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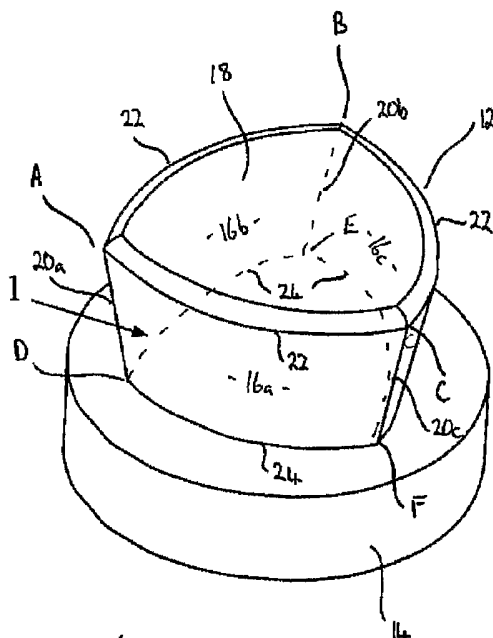
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(54) Title: DRIVING FORCE MEMBER



(57) Abstract: A driving force member 10 having an external profile adapted to engage another driving force member of substantially similar size having either a twisted or non-twisted recess such that, when so engaged, rotational driving force can be transferred from one driving force member 10 to the other, the external profile having a least one tapered portion 20.



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“DRIVING FORCE MEMBER”

FIELD OF THE INVENTION

The invention relates to a driving force member. The driving force member is particularly suited to receive a rotational driving force transferred by way of an additional driving force member taking the form of either a twisted or non-twisted recess.

BACKGROUND TO THE INVENTION

The following discussion of the background of the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

Driving force members are commonly used in any situation where a rotational driving force needs to be transferred from one article to components of another article. Typically, the two driving force members are configured such that the internal profile of one is matched to the external profile of the other. This match in profiles is often an identical match.

Recently, in the field of process and developer cartridges, driving force members included to transfer rotational driving force from an image processing apparatus to the photosensitive drum, or like components, have been implemented in the form of a twisted projection to be received within a twisted recess. While the use of driving force members having twisted profiles have produced benefits in the form of the driving force member being self-centring and also assisting in preventing disengagement of the driving force members while a rotational driving force is being applied, it has also introduced further complications. For instance:

- Existing driving force members not having a twisted profile can not be used with a driving force member having a twisted profile because the point of engagement between the two driving force members is insufficient to facilitate the transfer of the rotational driving force;

- A driving force member having a twisted profile requires further precision tooling equipment to meet the exacting tolerances the twisted profile sets; and
- A driving force member having a twisted profile is prone to breakage along its length by reason of its twisted profile. When breakage occurs, the failed components have significant rotational driving force applied to them and thus often cause damage to other components near the driving force members.

It is therefore an object of the present invention to create a driving force member that seeks to provide at least one of the advantages of a driving force member having a twisted profile while overcoming at least one of the disadvantages of a driving force member having a twisted profile and that can be used with driving force members having either a twisted recess or non-twisted recess profile.

It should be appreciated that while the following description will be made in relation to image processing equipment, it is not restricted to use and may be used in any circumstance where rotational driving force is required to be imparted from one component to another.

SUMMARY OF THE INVENTION

Throughout this document, unless otherwise indicated to the contrary, the terms "comprising", "consisting of", and the like, are to be construed as non-exhaustive, or in other words, as meaning "including, but not limited to".

In accordance with a first aspect of the invention there is a driving force member having an external profile adapted to engage another driving force member of substantially similar size having either a twisted or non-twisted recess such that, when so engaged, rotational driving force can be transferred from one driving force member to the other, the external profile having at least one tapered portion. Ideally, when engaged, the rotational driving force facilitates the self-centring of the driving force member within the other driving force member. The driving force member of the present invention is particularly suited to engage another driving force member of substantially similar size having either a non-twisted recess or a twisted recess with a degree of twist in the range of 1° to 15° per mm of the axial length of the recess.

