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(54) **DISPENSING MECHANISM**

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(56) References cited:
**EP-A1- 1 575 006 GB-A- 913 384
GB-A- 1 152 414 GB-A- 2 103 194
GB-A- 2 291 867 GB-A- 2 402 386
US-A- 2 037 751 US-A- 3 071 292
US-A- 3 120 324 US-A- 3 807 600
US-A1- 2011 284 572 US-A1- 2013 056 488**

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Description

[0001] The present invention relates to a cup dispensing mechanism, and to a carousel-type cup dispenser incorporating such a mechanism.

[0002] In-cup vending systems are based on stacks of disposable cups, each containing a portion of beverage making ingredients in its base. The cups are snap-fitted together in the stack, and the stack is then packaged, stored and transported conveniently by the vending operator. In use, the stack is removed from its packaging and loaded into the dispenser of a vending machine. In response to a vending command, the machine automatically splits a cup from the bottom of the stack and fills it with hot water to form the desired beverage. Most beverage vending machines contain a number of cup stacks, at least one such stack being provided for each beverage supplied by the machine. In such machines, the plurality of cup stacks are usually arranged in a carousel, so that rotating the carousel brings the desired cup stack to a dispensing position.

[0003] Carousel-type cup dispensers are known, for example, from GB-A-1368208 and WO01/82249. These particular dispensers use multiple spiral scroll splitters (also called snail cams) for splitting individual cups from the bottoms of the stacks. The scroll splitters (usually four in number) are equally spaced around the perimeter of the cups, and are equally driven by a single servo by means of a rack-and-pinion frame, or a ring-gear mechanism.

[0004] A carousel-type cup dispenser is also disclosed in GB-A-2404386. Another example of the prior art is disclosed in US2037751.

[0005] A problem with earlier dispensing mechanisms is that the machine can jam or a cup can be broken, or two cups can be dispensed at once. If the machine jams then the machine may be inoperable and requires a service engineer to be called. It is an object of this invention to avoid this problem.

[0006] The inventor has realised that the reason the split occurs is because the friction between the dispensing mechanism and the cups is such that movement of the cups can cause rotation of the mechanism. When the cups are loaded into the machine, the person loading the machine can inadvertently cause the dispensing mechanism to move as the cups are loaded into position. This can result in problems with the machine's operation at a later point in time. Claim 1 discloses the present invention. Preferred embodiments are disclosed in claims 2-14.

[0007] According to a first aspect of the present invention there is provided a cup dispensing mechanism for dispensing cups from a nested cup stack, comprising a ring and a splitting mechanism for splitting off an individual cup from the base of the stack, wherein the ring is rotatable from a first position to a second position to drive the splitting mechanism and at least initiate the splitting of a cup from the base of the stack, and characterised in

that the dispensing mechanism further comprises a means for preventing free rotation of the ring from the first position in the direction of the second position.

[0008] The cup dispensing mechanism may further comprise an actuator for rotating the ring from the first position to the second position, wherein the actuator is configured to exert a force which overcomes the resistance of the means for preventing free rotation of the ring.

[0009] The means for preventing free rotation of the ring may comprise a detent, preferably wherein said detent is located on a frame which at least partially surrounds said ring.

[0010] The means for preventing free rotation of the ring may further comprise a projection extending from the ring, wherein the projection is arranged to engage the detent to prevent free rotation of the ring.

[0011] The ring and projection may have a stiffness, whereby the ring deforms resiliently when the projection passes over the detent as the ring is rotated.

[0012] The projection and the ring may be a moulded unitary part.

[0013] The projection may extend outwardly from the ring in the plane of the ring.

[0014] The actuator may be a motorised actuator.

[0015] The splitting mechanism may comprise at least one cup splitting scroll, the or each scroll comprising a wedge-shaped projection for splitting a cup from the base of the stack as the scroll is rotated.

[0016] The splitting mechanism may comprise four or more cup splitting scrolls defining a cup dispensing aperture, wherein each scroll comprises a wedge-shaped projection for splitting a cup from the base of the stack as the scroll is rotated.

[0017] The or each scroll may further comprise a support ledge located below the top of the wedge projection and radially spaced from the wedge projection for supporting the bottom cup of a stack before operation of the scroll to split the cup from the base of the stack.

[0018] In the first position the or each scroll may be positioned such that a bottom cup of a stack of cups will rest on the support ledges when the stack of cups is located on the dispensing mechanism.

[0019] In the second position the or each scroll may be positioned such that the wedge projections extend into a position for at least initiating the splitting of a cup from the base of the stack.

[0020] The ring may be a ring gear, preferably adapted to drive the or each scroll.

[0021] A region of the radially outer surface of the ring gear may be toothed for engagement with gear teeth on the scrolls.

[0022] There is further provided a cup dispenser comprising two or more of the cup dispensing mechanisms as defined herein.

[0023] There is further provided a cup dispenser comprising a plurality of the dispensing mechanisms for dispensing cups from a corresponding plurality of nested cup stacks, each said mechanism comprising four or

more cup splitting scrolls defining a cup dispensing aperture, wherein adjacent dispensing mechanisms are closely spaced in the dispenser such that the smallest distance between adjacent cup dispensing apertures is about 25mm or less.

[0024] The term "cup dispensing aperture" refers to the imaginary circle having a radius equal to the maximum radius of the cups to be dispensed, through which the cups drop when dispensed by the mechanism. The mechanism will, of course, normally comprise an actual aperture of slightly greater size through which the cups drop, for example the aperture in the center of the drive ring described below. The above distance of 25mm or less is measured between the closest points on the cup dispensing aperture. Preferably, the distance is 20mm or less, more preferably 16mm or less, and most preferably 12mm or less.

[0025] Preferably, there are only four scrolls in each cup dispensing mechanism. Preferably, each of the dispensing mechanisms comprises two outer scrolls positioned on a first half of a perimeter of a cup dispensing aperture, the two outer scrolls being spaced apart from each other by a first distance, and two inner scrolls positioned on a second half of the aperture, spaced apart from each other by a second distance, wherein the second distance is less than the first distance. This enables cup dispensing mechanisms, when positioned around apertures of a circular carousel, to be arranged closer to each neighbouring cup dispensing mechanism around the carousel. This will permit a smaller carousel for a given number of stacks, or a larger number of stacks in a standard carousel.

[0026] Preferably each scroll has an outermost diameter of less than 32mm, more preferably less than 30mm. Most preferably, the scrolls have an outermost diameter of about 28mm to about 29mm.

[0027] The term "scroll" refers to a spiral cam or snail cam, that is to say a substantially cylindrical body mounted on a substantially vertical cylinder axis about which it can rotate, and having on an outer surface thereof a wedge-shaped projection (i.e. wedge-shaped when viewed in plan developments of the scroll surface) extending partially around the cylinder, typically from about 150 to about 300 degrees, preferably about 160 to about 200 degrees around the cylinder. The wedge-shaped projection is configured for insertion between and abutment against both the top surface of the lip (i.e. rim) of a bottom cup in the stack and the bottom surface of the lip of the next adjacent cup in the stack, so as to split the bottom cup from the stack as the cam is rotated.

[0028] It is a feature of certain in-cup vending systems that the vertical spacing (known as the cup pitch) between successive cups in the stack may vary, for example from about 5mm to about 20mm. Preferably, the wedge-shaped projection has sufficient length to split cups having a cup pitch anywhere in this range. It will be appreciated that the wedge-shaped projection may be hollow or interrupted without loss of function.

[0029] The wedge preferably comprises a substantially horizontal top surface and a substantially helical bottom surface. The wedge angle (helix angle) between the bottom surface and the horizontal (where "horizontal" is the plane perpendicular to the axis of the scroll splitter) may be constant. However, in certain preferred embodiments, the angle of the wedge may not be constant. For example, the wedge may have a cup splitting region with a relatively lower angle (say 18° to 22°, preferably about 21°) to provide maximum effectiveness in breaking the snap fitting between cups, followed by a relatively higher angle region (say 30° to 45°) to push the bottom cup away against friction and suction forces after the snap fitting has been broken. Preferably, the relatively lower angle region extends from about 100 to about 230 degrees around the cylinder, preferably about 120 to about 180 degrees around the cylinder in order to provide effective splitting of cup stacks having a wide range of cup pitches. Preferably, the relatively higher angle region extends from about 10 to about 30 degrees around the cylinder, preferably about 20 degrees around the cylinder in order to provide rapid separation of the bottom cup. The wedge may additionally comprise a second relatively higher angle region (say 30° to 45°) adjacent to the leading tip of the wedge, to minimize the length of the wedge that does not engage with the cups. Preferably, the second relatively higher angle region extends from about 5 to about 25 degrees around the cylinder, preferably about 10 degrees around the cylinder. Preferably the wedge has a mean angle over its whole length of less than 25°. More preferably, the mean angle is from 20° to 23°.

[0030] Other suitable examples of scroll splitters having more than one wedge angle are described in GB-A-2333289.

[0031] The scrolls further comprise a support detent located below the top of the wedge projection and radially spaced from the wedge projection for supporting the bottom cup of the stack before operation of the scroll to split the cup from the stack, i.e. between dispensing operations. The support detent is typically a radially extending ledge for abutment under the lip of the bottom cup.

[0032] Preferably, one or more cup guides are placed between one or more of the scrolls where the scrolls are spaced apart. The cup guides are normally positioned and dimensioned to abut the outside of the lip of at least the bottom cup (or preferably at least the bottom 2 or 3 cups) of the stack while the bottom cup is being split from the stack by the scrolls. In other words, the cup guides have abutment surfaces lying on the cup dispensing aperture to guide the cup dispensing. The cup guides may be fixed, or may be able to rotate, but in any case they define a fixed radius substantially equal to the maximum radius of the cups to reduce rocking or squeezing of the cups in the stack during splitting and during feeding of the cups after splitting. This prevents cups from slipping past the scrolls. Slipping past the scrolls would constitute a misfeed.

[0033] In certain embodiments, the cup guides are sub-

stantially vertical posts, preferably cylindrical posts, which may be rotatable. In other embodiments, the cup guides are fixed wall sections having curved internal surfaces that are radiused to match the outside radius of the cup stack. Preferably one or more cup guides are positioned around the perimeter of the cup dispensing aperture between the outer scrolls. Preferably one or more cup guides are positioned around the perimeter of the cup dispensing aperture between each outer scroll and its neighbouring inner scroll.

[0034] Preferably the scrolls for dispensing a given cup stack are all driven by a single drive member, preferably a ring gear, which preferably is permanently mounted to the scrolls. The radially inner surface of the ring gear may then define part of the aperture through which the cups drop as they are dispensed by the mechanism. Preferably, the radially outer surface of the ring gear is toothed for engagement with the scrolls. In certain embodiments, the gear teeth do not extend all around outer surface of the gear ring. Instead, a region of the gear ring between the inner and outer scrolls is substantially free of teeth so as to enable the cup splitters to be packed more closely together around the carousel without contact between the gear teeth on adjacent ring gears.

[0035] Preferably, the cup dispenser according to the present invention is a carousel-type cup dispenser. That is to say, it comprises a plurality of cup dispensing mechanisms radially spaced around a carousel axis. The dispensing mechanisms are fixed in relation to each other, but rotatable around the carousel axis. For example, the dispensing mechanisms may be located at fixed locations around the periphery of a rotatable circular base plate of the dispenser.

[0036] The mechanisms are located adjacent the bottom of each cup stack station of the carousel. Preferably there are at least twelve, more preferably at least sixteen cup stack stations on the carousel, still more preferably at least eighteen cup stack stations on the carousel.

