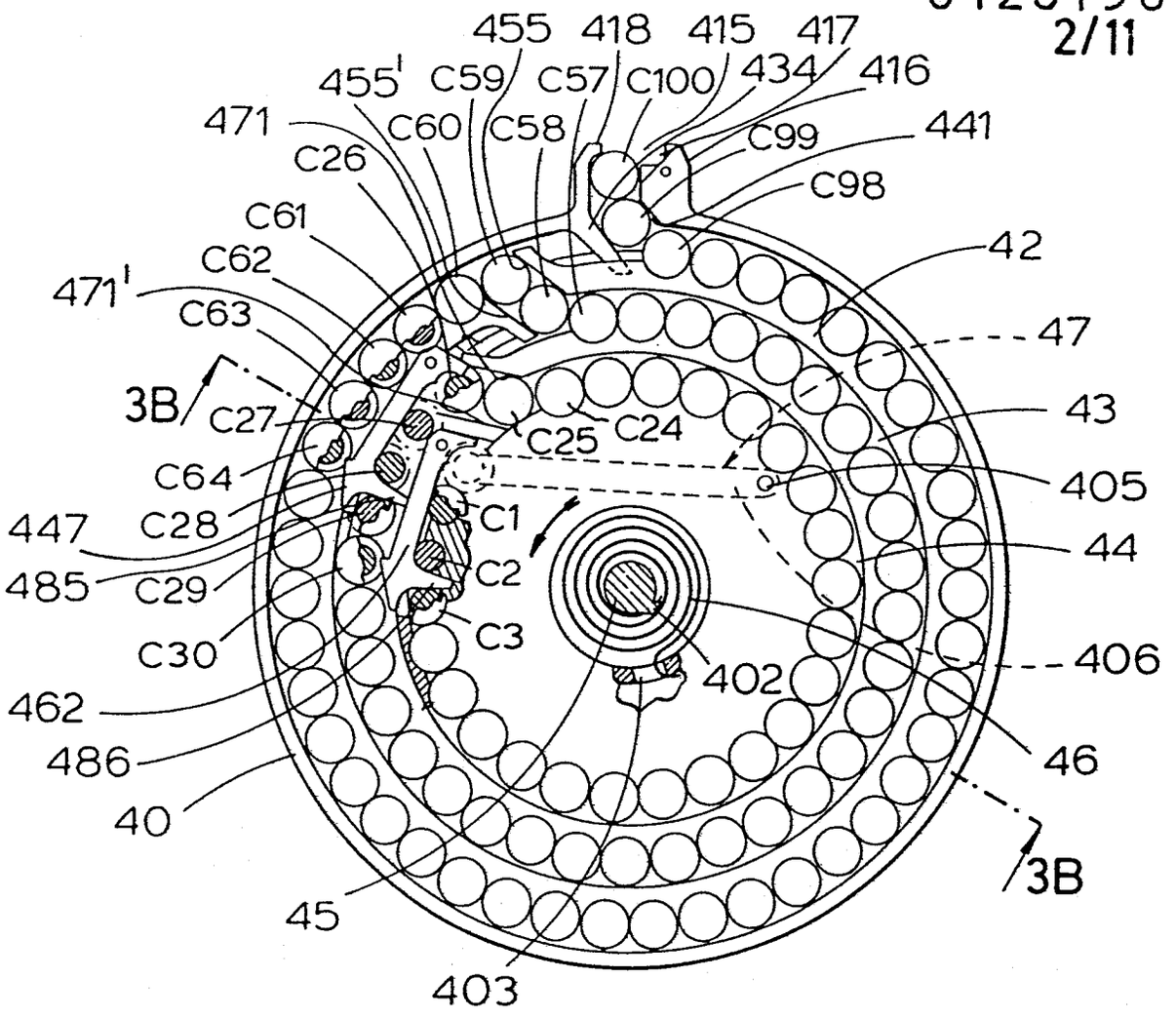

Fig. 3A

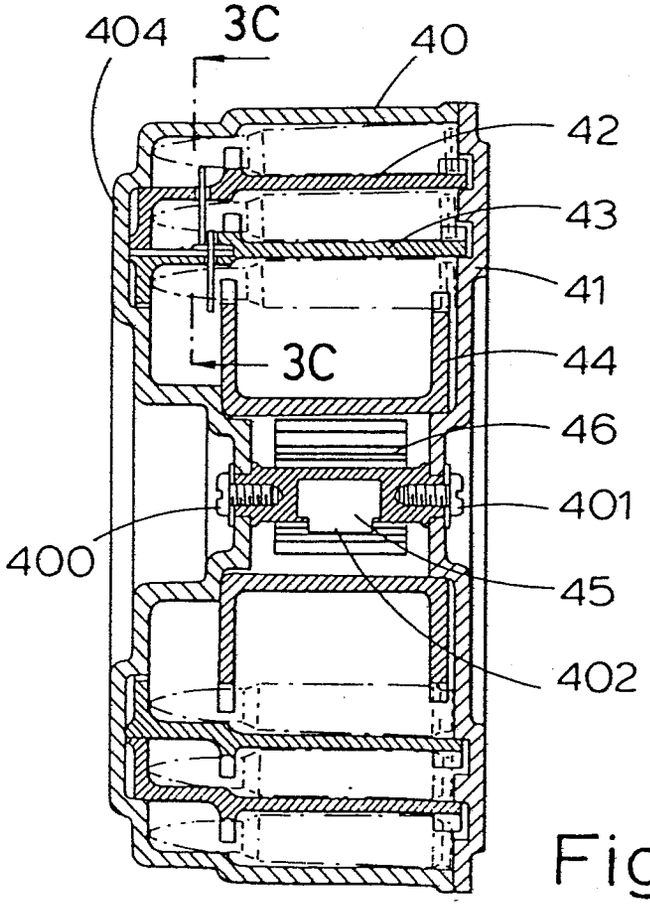

Fig. 3B

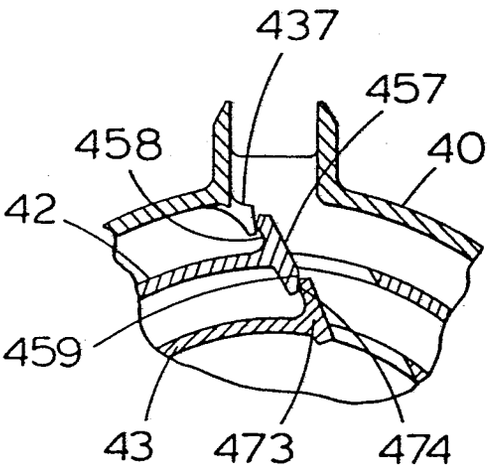

Fig. 3C

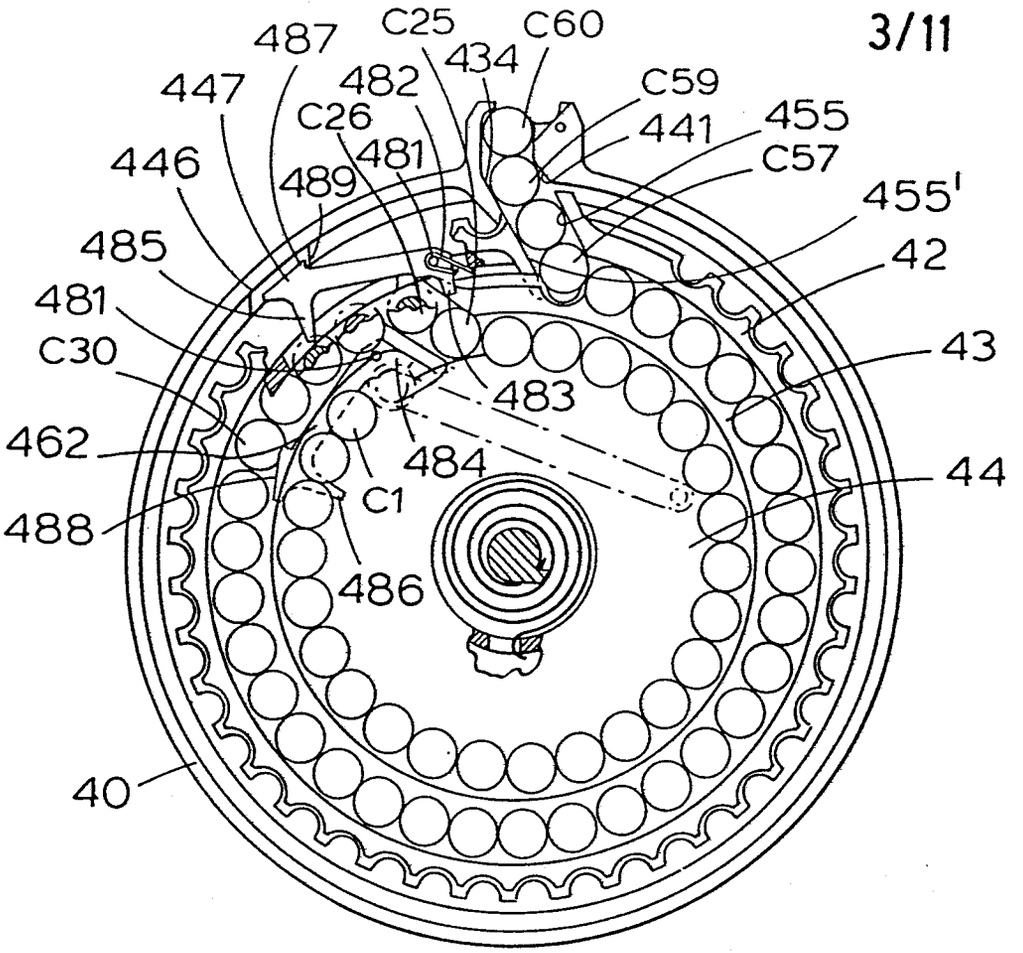

Fig.4