Preferably, the external profile of the driving force member is defined by a projection, the projection having a base, side walls and a triangular top surface, the top surface being substantially parallel to a floor of the recess of the other driving force member when the driving force members are engaged. In its preferred form, the top surface is substantially equal in shape to an equilateral triangle.

Alternatively, the external profile of the driving force member is defined by a projection, the projection having a base, side walls and a hexagonal top surface, the top surface being substantially parallel to a floor of the recess of the other driving force member when the driving force members are engaged. In the preferred form of this configuration, the top surface is substantially equal in shape to an irregular hexagon.

Ideally, the at least one tapered portion is defined by the external profiles of the side walls.

The driving force member may also include a short-cylinder base, the short-cylinder base connected to the projection at the base and having a diameter greater than the greatest width of the top surface. Alternatively, the driving force member may include an axial stem comprising a support member and a shaft, the axial stem being connected to the projection at the base and where the size of the base is greater than the size of the support member which is greater than the size of the shaft.

Preferably, the distance between each side wall and the rotational axis of the driving force member increases along a predetermined length of the rotational axis as it extends away from the base, the predetermined length correlating to at least a segment of the at least one tapered portion. This increase in distance may be determined with reference to a non-linear equation. For instance, the gradient of the profile of the side wall relative to the rotational axis of the driving force member (z) may be between 0 and $0.2z + r$, where r is the approximate minimum radius of the top surface. However, in its most preferred embodiment, the distance (d) between each portion of the side wall and the rotational axis of the driving force member (z) falls within the range set by the equations:

$$d = 0.0341z^2 + 0.0361z + 4.0812;$$

$$d = 0.0406z^2 + 0.0589z + 4.1093.$$

Alternatively, the distance between each side wall and the rotational axis of the driving force member decreases along a predetermined length of the rotational axis as it extends away from the base, the predetermined length correlating to at least a segment of the at least one tapered portion. Again, this decrease in distance may be determined with reference to a non-linear equation.

More preferably, the angle of a line taken between the point of connection of the side wall with the base and the point of connection of the side wall with the top surface, with respect to the rotational axis, ranges from 5° to 25°.

The joins between the side walls may be bevelled. The joins between the side walls and the top surface may also be bevelled. The apexes of the top surface may also be rounded.

Preferably, the parting line produced during manufacture of the driving force member is parallel to the top surface.

The driving force member may include an electroconductive portion.

In accordance with a second aspect of the invention there is a photosensitive drum including a driving force member where the rotational axis of the driving force member is concentric with the rotational axis of the photosensitive drum.

In accordance with a third aspect of the invention there is a drum hub including a driving force member, the drum hub adapted to engage a photosensitive drum such that the rotational axis of the driving force member of the drum hub is concentric with the rotational axis of the photosensitive drum.

In accordance with a fourth aspect of the invention there is a process cartridge including a photosensitive drum according to the second aspect of the invention or a drum hub according to the third aspect of the invention.

In accordance with a fifth aspect of the invention there is a developer cartridge including a developer roller including a driving force member, the rotational axis of the driving force member being concentric with the rotational axis of the developer roller.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is an isometric view of a driving force member according to a first embodiment of the invention.

Figure 2 is an isometric view of a driving force member according to a second embodiment of the invention.

Figure 3 is a cross-sectional view of a driving force member according to a fourth embodiment of the invention.

Figure 4 is a plan view of the driving force member as shown in Figure 3.

Figure 5 is a cross-sectional view of a drum hub including a driving force member according to a sixth embodiment.

Figure 6 is an isometric view of a driving force member according to an eighth embodiment of the invention.

Figure 7 is an isometric view of a driving force member according to a ninth embodiment of the invention.

Figure 8 is a cross-sectional view of the driving force member as shown in Figure 7.

Figure 9 is an isometric view of a process cartridge including a drum hub modified to include a driving force member as shown in Figure 7.

Figure 10 is an isometric view of the drum hub as shown in Figure 9, but shown in isolation.