[0037] As already noted, the four scrolls of each mechanism are preferably driven by a ring gear. The ring gear may be driven by a servo through an idler gear, for example as described in WO01/82249. However, preferably the ring gear has a cam thereon, and the cam is selectively operable by an actuator positioned outside or inside the carousel. The cam-driven ring gear provides the advantages that a single actuator, not mounted to the carousel, can be used to drive the mechanism on any stack - it is not necessary to have a separate driver for each stack splitting mechanism. A further advantage is that the actuator can be arranged so that it does not block the rotation of the carousel that is needed to bring different stacks to the dispensing location. The actuator preferably drives the cam in a reciprocating movement from a storage position (in which the bottom cup of the stack is supported by the support detent on the scroll as described above), to a dispensed position (in which the bottom cup has been dispensed and the next cup in the stack is supported on the top of the wedge projection),

and back to the storage position (in which the previously next cup is now the bottom cup supported on the support detent). In certain embodiments, the cam projection is situated between the outer scrolls, and the cam actuator will then be situated radially outside the carousel. In other embodiments, the cam projection is situated between the inner scrolls, in which case the cam actuator may be situated radially inside the carousel, and the cam projection will normally be situated above or below the plane of the scroll splitters in order to remain clear of the inner scrolls. It will be appreciated that alternative cam-driven mechanisms for rotating the scrolls, different from the ring gear, for example a belt-driven mechanism, could be contemplated within the scope of the present invention.

[0038] In certain embodiments, the manner in which the actuator rotates the ring gear results in a degree of lateral force being translated through to the cup splitting mechanisms. This effect is more evident when overcoming a high cup interlock force. To counteract this radial force the mechanism and system according to the present invention preferably further comprises one or more locking features operatively associated with the actuator to block or restrict lateral movement of the cup splitting mechanism while the cup is being split from the stack. The term "lateral movement" refers to relative movement of the actuator and the cup dispensing mechanism in the plane of the cup dispensing aperture i.e. horizontal. It may comprise movement in the direction of the actuator motion (y-axis movement), and/or movement of the cup splitting mechanism towards or away from the actuator (x-axis movement).

[0039] In certain embodiments of this type, a locking feature is provided by abutment between an outer surface of the actuator and a locking surface of the cup splitting mechanism. For example, the actuator may comprise an outer surface, such as a drive ring surface, wherein the outer surface abuts a complementary surface on the cup splitting mechanism or carousel adjacent to the actuator while cup splitting is taking place. This provides y-direction locking throughout the cup split in addition to a degree of actuator/base alignment.

[0040] Alternatively or additionally, a locking element mounted on, or driven by, the cup splitting actuator engages with a complementary locking element on the cup splitting mechanism to provide both x- and y-direction control only when the cup splitting is taking place. For example, the locking element may comprise a projection (z-direction) on the actuator mechanism that is rotated into engagement with a complementary recess on the cup splitting mechanism or the carousel when the actuator is driven to the cup splitting position. In other embodiments, a cam on the actuator may drive a locking arm into engagement with a suitable recess on the cup splitting mechanism or the carousel when the actuator is driven to the cup splitting position.

[0041] The present invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 shows a perspective view of a cup dispensing mechanism for a cup dispenser ;

Figure 2 shows a side elevation view of one of the scrolls of the mechanism of Fig. 1;

Figure 3 shows a top plan view showing part of a mechanism of a second arrangement similar to that of Figure 1 (with certain elements omitted for clarity) and part of an actuator mechanism of the dispensing system;

Figure 4 shows a schematic top plan view of a carousel cup dispenser incorporating a number of the mechanisms of Fig. 1 or Fig. 2;

Figure 5 shows a perspective view of a portion of a cup splitting mechanism according to a further arrangement, in particular to illustrate the engagement between a locking projection on the actuator and a complementary recess on the carousel; and

Figure 6 shows a further perspective view of a part of the system of Fig. 5, showing a locking element driven by the cup splitting actuator.

Figure 7 shows a perspective view of parts of a cup dispenser according to the present invention, in particular showing a detent;

Figure 8 shows a plan view of parts of a cup dispenser according to the present invention, in particular showing a detent;

Figure 9 shows a close-up perspective view of the detent of figure 8;

Figure 10 shows a close up perspective view of figure 8 with the ring gear located in a first position;

Figure 11 shows a close up perspective view of figure 8 with the ring gear located in a further position;

Figure 12 shows an alternative embodiment of a means for preventing free rotation of the ring in accordance with the present invention; and

Figure 13 shows a further alternative embodiment of a means for preventing free rotation of the ring in accordance with the present invention.

[0042] Firstly the features and operation of the cup dispenser will be described in relation to figures 1 to 6. The means for preventing free rotation of the ring is not shown in these figures but this feature is shown and described in relation to figures 7 to 13. The cup dispenser shown in figures 7 to 11, and in the alternative embodiments of figures 12 and 13, has the same features and operates

in the same way as described in relation to figures 1 to 6.

[0043] Referring to Figure 1, the embodiment comprises four identical scrolls 18, 20 rotatably mounted between a base plate 16 and a top plate 12 around apertures 22 in the base plate and the top plate large enough to allow passage of the desired cups. The top plate and the base plate 12, 16 are held in fixed, spaced, parallel relation by posts 14. The top plate 12 and the base plate 16 are trapezium shaped in plan for insertion into a carousel as will be seen below. Two of the scrolls are outer scrolls 18 and two of the scrolls are inner scrolls 20. The four scrolls 18, 20 are positioned so that a selected in-cup vending drinks cup, for example a KLIX (Registered Trade Mark) cup, for dispensing by the cup dispensing mechanism, will fit between, but will not fall past, the scrolls without activation of the cup dispensing mechanism. KLIX cups have tapered conical sides with an outside diameter just below the lip of 69mm, and a lip extending outwardly about 2mm from the sides. Cups having different diameters will require the scrolls 18, 20 to be spaced around a differently sized imaginary circle. A skilled person will be able to determine the appropriate size of that circle for a particular cup size by simple experimentation. In fact, the scrolls could be adjustably mounted on the base plate 16 for use with differently sized cups. For example, they could be bolted into radial slots in the top plate 12 and the base plate 16. Generally speaking, however, the ideal positions for the scrolls is such that the cups will dispense, one at a time, from the stack when using the scrolls but without misfeeds.

[0044] Figure 1 shows the scrolls in a non-dispensing or storage orientation. In this orientation, support ledges 43 provided on each of the scrolls 18, 20 would support the rim of the bottom cup if a stack of cups were to be placed between the scrolls 18, 20.

[0045] The two inner scrolls 20 are positioned closer together than the two outer scrolls 18. It can thus be seen that the four scrolls are positioned at the corners of a trapezium. The angles of the trapezium are optimized for close packing of the mechanisms in a carousel, wherein the axis of symmetry of the trapezium lies along a radius of the carousel. For example, the internal angle of the trapezium for a carousel having n stacks is desirably $90 + (180/n)$ degrees, i.e. 100° for an 18-stack carousel.

[0046] Referring to Figs. 1 and 2, each scroll 18, 20 has a gear teeth 28 at its base. The teeth 28 engage with teeth of a ring gear 30 that is coaxial with, the imaginary circle on which the scrolls are located. The ring gear 30 has a radially inner surface defining a circular aperture 32, also larger than the maximum cup diameter, for allowing a cup to pass therethrough without resistance.

[0047] The radially outside surface of the ring gear 30 comprises teeth for engaging with the gear teeth 28 of the scrolls. The radially inner surface of the ring gear 30 is smooth. The teeth are only provided as required in the vicinity of the scrolls. The region of the ring gear between the inner and outer scrolls is free of projecting teeth. This region is where the ring gears on adjacent dispensing

mechanisms approach most closely together, and the elimination of gear teeth in these regions enables closer packing of the mechanisms without interference between gear teeth on adjacent gear rings.

[0048] The four scrolls 18,20 each are rotatable about their axes, all of which axes are parallel to the axis of the cup stack and the ring gear 30. Similarly, the ring gear 30 is rotatable about its axis. Rotation of the ring gear 30 causes the four scrolls 18,20 all to rotate simultaneously.

[0049] The ring gear 30 has a cam 34 for engaging with an actuator 36 (shown in Figure 3) for actuating the cup dispensing mechanism by rotation of the ring gear 30 and therefore the four scrolls 18, 20. In this embodiment, the cam 34 is situated between the two outer, more widely spaced scroll splitters 18.

[0050] Referring now to Figure 2, a single scroll is shown. The scroll has the gear teeth 28 proximate its base. The remaining part of the scroll 18,20 is generally cylindrical. However it has a wedge shaped projection 42 extending approximately 240° around its sidewall and a cup rim support ledge 43 extending approximately 120° around the sidewall.

[0051] It can be seen that the wedge shaped projection has a substantially flat top surface and an inclined bottom surface 44. The wedge comprises a first region 47 proximate to the tip 46, extending about 11° radially, and having a pitch angle of about 31°. This is the initial lead-in region that does not encounter the bottom cup in use. The wedge comprises a second region extending about 146° radially and having a pitch angle of about 21°. This is the region of the wedge that engages between the bottom cup and adjacent cup of the stack to break the interlock between the cups. The length of this region enables the scroll to be used to split relatively widely spaced (large cup stack pitch) cups. The wedge comprises a third region extending about 14° radially and having a pitch angle of about 38°, to overcome frictional and suction resistance to release of the bottom cup from the stack following breaking of the interlock. Finally, the wedge comprises a fourth region of zero pitch. In this region, the bottom cup of the stack has fallen away and the next cup of the stack is resting on the flat top surface of the wedge.

[0052] The cup rim support ledge 43 has a level top surface for supporting the bottom cup of a stack prior to operation of the splitting mechanism to split the cup.

[0053] The above-described efficient design of the wedge projection allows the scroll to be made with an outermost diameter d of 28.5mm. Prior art scrolls have had diameters generally of 31.3mm or more. The advantage of a smaller diameter is that it is more compact and therefore takes up less room on the carousel.

[0054] Referring again to Fig.1, the mechanism further comprises cup guides 48 fixed to, and depending from the top plate 12. The cup guides 48 prevent cups from distorting, rocking or falling past the scrolls 18, 20 when the scrolls 18, 20 are rotated. There are two cup guides 48 positioned between the two outer scrolls 18. Further there are two cup guides 48 positioned between each

outer scroll 18 and its neighbouring inner scroll 20. The cup guides are positioned to allow undistorted cups to drop freely through the dispenser, but to restrict or prevent distortion or rocking of the cup stack that could cause a misfeed.

[0055] The cup guides 48 are approximately equispaced between the scrolls 18, 20. By equally spacing the cup guides 48 between the scrolls 18, 20, they will tend to support the cups as they are fed or split from the stack of cups. The cups, therefore, when being separated by the scrolls from the stack of cups, will be well supported. This further prevents misfeeds.

[0056] Referring now to Figure 3, a mechanism similar to that of Figs. 1 and 2 is shown with the scrolls 18, 20 in a dispensed state together with an actuator 36 in a disengaged position. In this embodiment, the actuator would be located outside the circumference of the carousel into which the splitting mechanism is fitted. There is also shown a rim 37 of a cup resting on the top of the wedge projections of the scrolls 18, 20. The dispensed cup will have fallen away below it.

[0057] In this embodiment, the actuator 36 comprises a disc having a recess therein. The recess defines a pair of radial surfaces 38,40.

[0058] The sequence of operation of the actuator will now be described. It starts with the scrolls 18, 20 in their non-dispensing orientation, as shown in Figure 1, with the actuator 36 in its disengaged position, as shown in Figure 3. The bottom cup of the stack is supported on the support ledges 43 of the scrolls by its projecting top lip.