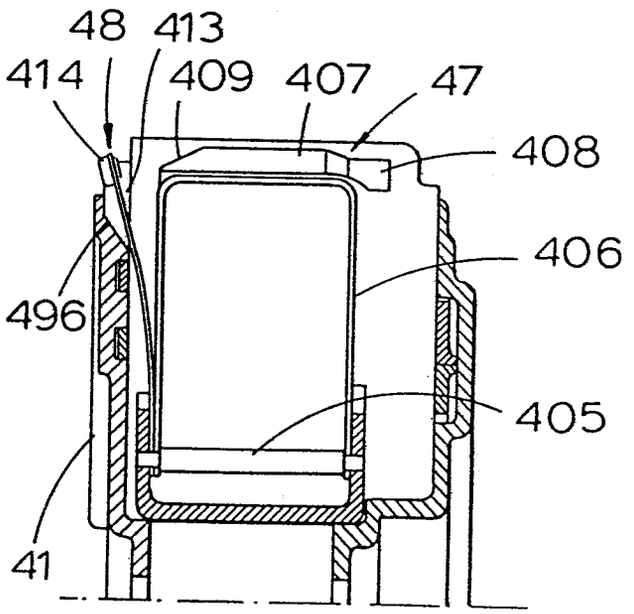

Fig.7B

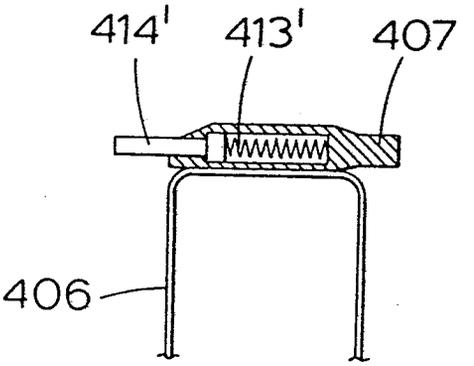

Fig.13

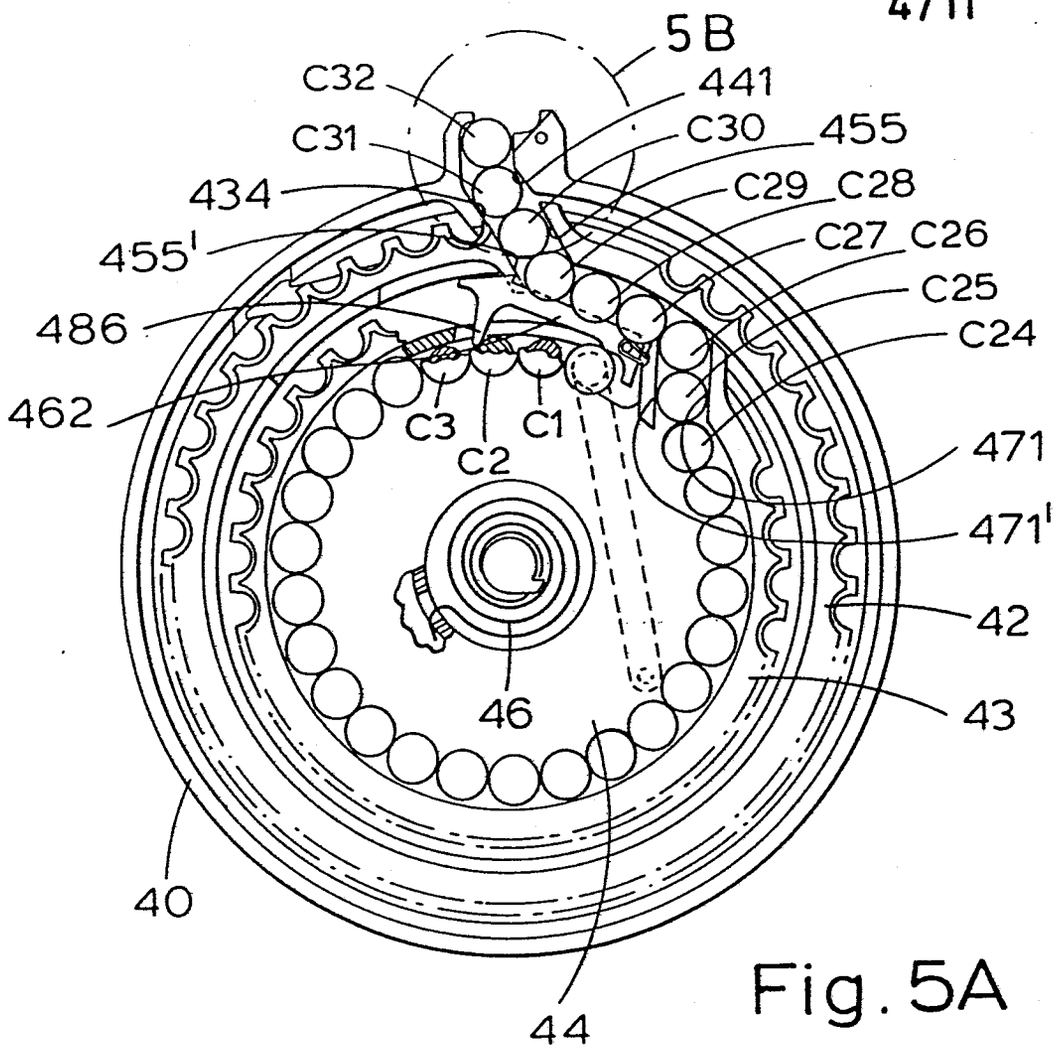
5B
C32
441
C31
C30
455
434
C29
C28
455'
C27
C26
C25
486
C24
462
C3
C1
C2
471
471'
42
46
43
40
44