Figure 11a is an isometric view of a driving force member taking the form of a twisted recess. Figure 11b is a cross-sectional view of the driving force member shown in Figure 11a.

Figure 12 is a first schematic representation of the driving force member of Figure 9 received within the driving force member of Figure 11.

Figure 13 is a second schematic representation of the driving force member of Figure 9 received within the driving force member of Figure 11.

PREFERRED EMBODIMENTS OF THE INVENTION

In accordance with a first embodiment of the invention there is a driving force member 10. The driving force member 10 comprises a projection 12 and a short-cylinder base 14. The projection 12 is attached to the base 14 such that only the side walls 16a, 16b, 16c and top face 18 are exposed. The diameter of the short-cylinder base 14 is larger in size than the diameter of the projection 12.

The projection as illustrated in Figure 1 is essentially defined by six apexes. Apexes ABC define the top face 18. Side wall 16a is defined by apexes ACDF. Side wall 16b is defined by apexes ABDE. Side wall 16c is defined by apexes BCEF. In doing so, the (x, y) co-ordinates of apex A substantially corresponds with the (x, y) co-ordinates of apex D. A similar situation exists in respect of the apex BE pairing and the apex CF pairing.

Apexes ABC are equidistant to each other, as are apexes DEF.

The edge 20a defined by apex AD is straight. Similarly, the edges 20b, 20c defined by apexes BE and apexes CF are also straight. The edges 22, 24 defined by apexes AB, AC, BC, DE, DF and EF are all slightly curved.

In this manner, the plan shape of each side wall 16a, 16b, 16c is a trapezoid. The longer parallel side of each trapezoid define the boundaries of the top face 18 (ie. they coincide with edges 22). This means that the distance between the centre point of the projection 12 and each edge 20, as taken within the xy plane, increases as it extends away from the base 14 along the z axis (the z axis also being the rotation axis of the driving force member 10).

In accordance with a second embodiment of the invention, where like numerals reference like parts, there is a driving force member 100. The driving force member 100 is identical to the driving force member 10, except that the longer parallel side of each side wall 16a, 16b, 16c defines the edges that connect the projection 12 to the base 14 (ie. they coincide with edges 24). This means that the distance between the centre point of the projection 12 and each edge 20, as taken within the xy plane, decreases as it extends away from the base 14 along the z axis.

In accordance with a third embodiment of the invention, where like numerals reference like parts, there is a driving force member 200. The driving force member 200 is

identical to the driving force member 10 with the exception of the short-cylinder base 14.

In this embodiment the short-cylinder base 14 is replaced with an axial stem 202. The axial stem 202 comprises a support member 204 and a shaft 206. The support member 204 and shaft 206 are both cylindrical in shape. The diameter of the support member 204 is greater than the diameter of the shaft 206.

The radius of the support member 204 is less than the distance between the centre point of the projection 12 and each edge 20, as taken within the xy plane, where $z = 0$.

The advantages of this third embodiment are that the manufacturing process of the driving force member 200 is simplified as well as providing a weak point that does not cause the whole member to fall apart on failure. To elaborate, the increase in overall size from the shaft 206 to the support member 204 to the majority of the projection 12 allows the majority of the driving force member 200 to be manufactured in a first cavity. The remainder of the driving force member 200 is manufactured in a second cavity. To complete the manufacture of the driving force member, the first and second cavity are positioned so as to engage each other – the resulting join being represented by parting line P in Figure 4. It is this parting line P that is also the weak point of the driving force member 200.

Furthermore, the use of the axial stem allows the driving force member to be included in sub-assemblies, for example, a gear piece of a process cartridge.