[0059] The first radial surface 38 of the actuator 36, upon rotating anti-clockwise, will engage with the cam 34 of the ring gear 30. This will cause the ring gear 30 to rotate clockwise. This will, in turn, cause the four scrolls 18,20 to rotate anti-clockwise, thereby driving the wedge projection between lip of the bottom cup and the lip of the next adjacent cup of the stack to split the bottom cup from the stack.

[0060] Typically, the scrolls rotate anti-clockwise by up to 300° from their non-dispensing orientation. However, in the embodiment shown, the scrolls will rotate by about 290°. Any more than 360° of rotation could cause a second cup to start to be dispensed. This, of course, is undesirable. Therefore a known rotation stop mechanism is provided to prevent such rotation.

[0061] After dispensing a cup, the scrolls 18, 20 and the cam 34 are in the orientation shown in Figure 3. The next cup on the stack is resting on the top of the wedge projection on the scrolls. The actuator 36 is then rotated backwards, i.e. clockwise, so that the second radial surface 40 of the actuator 36 engages the cam 34 of the ring gear 30 to return the ring gear 30 from its actuated position shown in Figure 3 to its reset position shown in Figure 1. This causes the next cup on the stack to drop down onto the support detent 43, ready for dispensing. Then the actuator 36 can be returned to its disengaged position as shown in Fig.3.

[0062] It can also be seen that the embodiment of Fig-

ure 3 has a radiused surface 45 that abuts against an outside surface 46 of the actuator 36 while the actuator 36 is engaged with the cam 34, thereby helping to reduce relative movement between the cup splitting mechanism and the actuator 36.

[0063] The disengaged position for the actuator 36 is such that the outermost tips of the first and second radial surfaces 38,40 do not extend into the carousel base plate 10. This allows the carousel to be rotated for selecting a particular stack of cups for dispensing a cup therefrom.

[0064] Referring to Figure 4, the carousel dispenser according to this embodiment of the invention comprises a carousel having 16 cup stack stations, each cup stack station having proximate its base its own mechanism comprising a set of four scrolls 18,20 as described above in relation to Figs. 1, 2 or 3. Shaped ribs 50 are provided extending upwardly from the base plate, as is conventional in the art, for entraining the stacks of cups upon inserting them into the carousel. However, because the scrolls are arranged non equi-spaced, the cup stack stations can be located circumferentially closer together than in previous carousels.

[0065] Each cup stack station may, for example, comprise cups containing different dry ingredients - e.g. for tea, coffee, chocolate or soup.

[0066] Referring to Figure 5, the illustrated embodiment has an actuator 52 located inside a carousel 54 of cup splitting mechanisms similar to that described in relation to Fig. 4. However, in this embodiment, the actuator 52 is situated inside the carousel, and drives a cam projection (not shown) that is located between and below the two innermost scroll splitters 56, 58 of the cup splitting mechanism on the carousel 54. The actuator 52 operates in generally the same fashion as the actuator 36 shown in Figure 3. However, the actuator 52 has the additional feature of upwardly projecting cylindrical wall section 60 that is received into a slot 62 in the inside wall of the carousel 54 when the actuator 52 is engaged with the cam projection on the cup splitting mechanism. This engagement between the wall section 60 on the actuator and the slot 62 in the carousel substantially prevents relative movement between the actuator 52 and the carousel 54, in particular radial movement of the carousel away from the actuator 52.

[0067] Figure 6 shows an alternative view of the embodiment of Figure 5, to illustrate a further mechanism for locking the relative position of the actuator 52 and the carousel 54 when the actuator 52 is engaging the cam on the cup splitting mechanism. The further locking means comprises a locking peg 64 linked to a tracking pin 66 that is received in a tracking slot 68 extending around the actuator, whereby the tracking pin 66 and the tracking slot 68 are in a tracked cam engagement, whereby rotation of the actuator to a position where the actuator is engaged with the cam on the cup splitting mechanism causes the pin and slot 66, 68 to lift the locking peg 64 into engagement with a complementary socket (not shown) on the carousel to prevent relative movement of

the actuator and the carousel in X or Y directions while the actuator is engaged with the cam on the splitting mechanism.

[0068] The means for preventing free rotation of the ring will now be described with reference to figures 7 to 11.

[0069] A detent 70 is provided on a frame 74 which at least partially surrounds the ring or ring gear 30. The ring gear 30 comprises a projection 72 extending outwardly from the ring in the plane of the ring, wherein the projection 72 is arranged to engage the detent 70 to prevent free rotation of the ring.

[0070] The detent 70 is fixed in position on the frame 74. The detent 70 does not deform in operation.

[0071] The ring gear 30 and its projection 72 have a stiffness, whereby the ring deforms resiliently when the projection passes over the detent as the ring is rotated. When the ring is rotated, the ring gear 30 deforms from a circular to an oval shape as the projection 72 passes over the detent 70. The detent 70 has a rounded edge 76 and the projection 72 has a rounded edge 78 to ease the passing of the detent 70 and the projection 72 past each other.

[0072] The projection 72 and the ring gear 30 are a moulded unitary part, preferably made from plastic.

[0073] Figure 7 shows a lever 134 extending from the ring gear 30 for engaging with an actuator, for example the actuator 36 shown in figure 3, for actuating the cup dispensing mechanism by rotation of the ring gear 30 and therefore the four scrolls 18, 20. In this embodiment, the lever 134 is situated between the two inner, more closely spaced scroll splitters 20.

[0074] The cup splitting scrolls 18, 20 shown in figure 7 define a cup dispensing aperture, wherein each scroll comprising a wedge-shaped projection 42 for splitting a cup from the base of the stack as the scroll is rotated. The scrolls further comprise a support ledge 43 located below the top of the wedge projection 42 and radially spaced from the wedge projection 42 for supporting the bottom cup of a stack before operation of the scroll to split the cup from the base of the stack.

[0075] The outer surface of the ring gear 30 has teeth 33 for engaging with corresponding teeth 26 on the scrolls whereby rotation of the ring gear causes rotation of the scrolls. The cup splitting scrolls and the splitting mechanism is described in more detail in relation to figures 1 to 6.

[0076] The operation of the cup dispensing mechanism will now be described in particular describing the operation of the means for preventing free rotation of the ring.

[0077] When the cups are loaded into a machine, the scrolls are located in a first position, which may be a non-dispensing or storage orientation, as shown in figure 10. The detent 70 will engage the projection 72 extending from the ring gear 30 to prevent free rotation of the ring gear 30 in a direction which would move the scrolls to initiate the splitting of a cup from the base of the stack. This prevents the person loading the machine from in-

adventently causing the scrolls to rotate as they load the cups into position. The force required to move the ring gear 30 from the first position is greater than the force that can be transmitted via the friction between the scrolls and the cup rim.

[0078] The bottom cup of the stack is supported on the support ledges 43 of the scrolls by its projecting top lip. When it is desired to dispense a cup, the actuator engages the lever 134, and exerts a force which overcomes the resistance of the means for preventing free rotation of the ring. The actuator drives the ring gear 30 and the projection 72 passes over the detent 70. The ring gear 30 deforms from a circular to an oval shape as the projection passes over the detent. The ring gear 30 is resilient and reverts to its original circular shape after the projection has passed over the detent.

[0079] The actuator is a motorised actuator. The motor force of the actuator is greater than the resistance to rotation resulting from the engagement of the detent 70 and the projection 72. Advantageously, the detent only increases the load seen by the motor of the actuator when moving the ring gear 30 from or to the first position, and the detent and projection do not increase the load over the rest of the splitting cycle.

[0080] Figure 11 shows the ring gear 30 after the projection 72 has passed over the detent 70. The arrow 80 indicates the direction of rotation of the ring. The actuator 36 continues to rotate the ring gear 30 clockwise. This will cause the four scrolls 18,20 to rotate anti-clockwise, thereby driving the wedge projection 42 between lip of the bottom cup and the lip of the next adjacent cup of the stack to split the bottom cup from the stack.

[0081] After dispensing a cup, the next cup on the stack is resting on the top of the wedge projection on the scrolls. The ring gear 30 is then rotated anticlockwise by the actuator, opposite the direction of arrow 80, to return the ring gear 30 from its actuated position to the first position shown in figure 10. This causes the next cup on the stack to drop down onto the support ledges 43, ready for dispensing.

[0082] The detent 70 will engage the projection 72 as the ring is rotated anticlockwise back to the first position. The actuator drives the ring gear 30 and the projection 72 passes over the detent.

[0083] 76. As before, the ring gear 30 deforms from a circular to an oval shape as the projection passes over the detent. Figure 12 shows an alternative means for preventing free rotation of the ring. Instead of having a projection and detent, as shown in figures 7 to 11, the means for preventing free rotation of the ring may instead comprise a sprung peg extending from the frame 174 which at least partially surrounds the ring gear 30. Figure 12 shows the peg 170 supported within the frame 174. The peg is biased towards the ring gear 30 by a spring 172. The ring gear 30 comprises a hollow 178 having raised sides 182. The rounded outer surface of the peg 170 is located in the hollow 178 when the ring gear 30 is located in the first position. This prevents free rotation of

the ring gear in the direction of the second position, indicated by arrow 180, since the peg 170 must be lifted out of the hollow against the force of the spring to rotate the ring away from the first position.

[0084] Figure 13 shows a further alternative means for preventing free rotation of the ring gear 30. Instead of having a projection and detent, as shown in figures 7 to 11, the means for preventing free rotation of the ring gear 30 may instead comprise a raised friction surface 272 located on the ring gear 30. The frame 274 which at least partially surrounds the ring gear 30 also has a raised friction surface 270. The two friction surfaces 270, 272 engage with each other when the ring is in the first position to prevent free rotation of the ring from the first position in the direction of the second position, indicated by arrow 280, since the friction between the two surfaces 270, 272 must be overcome to rotate the ring away from the first position.

[0085] The present invention has been described above purely by way of example. Modifications in detail may be made within the scope of the invention as defined in the claims.

25 Claims

1. A cup dispensing mechanism for dispensing cups from a nested cup stack, comprising a ring (30) and a splitting mechanism for splitting off an individual cup from the base of the stack, wherein the ring (30) is rotatable from a first position to a second position to drive the splitting mechanism and at least initiate the splitting of a cup from the base of the stack, and **characterised in that** the dispensing mechanism further comprises a means for preventing free rotation of the ring (30) from the first position in the direction of the second position, wherein the means for preventing free rotation of the ring comprises a detent (70) located on a frame (74) which at least partially surrounds said ring (30) and a projection (72) extending from the ring (30), wherein the projection (72) is arranged to engage the detent (70) to prevent free rotation of the ring (30) and that the ring (30) and projection (72) have a stiffness, whereby the ring (30) deforms resiliently when the projection (72) passes over the detent (70) as the ring (30) is rotated.
2. The cup dispensing mechanism of claim 1, further comprising an actuator (36) for rotating the ring (30) from the first position to the second position, wherein the actuator (36) is configured to exert a force which overcomes the resistance of the means for preventing free rotation of the ring (30).
3. The cup dispensing mechanism claim 2, wherein the actuator (36) is a motorised actuator.