Fig. 5A

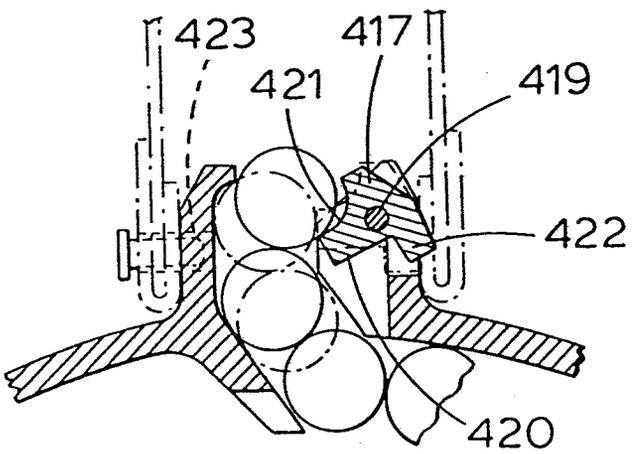
423
417
421
419
422
420

Fig. 5B

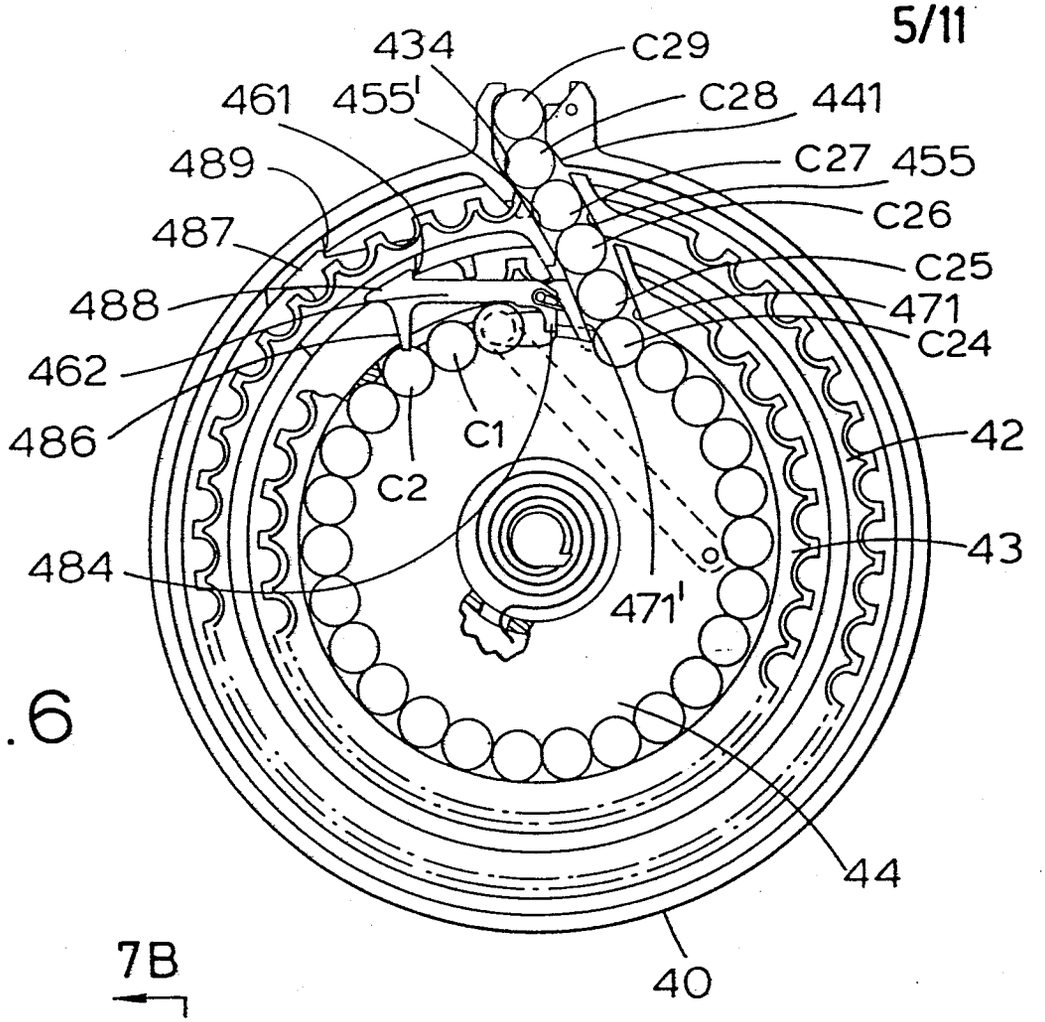
434
C29
461
455'
C28
441
489
C27
455
C26
487
C25
488
471
C24
462
486
C1
42
C2
43
484
471'
44
40