In accordance with a fourth embodiment of the invention, there is a photosensitive drum adapted to have the driving force member 200 of the third embodiment received therein. The centre of the driving force member 200 is located on the rotation axis of the photosensitive drum. The driving force member 200 in the embodiment shown is integrally formed with the rotation shaft having its rotation axis concentric with the rotation axis of the photosensitive drum. Alternatively, and in accordance with a fifth embodiment of the invention there is a drum hub 300 adapted to receive the driving force member 200 of the third embodiment. A cross-sectional view of this latter arrangement is shown in Figure 5. The drum hub 300 is further adapted to engage a photosensitive drum 302. Again, the centre of the driving force member 200 is located on the rotation axis of the photosensitive drum 302.

In accordance with a sixth embodiment of the invention, there is a developer cartridge including a developer roller adapted to have the driving force member 200 of the third embodiment received therein. The centre of the driving force member 200 is located on the rotation axis of the developer roller. The driving force member 200 is integrally formed with the rotation shaft having its rotation axis concentric with the rotation axis of the developer roller. As a developer cartridge is well known to the person skilled in the art, the other components that make up the developer cartridge will not be described here. However, the preferred implementation of this embodiment comprises a developer cartridge including the developer roller and toner container.

In accordance with a seventh embodiment of the invention, there is a process cartridge including a photosensitive drum according to the fourth embodiment of the invention or a photosensitive drum hub according to the fifth embodiment of the invention. As a process cartridge is well known to the person skilled in the art, the other components that make up the process cartridge will not be described here. However, the preferred implementation of this embodiment comprises a process cartridge including the photosensitive drum or photosensitive drum hub as already mentioned, a toner container, a developer roller, a cleaning blade, a charge roller and a scavenger unit.

In an eighth embodiment of the invention there is a driving force member 300. The driving force member 300 as illustrated in Figure 6 is essentially defined by twelve apexes. Apexes ABCDEF define the top face 302. Side wall 304a is defined by apexes ABHG. Side wall 304b is defined by apexes BCHI. Side wall 304c is defined by apexes CDIJ. Side wall 304d is defined by apexes DEJK. Side wall 304e is defined by apexes EFKL. Side wall 304f is defined by apexes AFGL.

Each side wall 304 is substantially rectangular in shape. This means that the (x, y) co-ordinates of apex A substantially corresponds with the (x, y) co-ordinates of apex G. A similar situation exists in respect of the apex BH pairing, the apex CI pairing, the apex DJ pairing, the apex EK pairing and the apex FL pairing.

Apexes ABCDEF and Apexes GHIJKL each form an irregular hexagon. The irregular hexagon formed is similar in shape to an isosceles triangle having bulging sides. To elaborate:

- Apex A is equidistant to apex B and apex F;

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- Apex B is equidistant to apex A and apex C;
- Apex C is equidistant to apex B and apex D;
- Apex D is equidistant to apex C and apex E;
- Apex E is equidistant to apex D and apex F;
- Apex F is equidistant to apex A and apex E;
- Apexes ACE are equidistant to each other;
- Apexes BDF are equidistant to each other;
- Apex G is equidistant to apex H and apex L;
- Apex H is equidistant to apex G and apex I;
- Apex I is equidistant to apex H and apex J;
- Apex J is equidistant to apex I and apex K;
- Apex K is equidistant to apex J and apex L;
- Apex L is equidistant to apex G and apex K;
- Apexes GIK are equidistant to each other; and
- Apexes HJL are equidistant to each other.

Each apex is rounded to smooth out sharp edges in the irregular hexagon.

As mentioned above, the side walls 304 are substantially rectangular in shape. Each side wall has a curved portion 306 and a straight portion 308. The curved portion 306 of each side wall 304 is adjacent the respective portion of the irregular hexagon ABCDEF to which it is connected. The straight portion 308 of each side wall is adjacent the respective portion of the irregular hexagon GHIJKL to which it is connected. In this manner, the size of the irregular hexagon ABCDEF is greater than the size of irregular hexagon GHIJKL.

In accordance with a ninth embodiment of the invention, where like numerals reference like parts, there is a driving force member 400. The driving force member 400 is

identical to the driving force member 300, except that edges 304 are curved and each apex is rounded in the xy plane.