4. The cup dispensing mechanism according to any preceding claim, wherein the projection (72) and the ring (30) are a moulded unitary part.
5. The cup dispensing mechanism according to any preceding claim, wherein the projection (72) extends outwardly from the ring (30) in the plane of the ring (30).
6. The cup dispensing mechanism of any one of the preceding claims, wherein the splitting mechanism comprises at least one cup splitting scroll (18), the or each scroll comprising a wedge-shaped projection (42) for splitting a cup from the base of the stack as the scroll (18) is rotated.
7. The cup dispensing mechanism of claim 6 wherein the or each scroll (18) further comprises a support ledge (43) located below the top of the wedge-shaped projection (42) and radially spaced from the wedge-shaped projection (42) for supporting the bottom cup of a stack before operation of the scroll (18) to split the cup from the base of the stack, wherein in the first position the or each scroll (18) is positioned such that a bottom cup of a stack of cups will rest on the support ledges (43) when the stack of cups is located on the dispensing mechanism.
8. A cup dispenser comprising two or more of the cup dispensing mechanisms as defined in the preceding claims.
9. A cup dispenser comprising a plurality of cup dispensing mechanisms as defined in any one of the preceding claims for dispensing cups from a corresponding plurality of nested cup stacks, each said mechanism comprising four or more cup splitting scrolls (18), (20) defining a circular cup dispensing aperture, and wherein adjacent dispensing mechanisms are closely spaced in the dispenser such that the smallest distance between adjacent cup dispensing apertures is about 25mm or less.
10. A cup dispenser according to claim 9, wherein each cup dispensing mechanism comprises two outer cup splitting scrolls (18) positioned on a first half of a perimeter of the cup dispensing aperture, the two outer scrolls (18) being spaced apart from each other by a first distance, and two inner cup splitting scrolls (20) positioned on a second half of the aperture, spaced apart from each other by a second distance, wherein the second distance is less than the first distance, wherein the inner and outer scrolls (18), (20) are positioned substantially at the corners of a trapezium surrounding said cup dispensing aperture.
11. A cup dispenser according to claim 9 or claim 10,

wherein each dispensing mechanism comprises a ring gear (30) adapted to drive the scrolls (18, 20) of that dispensing mechanism.

12. A cup dispenser according to claim 11, wherein a region of the radially outer surface of the ring gear (30) is toothed for engagement with gear teeth (28) on the scrolls (18, 20), and another region of the radially outer surface of the ring gear (30) between scrolls (18, 20) is substantially free of teeth so as to enable the cup splitters to be packed more closely together without contact between the gear teeth on adjacent ring gears.
13. A cup dispenser according to claim 11 or 12, wherein each ring gear (30) is provided with a cam projection (34) whereby moving the cam projection (34) from a first position to a second position drives the dispensing of a single cup, further comprising a cam actuator (36) adapted to move the cam projection (34) in a reciprocating fashion between the first and second positions, wherein the cam actuator (36) is a single cam actuator at a fixed location in the dispenser for driving cup splitting from a plurality of cup splitters (18), and one or more locking features operatively associated with the cam actuator (36) to block or restrict lateral movement of the cup splitting mechanism in the plane of the cup dispensing aperture while a cup is being split from the stack.
14. A cup dispenser according to any of claims 9 to 13, which is a carousel type cup dispenser, wherein the scrolls (18, 20) of each mechanism are driven by a ring gear (30), the ring gears (30) each have a cam (34) thereon, and the cams (34) on a plurality of said mechanisms are selectively operable by a single actuator (36) positioned outside or inside the carousel, and wherein the cam (34) and the actuator (36) are located above or below the plane of the ring gear (30) to reduce crowding in the plane of the ring gear (30).

Patentansprüche

1. Becherspendemechanismus zum Spenden von Bechern von einem ineinandergeschachtelten Becherstapel, der einen Ring (30) und einen Abtrennmechanismus zum Abtrennen eines einzelnen Bechers vom unteren Ende des Stapels umfasst, wobei der Ring (30) von einer ersten Position in eine zweite Position drehbar ist, um den Abtrennmechanismus anzutreiben und das Abtrennen eines Bechers vom unteren Ende des Stapels zumindest einzuleiten, und **dadurch gekennzeichnet, dass** der Spendemechanismus ferner ein Mittel zum Verhindern einer freien Drehung des Rings (30) von der ersten Position in Richtung der zweiten Position umfasst, wobei

- das Mittel zum Verhindern einer freien Drehung des Rings eine Arretierung (70), die an einem Rahmen (74) angeordnet ist, der den genannten Ring (30) zumindest teilweise umgibt, und einen Vorsprung (72) umfasst, der sich von dem Ring (30) erstreckt, wobei der Vorsprung (72) zum Eingreifen in die Arretierung (70) ausgelegt ist, um eine freie Drehung des Rings (30) zu verhindern, und dadurch, dass der Ring (30) und der Vorsprung (72) eine Steifigkeit aufweisen, wodurch sich der Ring (30) elastisch verformt, wenn der Vorsprung (72) beim Drehen des Rings (30) über die Arretierung (70) läuft.
2. Becherspendemechanismus nach Anspruch 1, der ferner ein Stellglied (36) zum Drehen des Rings (30) von der ersten Position in die zweite Position umfasst, wobei das Stellglied (36) so konfiguriert ist, dass es eine Kraft ausübt, die den Widerstand des Mittels zum Verhindern einer freien Drehung des Rings (30) überwindet.
 3. Becherspendemechanismus nach Anspruch 2, wobei das Stellglied (36) ein motorisiertes Stellglied ist.
 4. Becherspendemechanismus nach einem vorherigen Anspruch, wobei der Vorsprung (72) und der Ring (30) ein einstückiges Formteil sind.
 5. Becherspendemechanismus nach einem vorherigen Anspruch, wobei sich der Vorsprung (72) von dem Ring (30) in der Ebene des Rings (30) nach außen erstreckt.
 6. Becherspendemechanismus nach einem vorherigen Anspruch, wobei der Abtrennmechanismus mindestens eine Becherabtrennschnecke (18) umfasst, wobei die oder jede Schnecke einen keilförmigen Vorsprung (42) zum Abtrennen eines Bechers vom unteren Ende des Stapels beim Drehen der Schnecke (18) aufweist.
 7. Becherspendemechanismus nach Anspruch 6, wobei die oder jede Schnecke (18) ferner eine Stützleiste (43) umfasst, die sich unterhalb der Oberseite des keilförmigen Vorsprungs (42) befindet und radial von dem keilförmigen Vorsprung (42) beabstandet ist, um den untersten Becher eines Stapels vor der Betätigung der Schnecke (18) zu stützen, um den Becher vom unteren Ende des Stapels abzutrennen, wobei in der ersten Position die oder jede Schnecke (18) so positioniert ist, dass ein unterster Becher eines Becherstapels auf den Stützleisten (43) ruht, wenn sich der Becherstapel auf dem Spendemechanismus befindet.
 8. Becherspender, der zwei oder mehr der Becherspendemechanismen wie in den vorherigen Ansprüchen definiert umfasst.
 9. Becherspender, der eine Mehrzahl von Becherspendemechanismen wie in einem der vorherigen Ansprüche definiert zum Spenden von Bechern aus einer entsprechenden Mehrzahl von ineinandergeschachtelten Becherstapeln umfasst, wobei jeder genannte Mechanismus vier oder mehr Becherabtrennschnecken (18), (20) umfasst, die eine kreisförmige Becherspendeöffnung definieren, und wobei benachbarte Spendemechanismen in dem Spender eng beabstandet sind, so dass der kleinste Abstand zwischen benachbarten Becherspendeöffnungen etwa 25 mm oder weniger beträgt.
 10. Becherspendemechanismus nach Anspruch 9, wobei jeder Becherspendemechanismus zwei äußere Becherabtrennschnecken (18), die auf einer ersten Hälfte eines Umfangs der Becherspendeöffnung positioniert sind, wobei die beiden äußeren Schnecken (18) um eine erste Distanz voneinander beabstandet sind, und zwei innere Becherabtrennschnecken (20) umfasst, die auf einer zweiten Hälfte der Öffnung um eine zweite Distanz voneinander beabstandet positioniert sind, wobei die zweite Distanz geringer ist als die erste Distanz, wobei die innere und die äußere Schnecke (18), (20) im Wesentlichen an den Ecken eines Trapezes positioniert sind, das die genannte Becherspendeöffnung umgibt.
 11. Becherspender nach Anspruch 9 oder 10, wobei jeder Spendemechanismus einen Zahnkranz (30) umfasst, der zum Antreiben der Schnecken (18, 20) dieses Spendemechanismus geeignet ist.
 12. Becherspender nach Anspruch 11, wobei ein Bereich der radial äußeren Fläche des Zahnkranzes (30) für den Eingriff mit Zahnradzähnen (28) an den Schnecken (18, 20) gezahnt ist und ein anderer Bereich der radial äußeren Fläche des Zahnkranzes (30) zwischen den Schnecken (18, 20) im Wesentlichen zahnfrei ist, um zu ermöglichen, dass die Becherabtrenner ohne Kontakt mit den Zahnradzähnen an benachbarten Zahnkränzen enger aneinander gepackt werden können.
 13. Becherspender nach Anspruch 11 oder 12, wobei jeder Zahnkranz (30) mit einem Nockenvorsprung (34) versehen ist, wobei das Bewegen des Nockenvorsprungs (34) von einer ersten Position in eine zweite Position das Spenden eines einzelnen Bechers antreibt, ferner umfassend ein Nockenstellglied (36), ausgelegt zum Hin- und Herbewegen des Nockenvorsprungs (34) zwischen der ersten und der zweiten Position, wobei das Nockenstellglied (36) ein einzelnes Nockenstellglied an einer festen Stelle in dem Spender ist, um das Abtrennen eines Bechers von einer Mehrzahl von Becherabtrennern (18) anzutreiben, und ein oder mehrere Verriegelungsmerkmale, die operativ mit dem Nockenstell-

glied (36) assoziiert sind, um eine seitliche Bewegung des Becherabtrennmechanismus in der Ebene der Becherspendeöffnung zu blockieren oder einzuschränken, während ein Becher von dem Stapel abgetrennt wird.

14. Becherspender nach einem der Ansprüche 9 bis 13, der ein karussellartiger Becherspender ist, bei dem die Schnecken (18, 20) jedes Mechanismus durch einen Zahnkranz (30) angetrieben werden, wobei sich auf jedem der Zahnkränze (30) eine Nocke (34) befindet, und die Nocken (34) auf einer Mehrzahl der genannten Mechanismen selektiv durch ein einzelnes Stellglied (36) betätigt werden können, das außerhalb oder innerhalb des Karussells positioniert ist, und wobei sich die Nocke (34) und das Stellglied (36) oberhalb oder unterhalb der Ebene des Zahnkranzes (30) befindet, um Überfüllung in der Ebene des Zahnkranzes (30) zu verringern.