Fig.6

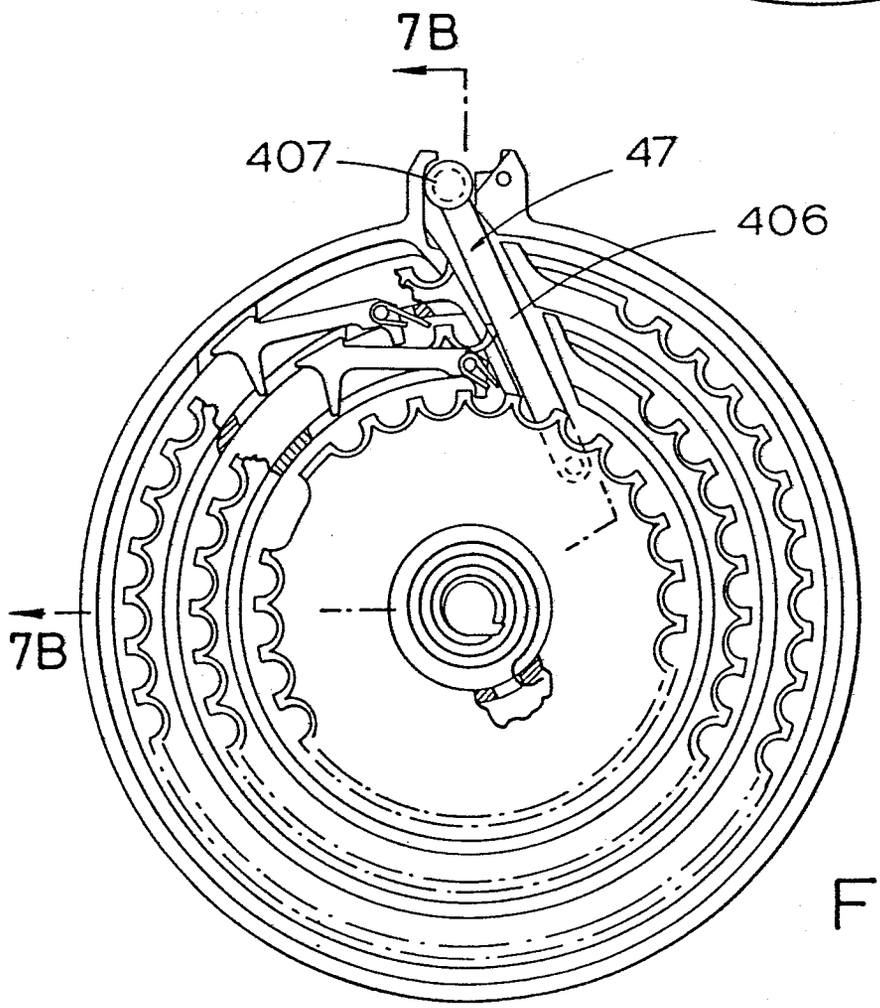
7B
407
47
406
7B

Fig.7A

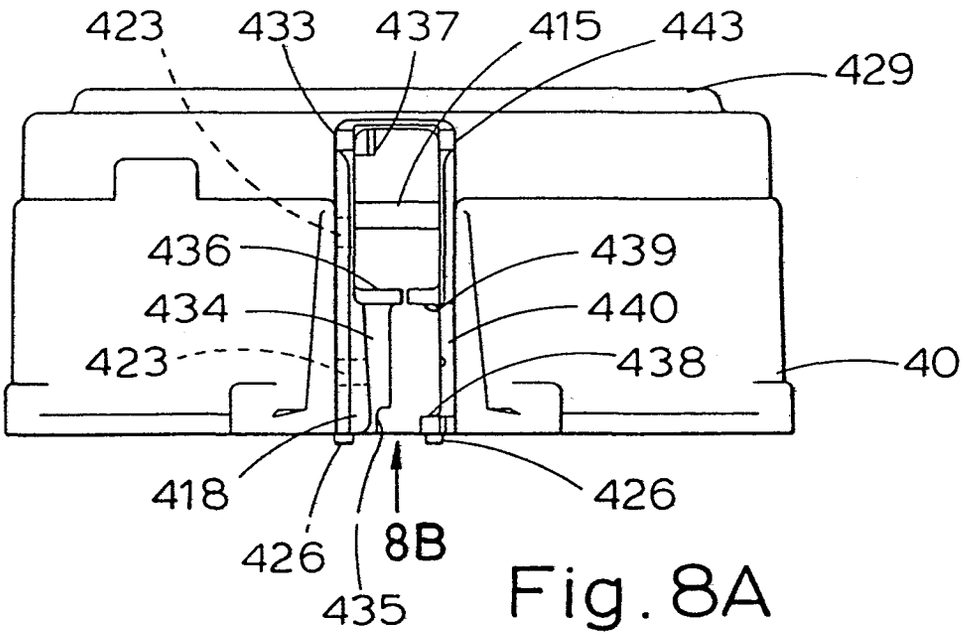
423
433
437
415
443
429
436
439
434
440
423
438
40
418
426
426
8B
435