Figure 7 shows the preferred implementation of this embodiment of the invention. As is shown, there is a minimal curve profile 402 and a maximum curve profile 404 for each apex (although only one is shown for clarity). The maximum curve profile 404 represents the curve of the side wall 304 at the point of the rounded apex having the maximum distance from the centre point of the projection 300 as determined in the xy plane. The minimum curve profile 402 represents the curve of the side wall 304 at the two points of the rounded apex having the minimum distance from the centre point of the projection 300 as determined in the xy plane. In Figure 7 as shown, the distance (d) between a point of the side wall 304 and the centre point of the projection 300, as determined within the xy plane, can be calculated by the following formulas.

$$\textbf{Minimum Curve Profile} \quad d = 0.0341z^2 + 0.0361z + 4.0812 \text{ (mm)}$$

$$\textbf{Maximum Curve Profile} \quad d = 0.0406z^2 + 0.0589z + 4.1093 \text{ (mm)}$$

It should be appreciated that the above minimum curve profile 402 and maximum curve profile 404 equations have been determined with reference to a particular aperture having a twisted recess configuration of a substantially similar size. However, the invention may be used with any particular aperture configuration and not just one having a twisted recess configuration.

For instance, to the best of the applicant's determination, to fit a wide variety of aperture configurations, including non-twisted configurations, the gradient of the minimum curve profile 402 and maximum curve profile 404 can range from 0 to $0.2z + r$, where r is the approximate minimum radius of the tapered surface profile of the projection 12. Additionally, the overall angle θ , as shown in Figure 8 and taken from the point of the driving force member closest to the photosensitive drum in the longitudinal direction to the point of the driving force member furthest from the photosensitive drum in the longitudinal direction, taken with reference to a right angle parallel with the longitudinal direction of the photosensitive drum, can range from 5° to 25° .

The invention will now be described in use with respect to a process cartridge 500 according to the seventh embodiment of the invention. The process cartridge 500 includes the drum hub 300 according to the sixth embodiment of the invention.

However, the drum hub 300 includes the driving force member 400 of the ninth embodiment of the invention. The configuration is appropriately shown in Figures 9 and 10.

The process cartridge 500 is adapted to be received within an image processing apparatus (not shown). The image processing apparatus has a driving force member 502 positioned therein adapted to receive the driving force member 400 when the process cartridge 500 is received within the image processing apparatus. The driving force member 502 of the image processing apparatus is shown in Figure 11.

The driving force member 502 of the image processing apparatus is a recess 504 integrally formed within a drive shaft 506 of the image processing apparatus. The recess 504 is a polygonal shape twisted in the rotational direction R of the drive shaft 506. The recess 504 has a cross-section in the xy plane of a substantially equilateral triangle. The degree of twist in the recess 504 shown is approximately 7.5° per 1 mm of the axial length of the recess 504.

The relationship between the recess 504 and the driving force member 400 can be shown by the rule $d_1 < d_0 < d_2$, where d_0 is the diameter of a circumscribed circle of the triangular prism of the driving force member 400, d_1 is the diameter of the inscribed circle of the triangle of the recess 504 and d_2 is the diameter of the circumscribed circle of the triangle of the recess 504.

When the process cartridge 500 is received within the image processing apparatus, the drive shaft 506 moves from a retracted position to an engaged position by way of the urging force applied to it by a weak spring. In the engaged position, the driving force member 502 engages the driving force member 400. This process of engagement, and subsequent transfer of rotational driving force, will now be described in detail.

Figure 12 shows a schematic of the driving force member 400 as received within the driving force member 502. The twisted configuration of the recess 504 is represented by first equilateral triangle 508 and second equilateral triangle 510. First equilateral triangle 508 represents the cross-section profile of the recess 504, as taken in the xy plane, at the aperture opening. Second equilateral triangle 510 represents the cross-sectional profile of the recess 504, as taken in the xy plane, at the bottom of the aperture.