Revendications

1. Mécanisme de distribution de gobelets servant à distribuer des gobelets en provenance d'une pile de gobelets emboîtés, comportant une couronne (30) et un mécanisme de séparation servant à séparer un gobelet individuel en provenance de la base de la pile, dans lequel la couronne (30) est en mesure de tourner d'une première position à une deuxième position pour entraîner le mécanisme de séparation et pour au moins lancer la séparation d'un gobelet en provenance de la base de la pile, et **caractérisé en ce que** le mécanisme de distribution comporte par ailleurs un moyen servant à empêcher une libre rotation de la couronne (30) de la première position dans la direction de la deuxième position, dans lequel le moyen servant à empêcher une libre rotation de la couronne comporte un cliquet (70) situé sur un cadre (74) qui entoure au moins partiellement ladite couronne (30) et une partie saillante (72) s'étendant depuis la couronne (30), dans lequel la partie saillante (72) est agencée pour se mettre en prise avec le cliquet (70) pour empêcher une libre rotation de la couronne (30) et **en ce que** la couronne (30) et la partie saillante (72) ont une rigidité, dans lequel la couronne (30) se déforme de manière élastique quand la partie saillante (72) passe sur le cliquet (70) lors de la rotation de la couronne (30).
2. Mécanisme de distribution de gobelets selon la revendication 1, comportant par ailleurs un actionneur (36) servant à faire tourner la couronne (30) de la première position à la deuxième position, dans lequel l'actionneur (36) est configuré pour exercer une force qui surmonte la résistance du moyen servant à empêcher une libre rotation de la couronne (30).
3. Mécanisme de distribution de gobelets selon la revendication 2, dans lequel l'actionneur (36) est un actionneur motorisé.
4. Mécanisme de distribution de gobelets selon l'une quelconque des revendications précédentes, dans lequel la partie saillante (72) et la couronne (30) sont une pièce moulée d'un seul tenant.
5. Mécanisme de distribution de gobelets selon l'une quelconque des revendications précédentes, dans lequel la partie saillante (72) s'étend vers l'extérieur depuis la couronne (30) dans le plan de la couronne (30).
6. Mécanisme de distribution de gobelets selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de séparation comporte au moins une volute de séparation de gobelet (18), la ou chaque volute comportant une partie saillante en forme de coin (42) servant à séparer un gobelet en provenance de la base de la pile au fur et à mesure que la volute (18) est tournée.
7. Mécanisme de distribution de gobelets selon la revendication 6, dans lequel la ou chaque volute (18) comporte par ailleurs un bord de support (43) situé sous la partie supérieure de la partie saillante en forme de coin (42) et espacé dans le sens radial par rapport à la partie saillante en forme de coin (42) pour supporter le gobelet du bas d'une pile avant tout fonctionnement de la volute (18) pour séparer le gobelet en provenance de la base de la pile, dans lequel, dans la première position, la ou chaque volute (18) est positionnée de telle sorte qu'un gobelet du bas d'une pile de gobelets vient se reposer sur les bords de support (43) quand la pile de gobelets est située sur le mécanisme de distribution.
8. Distributeur de gobelets comportant deux ou plusieurs des mécanismes de distribution de gobelets selon les revendications précédentes.
9. Distributeur de gobelets comportant une pluralité de mécanismes de distribution de gobelets selon l'une quelconque des revendications précédentes servant à distribuer des gobelets en provenance d'une pluralité correspondante de piles de gobelets emboîtés, chaque dit mécanisme comportant quatre volutes de séparation de gobelet ou plus (18), (20) définissant une ouverture de distribution de gobelet circulaire, et dans lequel des mécanismes de distribution adjacents sont étroitement espacés dans le distributeur de telle sorte que la distance la plus petite entre des ouvertures de distribution de gobelet adjacents mesure environ 25 mm ou moins.
10. Distributeur de gobelets selon la revendication 9,

dans lequel chaque mécanisme de distribution de gobelet comporte deux volutes de séparation de gobelet extérieures (18) positionnées sur une première moitié d'un périmètre de l'ouverture de distribution de gobelet, les deux volutes extérieures (18) étant espacées l'une de l'autre selon une première distance, et deux volutes de séparation de gobelet intérieures (20) positionnées sur une deuxième moitié de l'ouverture, espacées l'une de l'autre selon une deuxième distance, dans lequel la deuxième distance est inférieure à la première distance, dans lequel les volutes intérieures et extérieures (18), (20) sont positionnées sensiblement au niveau des angles d'un trapèze entourant ladite ouverture de distribution de gobelet.

11. Distributeur de gobelets selon la revendication 9 ou la revendication 10, dans lequel chaque mécanisme de distribution comporte une couronne dentée (30) adaptée pour entraîner les volutes (18, 20) de ce mécanisme de distribution.

12. Distributeur de gobelets selon la revendication 11, dans lequel une région de la surface extérieure dans le sens radial de la couronne dentée (30) est dentée à des fins de mise en prise avec des dents d'engrenage (28) sur les volutes (18, 20), et une autre région de la surface extérieure dans le sens radial de la couronne dentée (30) entre les volutes (18, 20) est sensiblement exempte de dents de manière à permettre aux dispositifs de séparation de gobelet de se trouver disposés plus étroitement ensemble sans contact entre les dents d'engrenage et les couronnes dentées adjacentes.

13. Distributeur de gobelets selon la revendication 11 ou la revendication 12, dans lequel chaque couronne dentée (30) comporte une partie saillante de came (34), ce par quoi le déplacement de la partie saillante de came (34) d'une première position à une deuxième position entraîne la distribution d'un seul gobelet, comportant par ailleurs un actionneur de came (36) adapté pour déplacer la partie saillante de came (34) selon un mouvement de va-et-vient entre les première et deuxième positions, dans lequel l'actionneur de came (36) est un actionneur de came unique au niveau d'un emplacement fixe dans le distributeur pour entraîner la séparation de gobelet en provenance d'une pluralité de dispositifs de séparation de gobelet (18), et un ou plusieurs éléments de verrouillage associés fonctionnellement à l'actionneur de came (36) pour bloquer ou limiter tout mouvement latéral du mécanisme de séparation de gobelet dans le plan de l'ouverture de distribution gobelet lors de la séparation d'un gobelet en provenance de la pile.

14. Distributeur de gobelets selon l'une quelconque des revendications 9 à 13, qui est un distributeur de go-

belets de type carrousel, dans lequel les volutes (18, 20) de chaque mécanisme sont entraînées par une couronne dentée (30), les couronnes dentées (30) ont chacune une came (34) sur celles-ci, et les comes (34) sur une pluralité desdits mécanismes sont actionnables de manière sélective par un seul actionneur (36) positionné à l'extérieur ou à l'intérieur du carrousel, et dans lequel la came (34) et l'actionneur (36) sont situés au-dessus ou en-dessous du plan de la couronne dentée (30) pour réduire tout encombrement dans le plan de la couronne dentée (30).