Fig. 8A

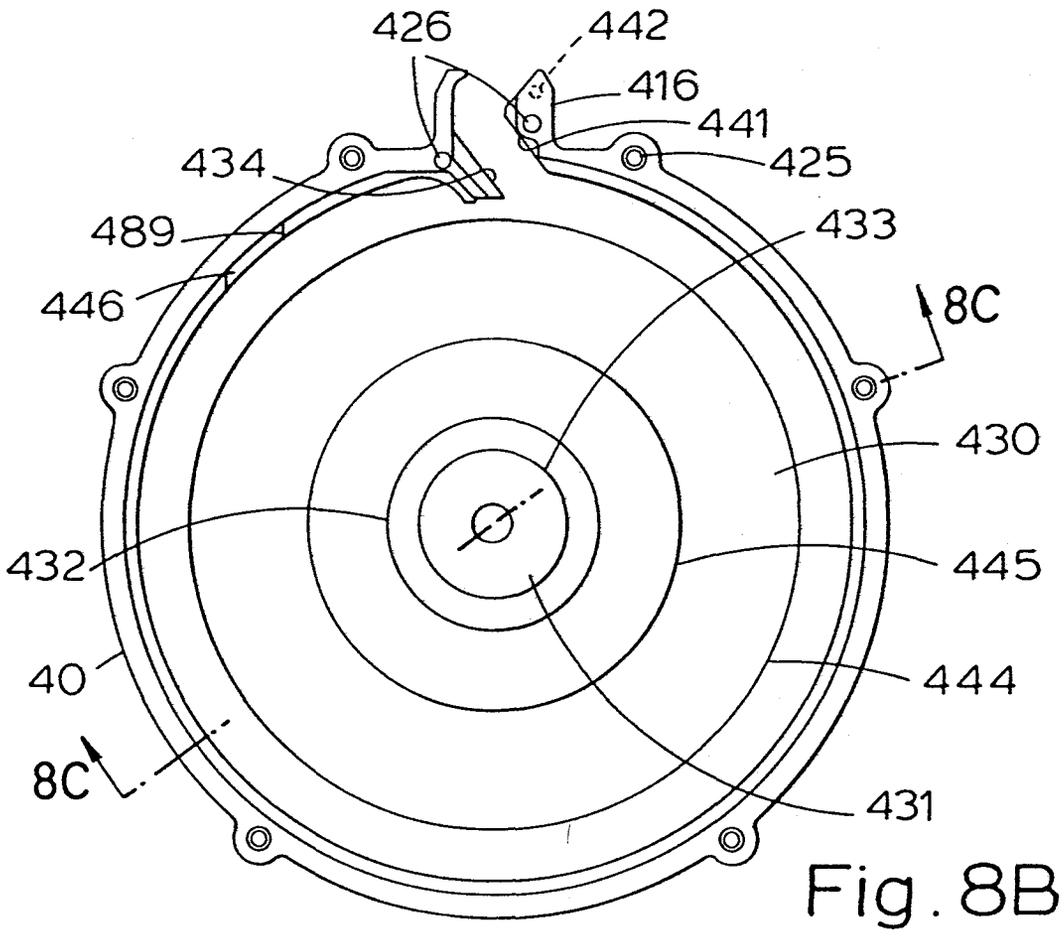
426
442
416
441
425
434
489
433
446
8C
430
432
445
40
444
8C
431