As is depicted in Figure 13 the shape of the driving force member 400 is such that it is substantially equal to the "free space" 512 area represented by the intersection of the first equilateral triangle 508 and the second equilateral triangle 510. In this manner, the driving force member 400 is able to be received completely within recess 504.

Further, because of the curved profile of each side wall 304 in the embodiment shown, as rotational driving force is applied to the driving force member 400 by driving force member 502, the driving force member 400 moves to a second position as shown in Figure 12. In this the second position, the twisted configuration of the recess 504 prevents the driving force member 400 from moving along the z axis and thereby exiting the recess 504.

While also in this second position, the side walls 304 of the driving force member 400 are contacted regularly with the inside surfaces of the recess 504. In doing so, the centre of the driving force member 400 aligns with the centre of the recess 504 as part of the process of rotation. This provides the added advantage of rotation accuracy due to a minimisation of rotation non-uniformity of the coupling driving due to load variation and also to minimising changes in contact points.

Once regular contact has been made, rotational driving force applied to driving force member 500 can be efficiently conveyed to driving force member 400.

The same resilient driving force member 400 can also be received within a driving force member (not shown) of substantially similar size having a non-twisted polygonal recess. In this configuration, once the resilient driving force member 400 is received within the non-twisted recess, the application of rotational driving force causes the apexes to contact the corners of the recess. The extent of contact is determined by the profile of the non-twisted polygonal recess relative to the profile of the driving force member 400.

The rotational driving force applied to the driving force member is then conveyed to driving force member 400.

As would be evident from the above description, the driving force members described are easy to manufacture and do not require high precision tooling equipment to do so. Further, the configuration of the driving force members described are such that any failure of the component is unlikely to result in breakage along its length. Therefore, the driving force member should still be able to facilitate the transfer of rotational driving

force even in the event of breakage. As this is also likely to result in smaller failed components, the damage potentially caused to other components near the driving force member is also likely to be minimised.

It should be appreciated by the person skilled in the art that the above invention is not limited to the embodiment described. In particular, the following modifications and improvements may be made without departing from the scope of the present invention:

- The profile of the projections may be such that rather than being tapered along its full length, the profile may be tapered along one or more portions thereof.
- The driving force member 10 may include an electroconductive portion or be formed completely from an electrically conductive material. This allows the driving force member to ground electrical components to which it is connected. For instance, the circular aperture provided for in the centre of the projection 300 can be made of an electroconductive material and adapted to receive an electroconductive portion in the other driving force member to which it subsequently engages.
- Side walls 20 and the edges between the apexes defining the top face 18 can be bevelled. This assists in avoiding wobble and vibration in the projection 12.
- The recess may have other configuration to that described above. For instance the recess may be rectangular or any other polygonal shape, or the recess may have a cross-sectional profile equal to an isosceles triangle.
- Alternatively, the driving force member 10 may be manufactured from a relatively soft substance. This reduces the potential for damage to other components near the coupling of driving force members is reduced in the unlikely event of failure.
- The driving force member may be adapted to engage a driving force member in the form of a twisted recess where the degree of twist is anywhere from 1° to 15° per 1 mm of the axial length of the recess.
- The drive force member may be configured as a regular hexagon.
- The driving force member may be used to rotate a component of the process cartridge other than the photosensitive drum – for instance, the driving force

member may be used to rotate a developer roller and/or agitator contained within the toner container.

It should be further appreciated by the person skilled in the art that the features described in one embodiment, where not mutually exclusive or alternatives, may be combined with features described in other embodiments described to create yet further embodiments that fall within the scope of the present invention.