FIG. 1

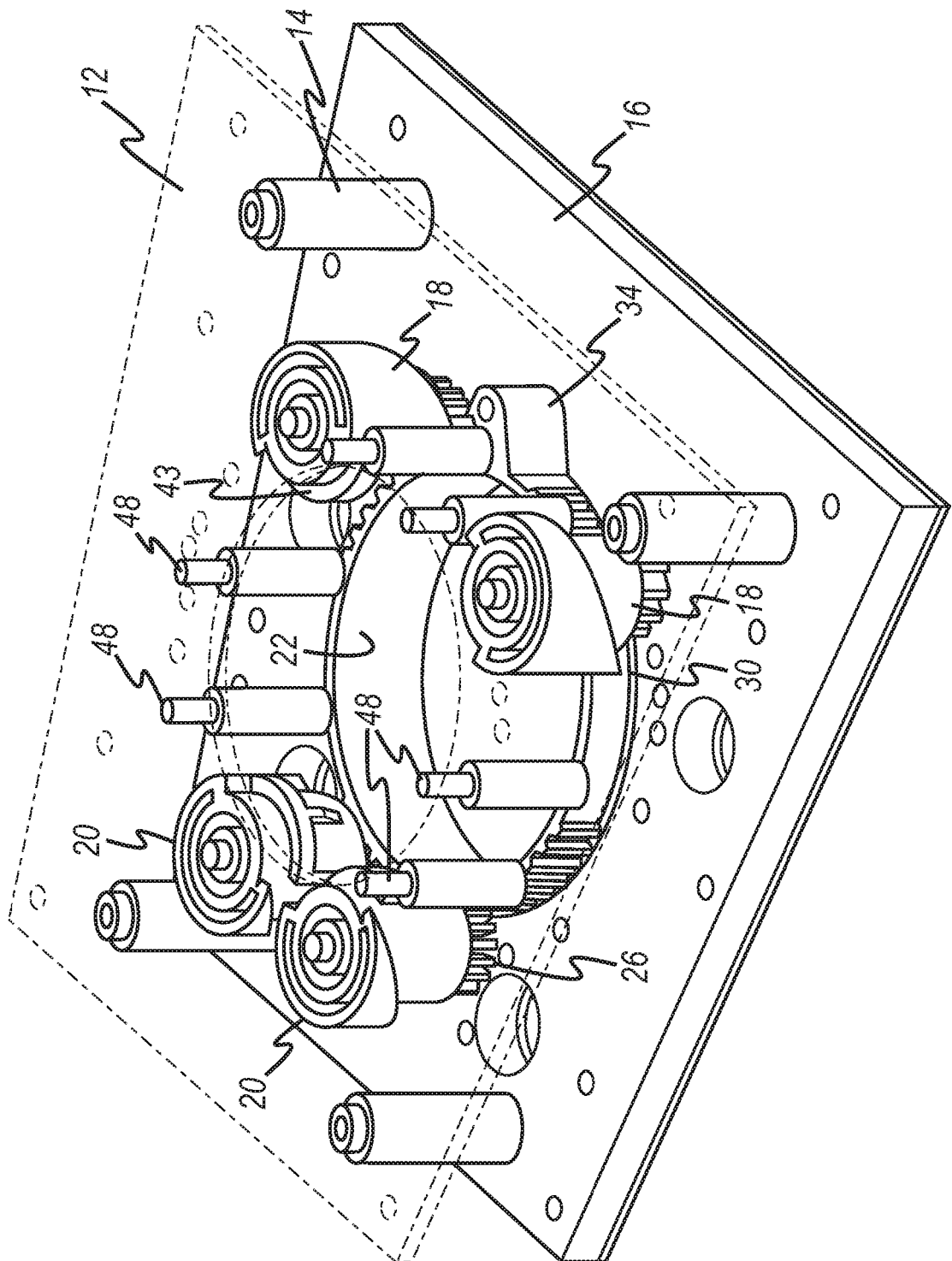


FIG. 2

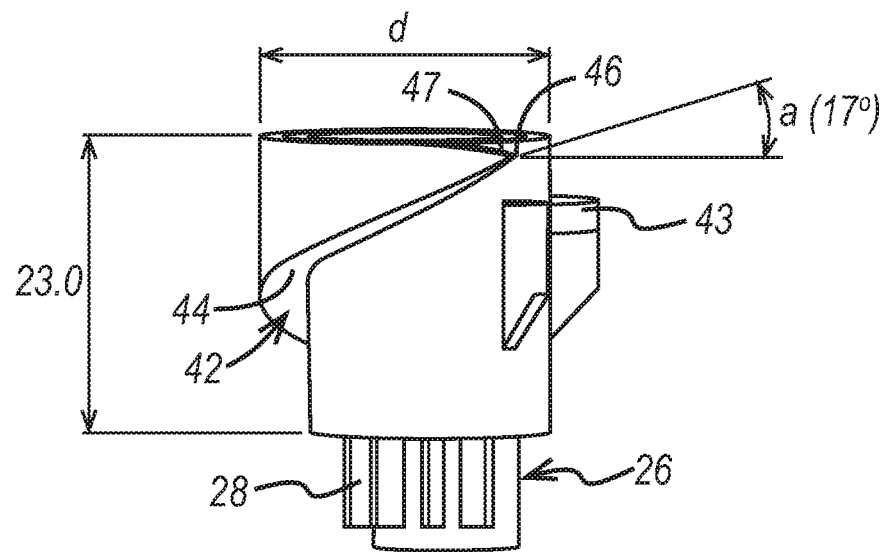


FIG. 9

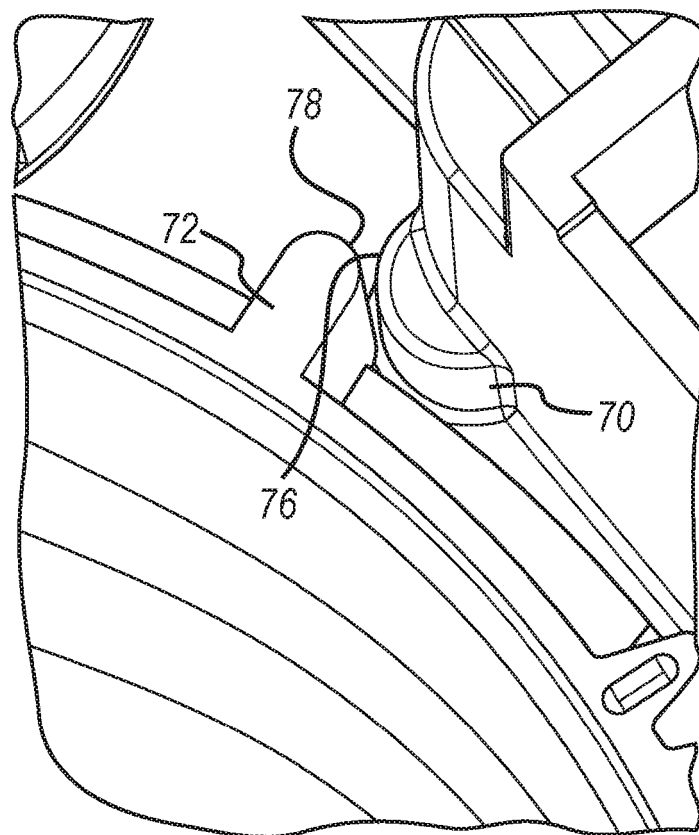
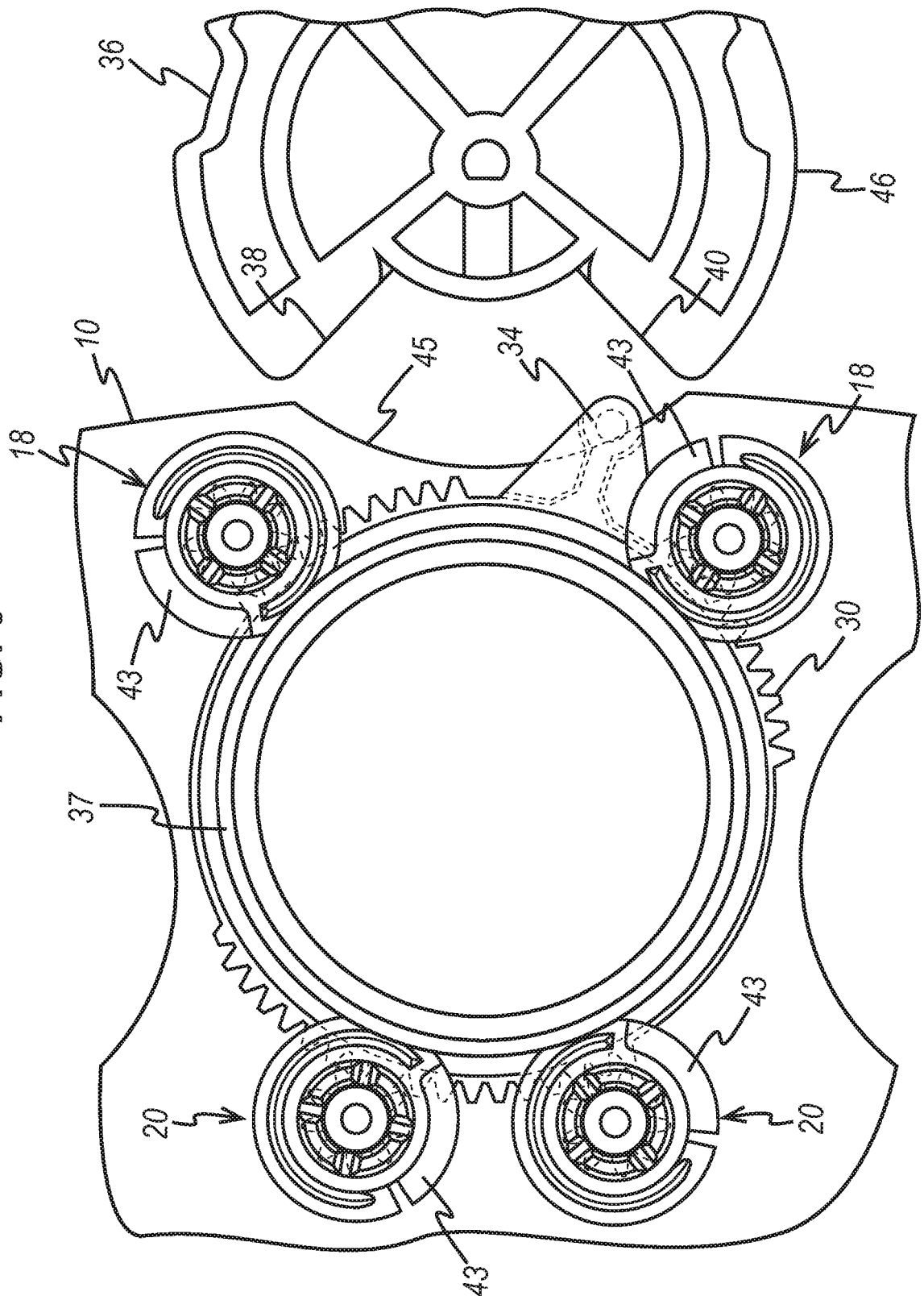