Fig. 8B

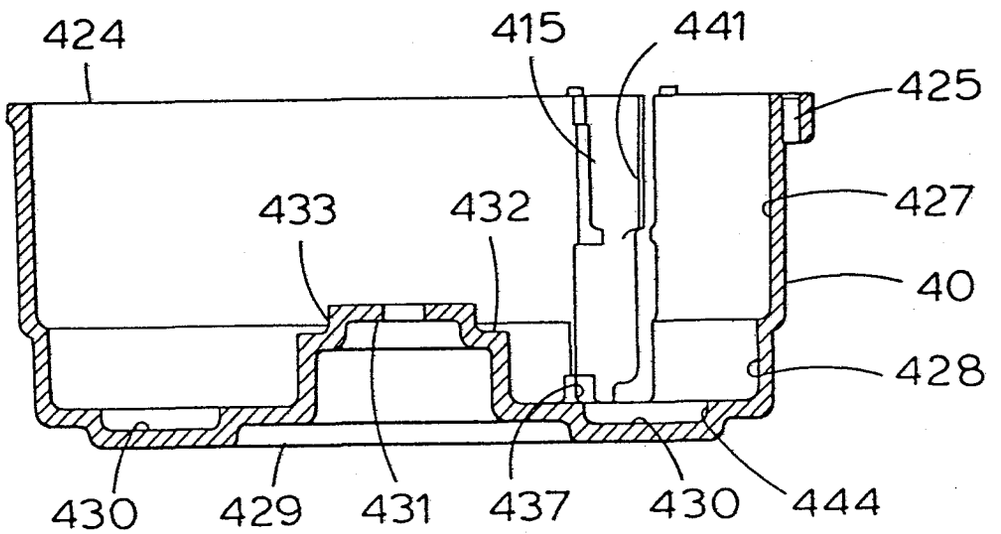

Fig. 8C

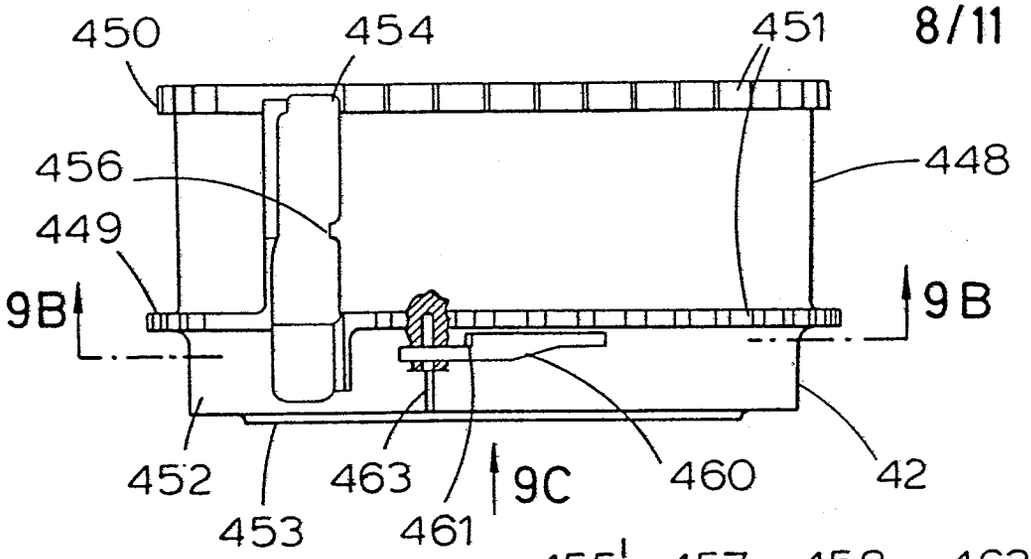

Fig.9A

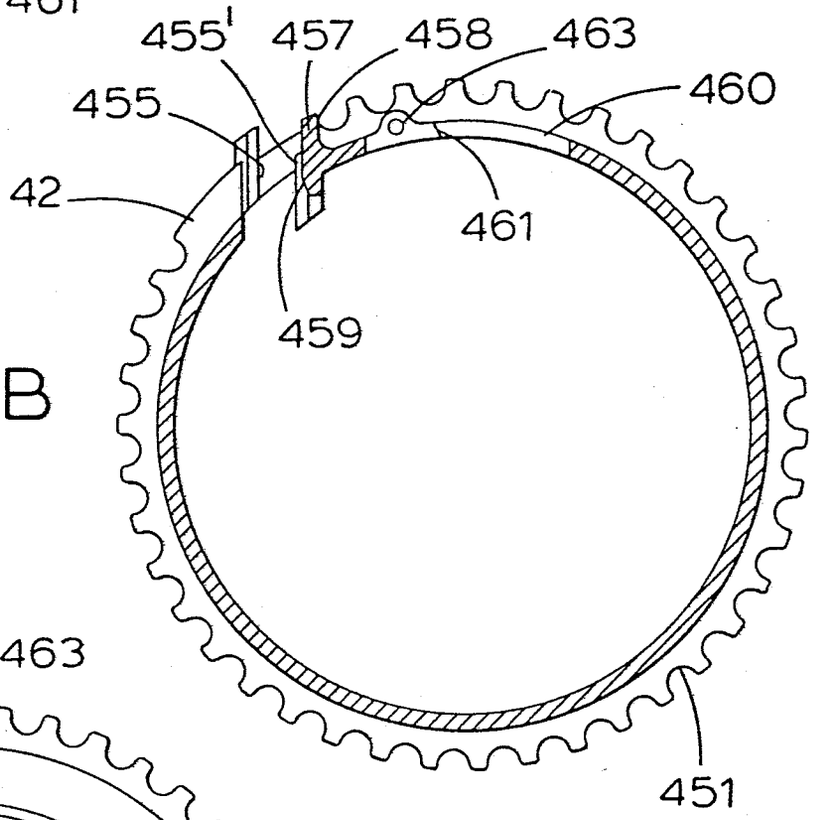

Fig.9B

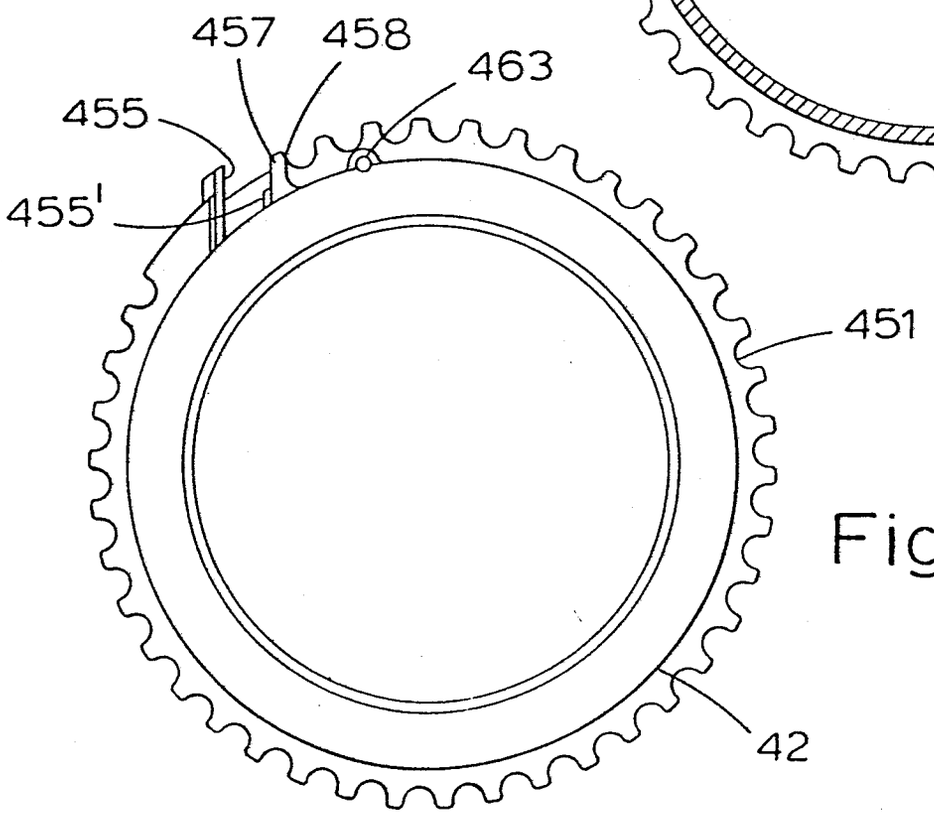

Fig.9C

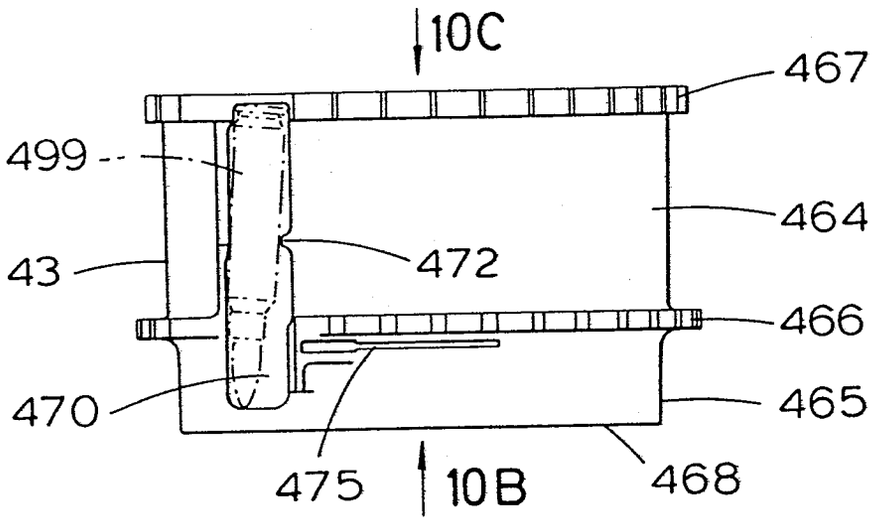

Fig.10A

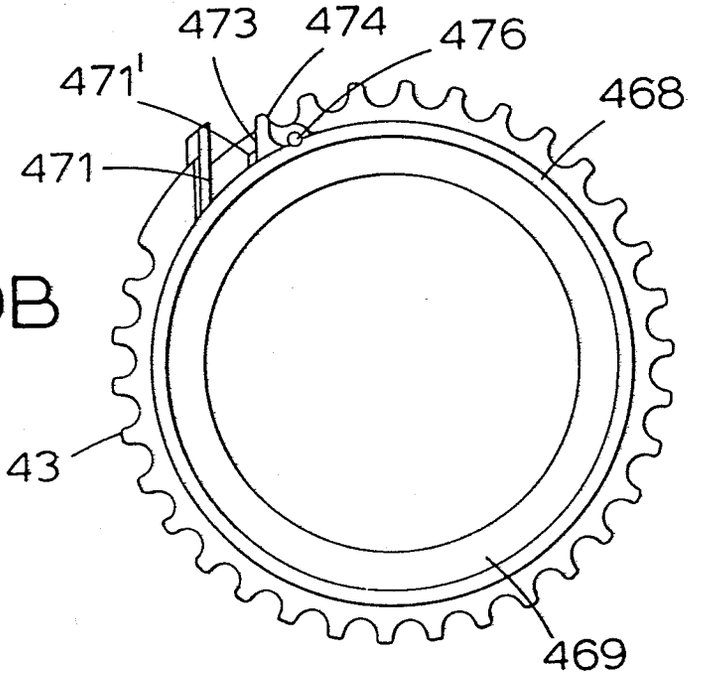

Fig.10B

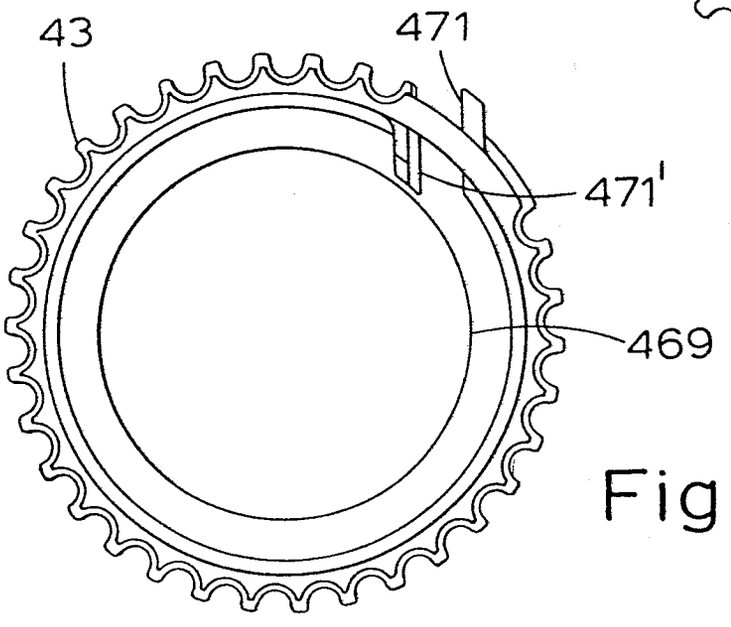

Fig.10C

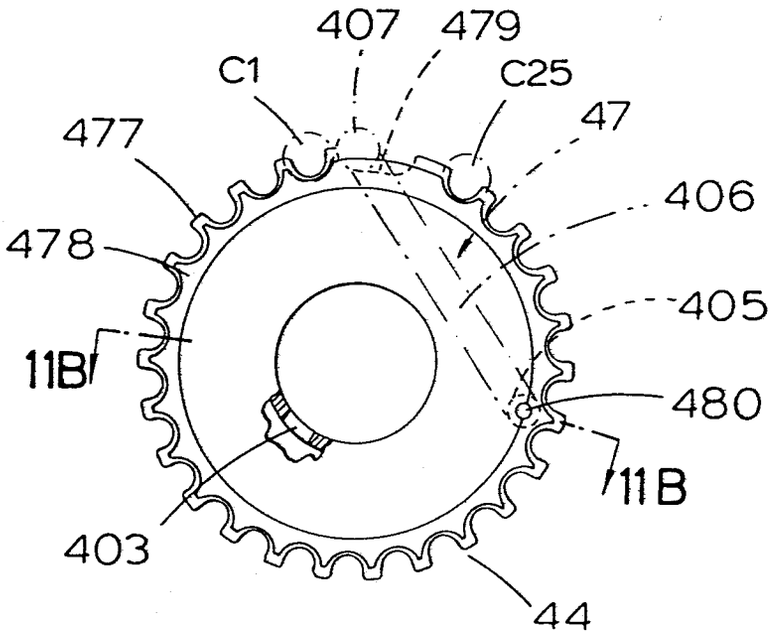

Fig.11A