FIG. 3



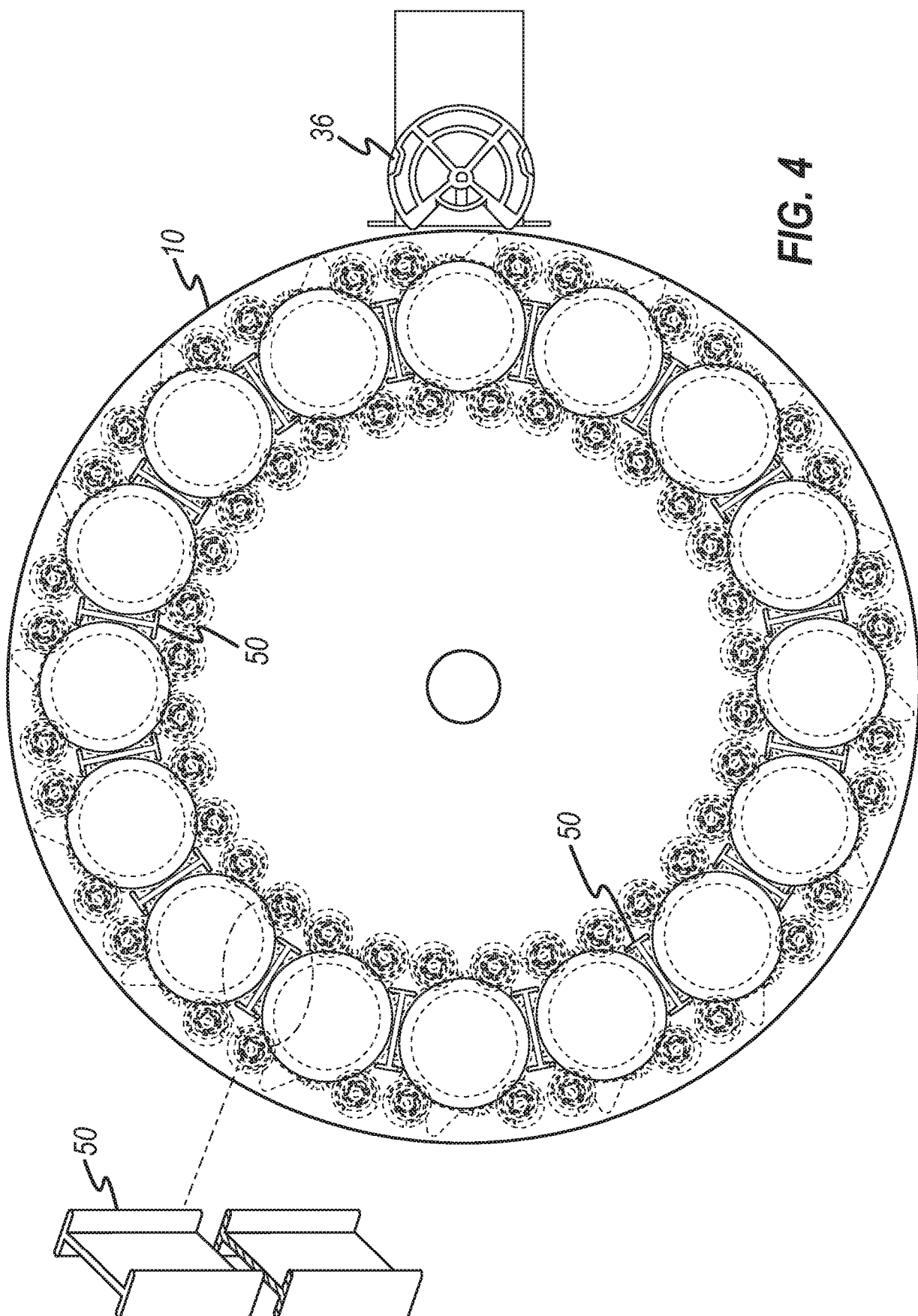
4
G
L

FIG. 5

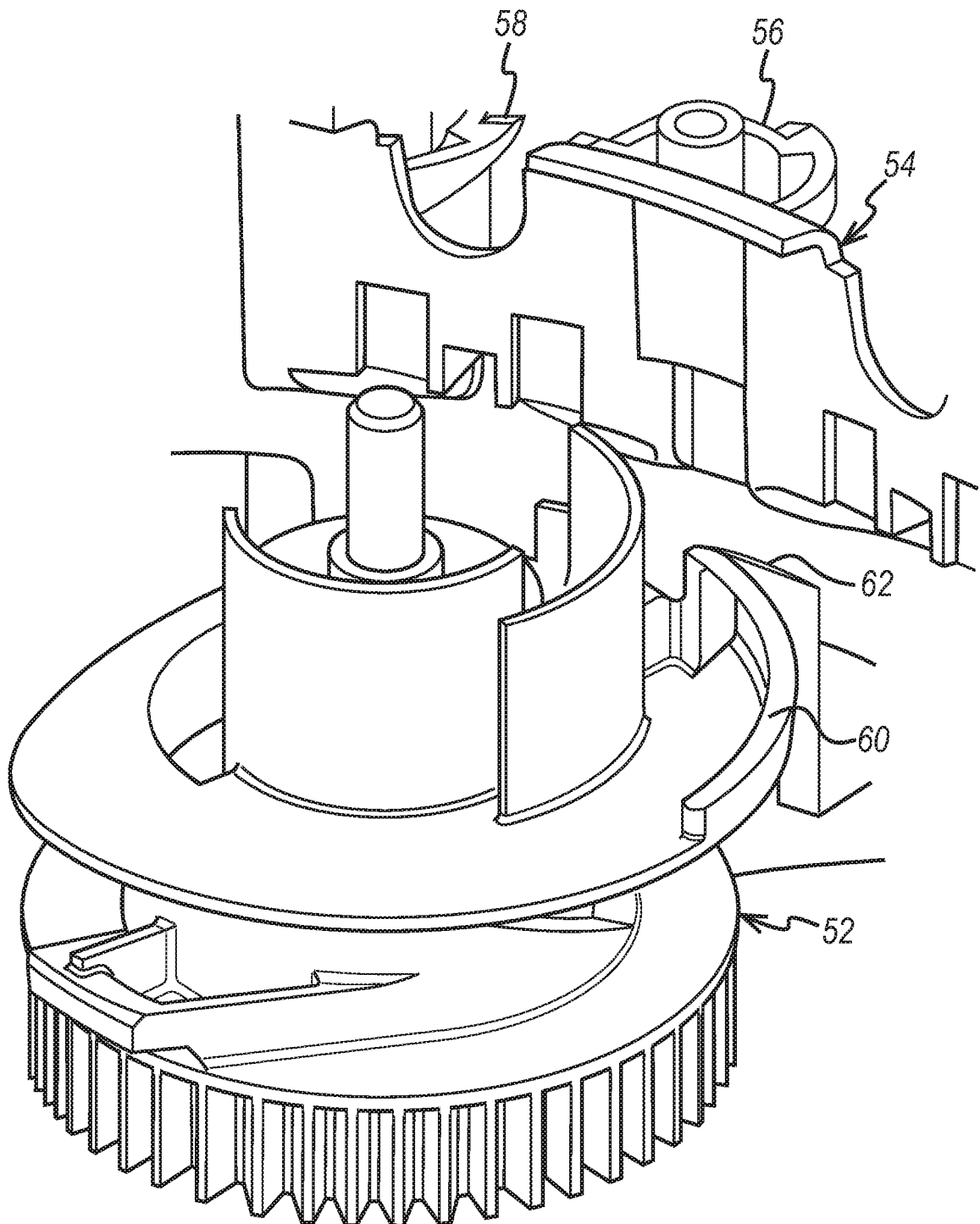
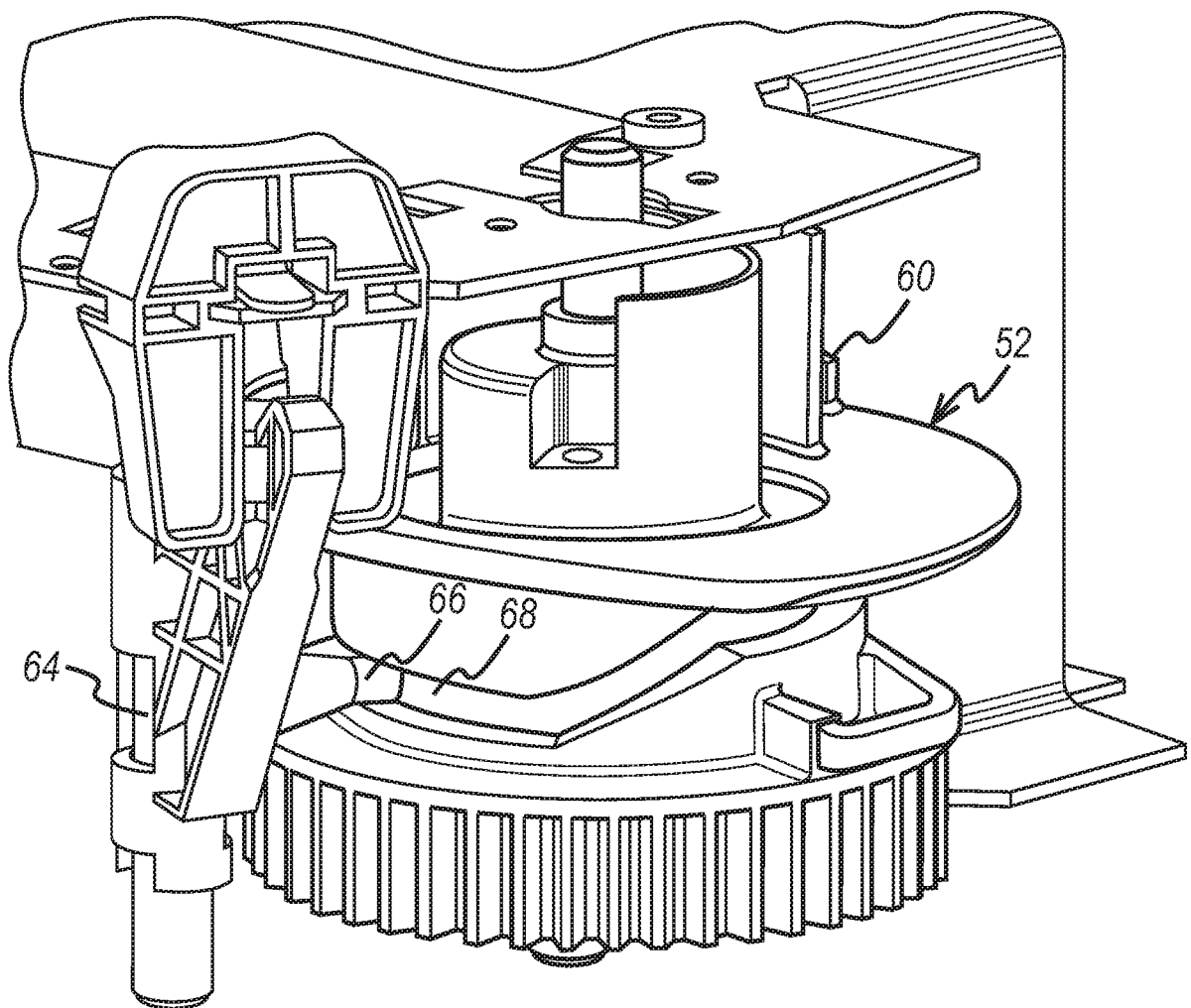
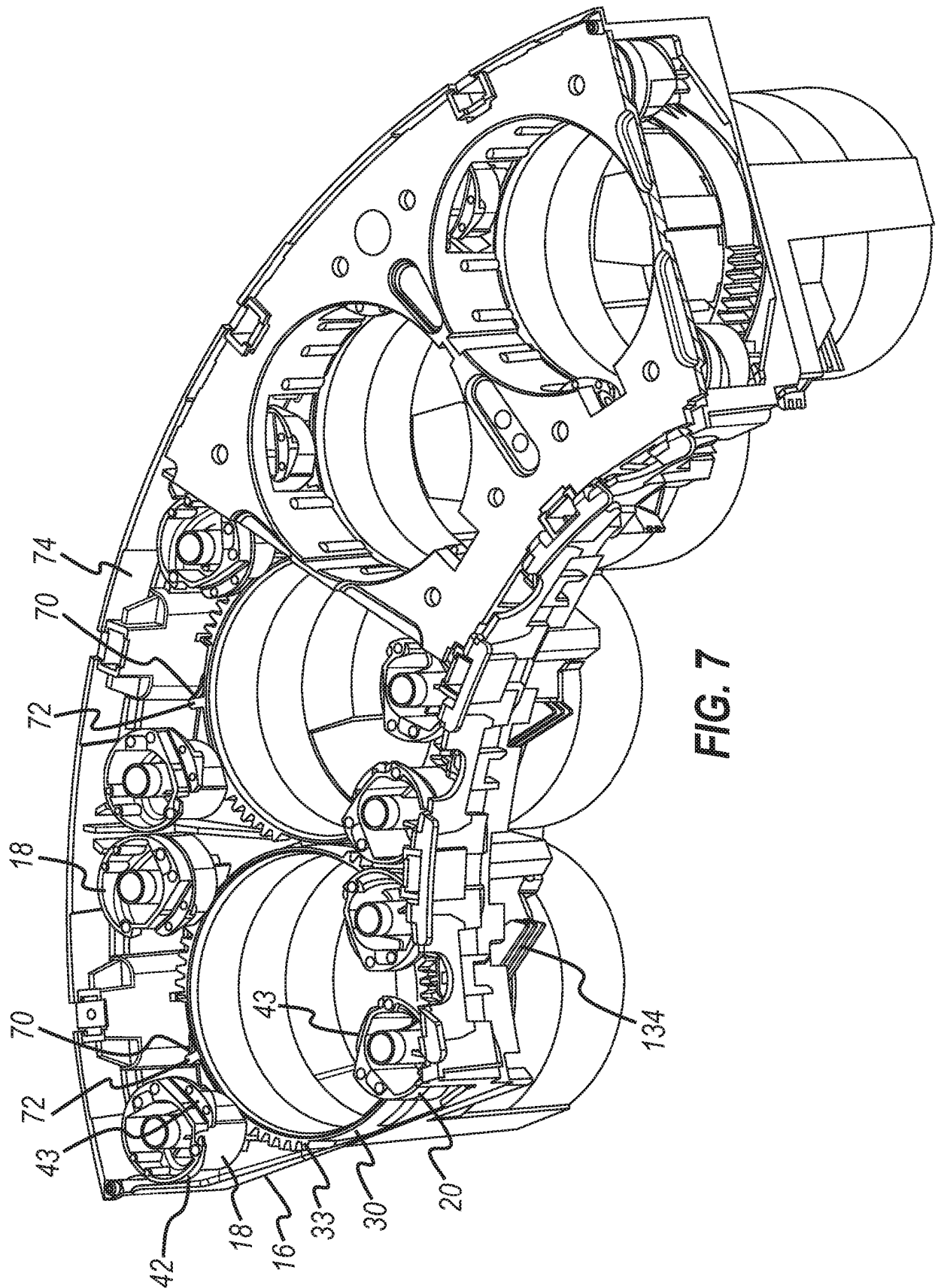