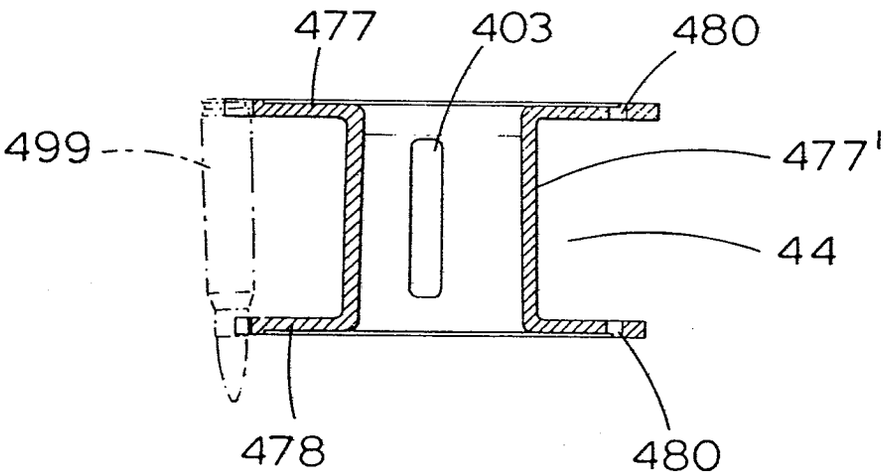

Fig.11B

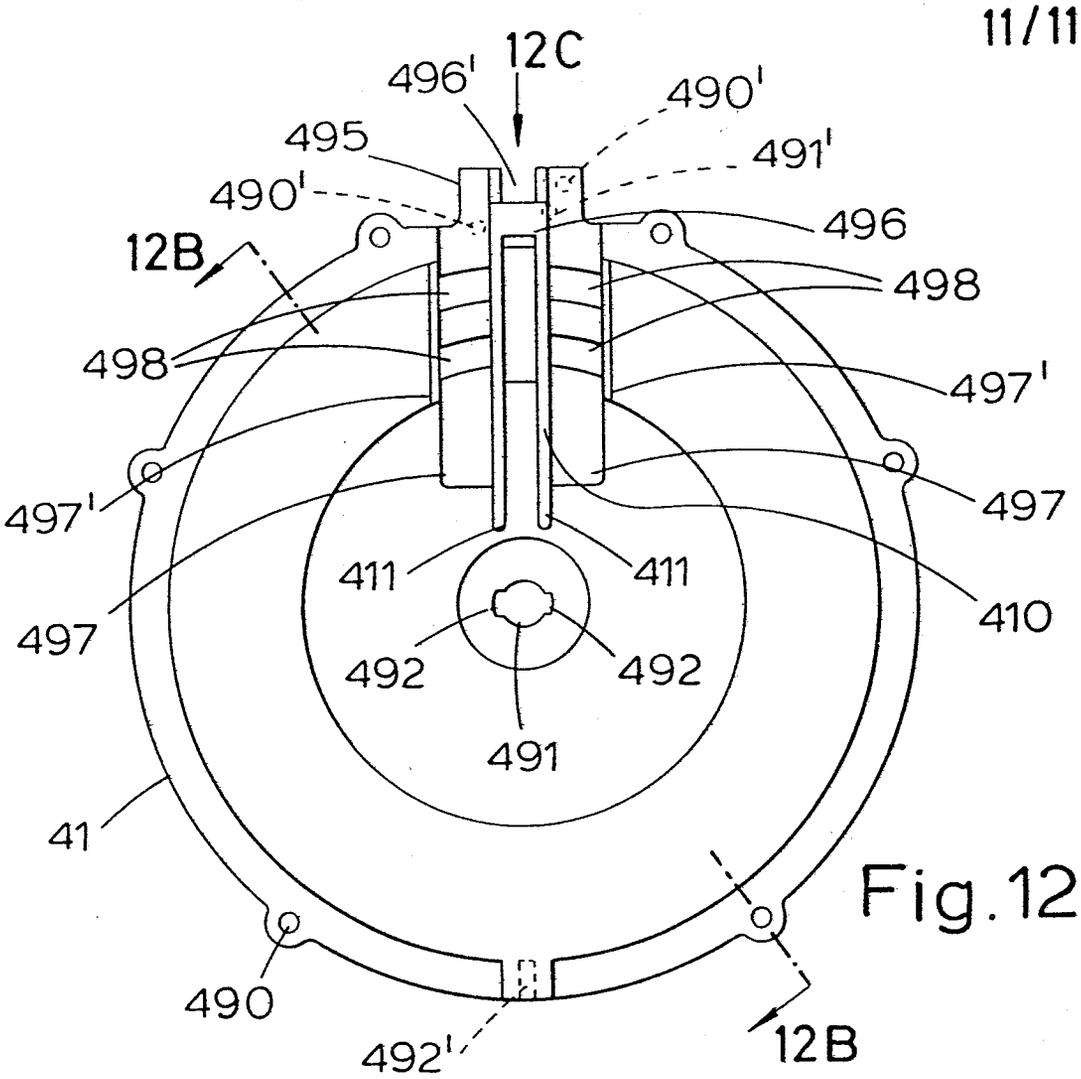

Fig.12A

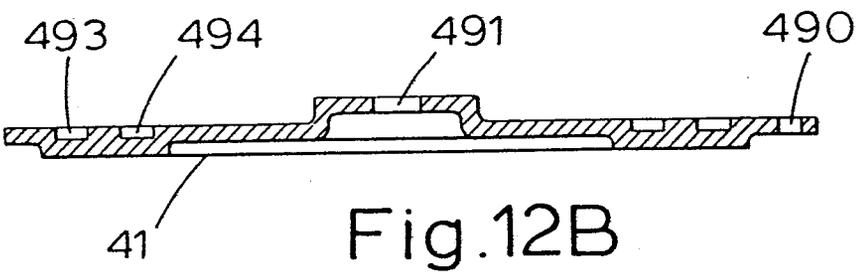

Fig.12B

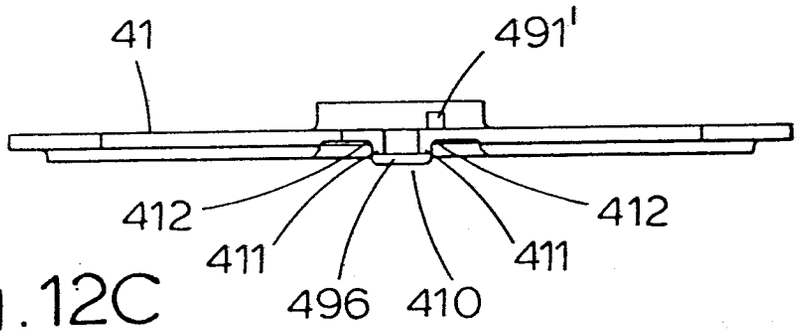

Fig.12C