FIG. 6





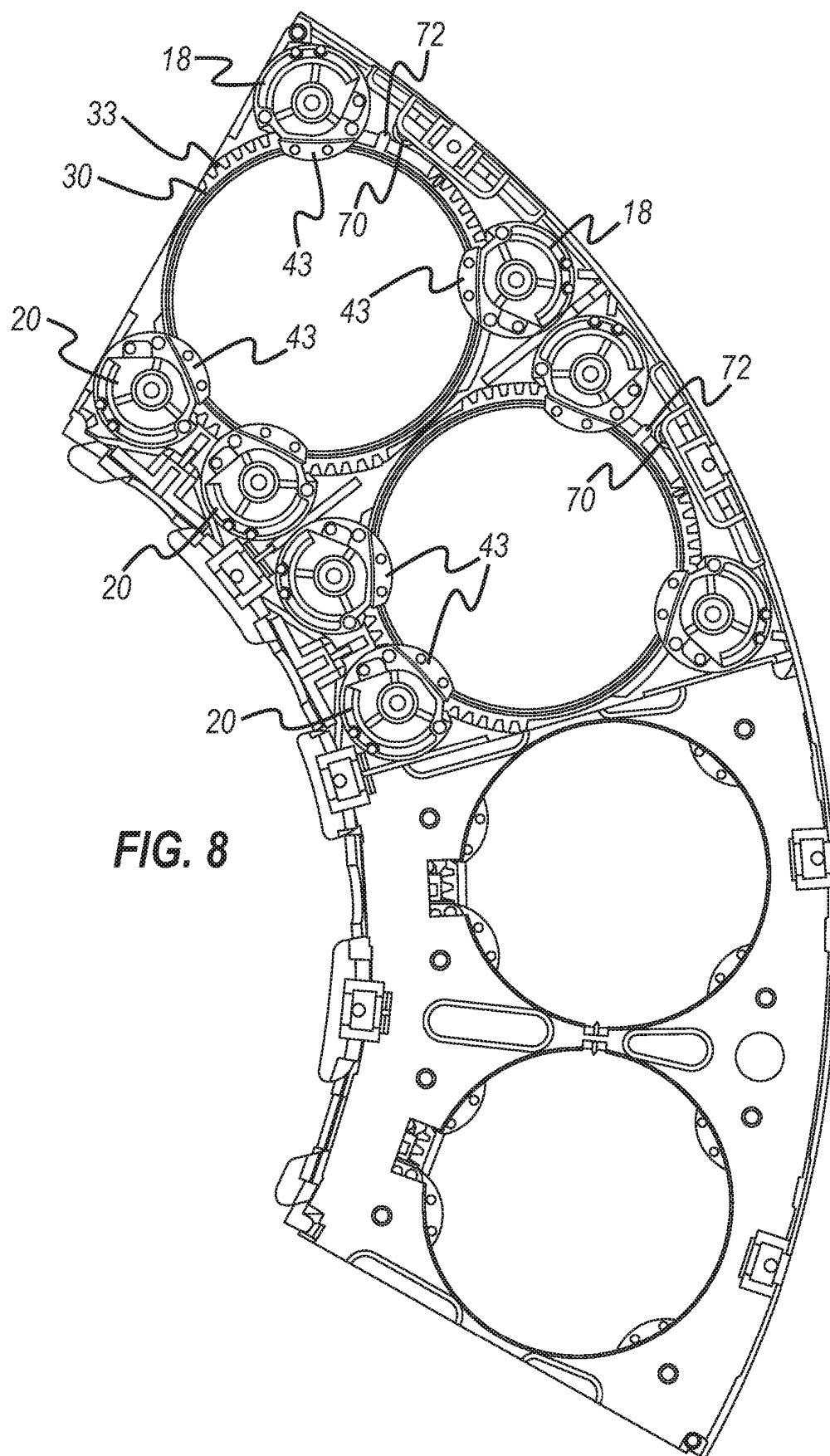


FIG. 8

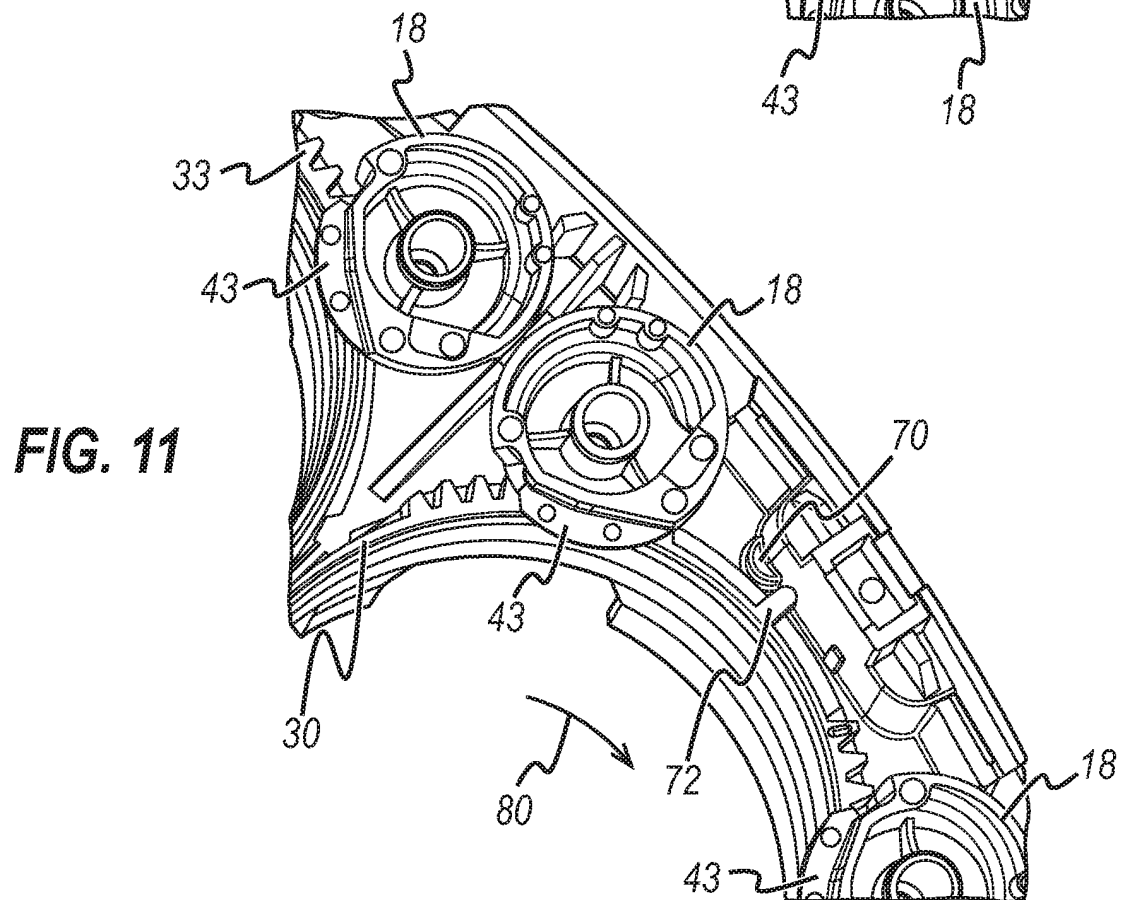
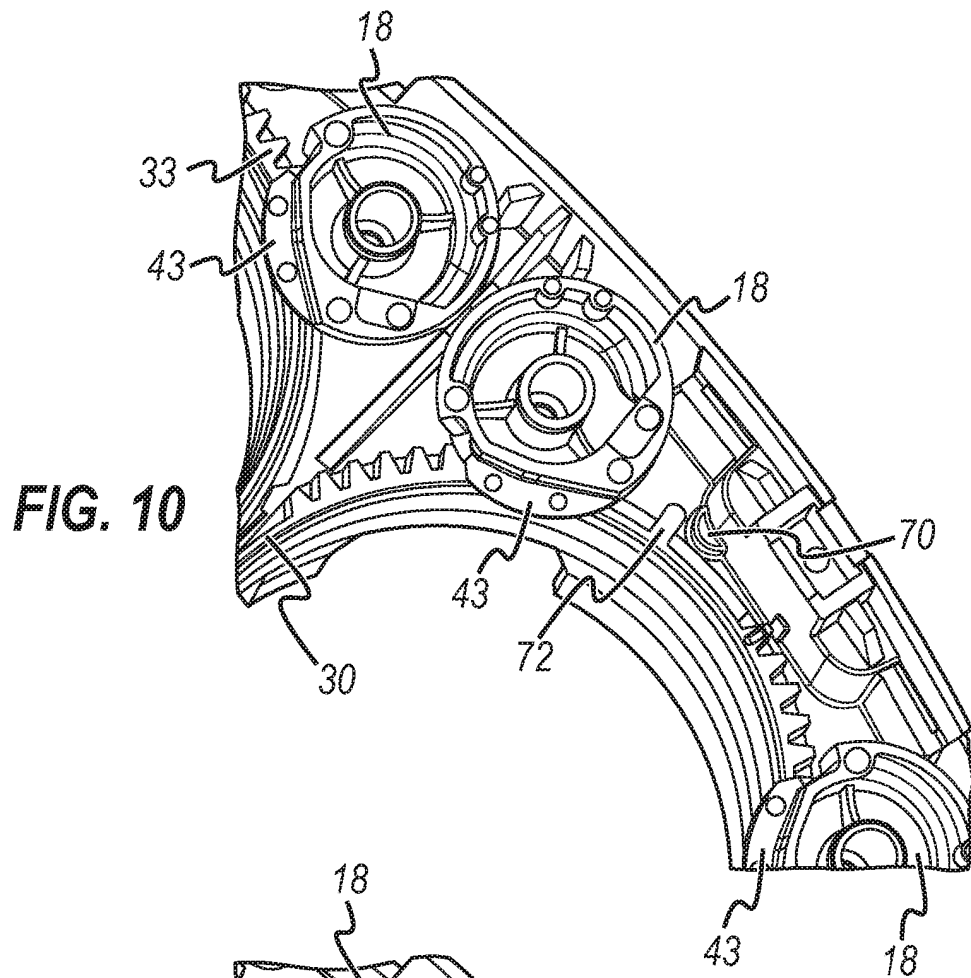


FIG. 12

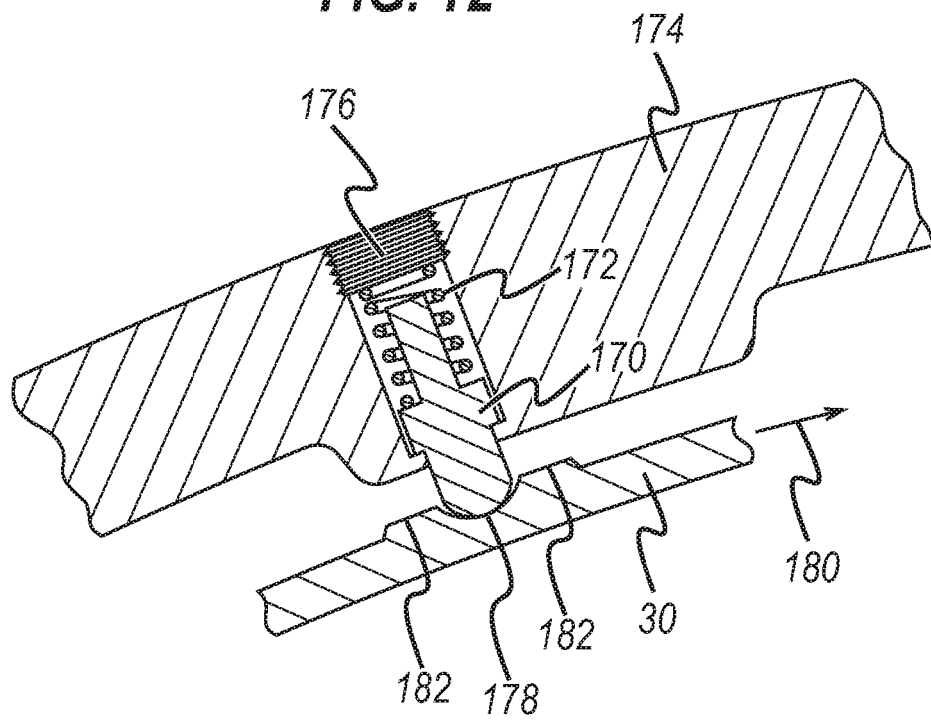
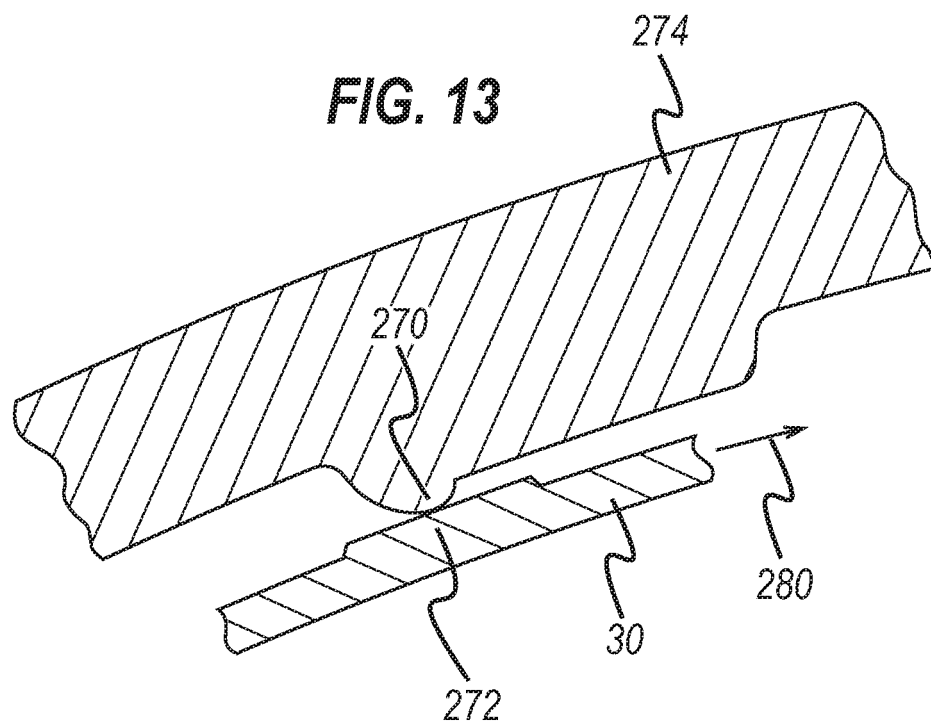


FIG. 13



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 1368208 A [0003]
- WO 0182249 A [0003] [0037]
- GB 2404386 A [0004]
- US 2037751 A [0004]
- GB 2333289 A [0030]