We Claim:

1. A driving force member having an external profile adapted to engage another driving force member of substantially similar size having either a twisted or non-twisted recess such that, when so engaged, rotational driving force can be transferred from one driving force member to the other, the external profile having at least one tapered portion.
2. A driving force member according to claim 1 where, when engaged, the rotational driving force facilitates the self-centring of the driving force member within the other driving force member.
3. A driving force member according to claim 1 or claim 2 having an external profile adapted to engage another driving force member of substantially similar size having either a non-twisted recess or a twisted recess with a degree of twist in the range of 1° to 15° per mm of the axial length of the recess.
4. A driving force member according to any preceding claim, where the external profile of the driving force member is defined by a projection, the projection having a base, side walls and a triangular top surface, the top surface being substantially parallel to a floor of the recess of the other driving force member when the driving force members are engaged.
5. A driving force member according to claim 4, where the top surface is substantially equal in shape to an equilateral triangle.
6. A driving force member according to any one of claims 1 to 3, where the external profile of the driving force member is defined by a projection, the projection having a base, side walls and a hexagonal top surface, the top surface being substantially parallel to a floor of the recess of the other driving force member when the driving force members are engaged.
7. A driving force member according to claim 6, where the top surface is substantially equal in shape to an irregular hexagon.
8. A driving force member according to any one of claims 4 to 7, where the at least one tapered portion is defined by the external profiles of the side walls.

9. A driving force member according to any one of claims 4 to 8, further including a short-cylinder base, the short-cylinder base connected to the projection at the base and having a diameter greater than the greatest width of the top surface.
10. A driving force member according to any one of claims 4 to 8, further including an axial stem comprising a support member and a shaft, the axial stem being connected to the projection at the base and where the size of the base is greater than the size of the support member which is greater than the size of the shaft.
11. A driving force member according to any one of claims 4 to 10, where the distance between each side wall and the rotational axis of the driving force member increases along a predetermined length of the rotational axis as it extends away from the base, the predetermined length correlating to at least a segment of the at least one tapered portion.
12. A driving force member according to claim 11, where the distance between each side wall and the rotational axis of the driving force member increases according to a non-linear equation.
13. A driving force member according to claim 11 or claim 12, where the gradient of the profile of the side wall relative to the rotational axis of the driving force member (z) is between 0 and $0.2z + r$, where r is the approximate minimum radius of the top surface.
14. A driving force member according to claim 13, where the distance (d) between each portion of the side wall and the rotational axis of the driving force member (z) falls within the range set by the equations:

$$d = 0.0341z^2 + 0.0361z + 4.0812;$$

$$d = 0.0406z^2 + 0.0589z + 4.1093.$$

15. A driving force member according to any one of claims 4 to 10, where the distance between each side wall and the rotational axis of the driving force member decreases along a predetermined length of the rotational axis as it extends away from the base, the predetermined length correlating to at least a segment of the at least one tapered portion.

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16. A driving force member according to claim 15, where the distance between each side wall and the rotational axis of the driving force member decreases according to a non-linear equation.
17. A driving force member according to any one of claims 11 to 16, where the angle of a line taken between the point of connection of the side wall with the base and the point of connection of the side wall with the top surface, with respect to the rotational axis, ranges from 5° to 25° .
18. A driving force member according to any one of claims 4 to 17, where the joins between the side walls are bevelled.
19. A driving force member according to any one of claims 4 to 18, where the joins between the side walls and the top surface are bevelled.
20. A driving force member according to any one of claims 10 to 19, as dependent on claim 10, where the parting line produced during manufacture of the driving force member is parallel to the top surface.
21. A driving force member according to any one of claims 4 to 20, where the apexes of the top surface are rounded.
22. A driving force member according to any preceding claim including an electroconductive portion.
23. A photosensitive drum including a driving force member according to any one of claims 1 to 22, the rotational axis of the driving force member being concentric with the rotational axis of the photosensitive drum.
24. A drum hub including a driving force member according to any one of claims 1 to 22, the drum hub adapted to engage a photosensitive drum such that the rotational axis of the driving force member of the drum hub is concentric with the rotational axis of the photosensitive drum.
25. A process cartridge including a photosensitive drum according to claim 23 or a drum hub according to claim 24.

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26. A developer cartridge including a developer roller having a driving force member attached thereto, the rotational axis of the driving force member being concentric with the rotational axis of the developer roller.

27. A driving force member substantially as described herein with reference to the drawings, excepting Figures 11a and 11b.

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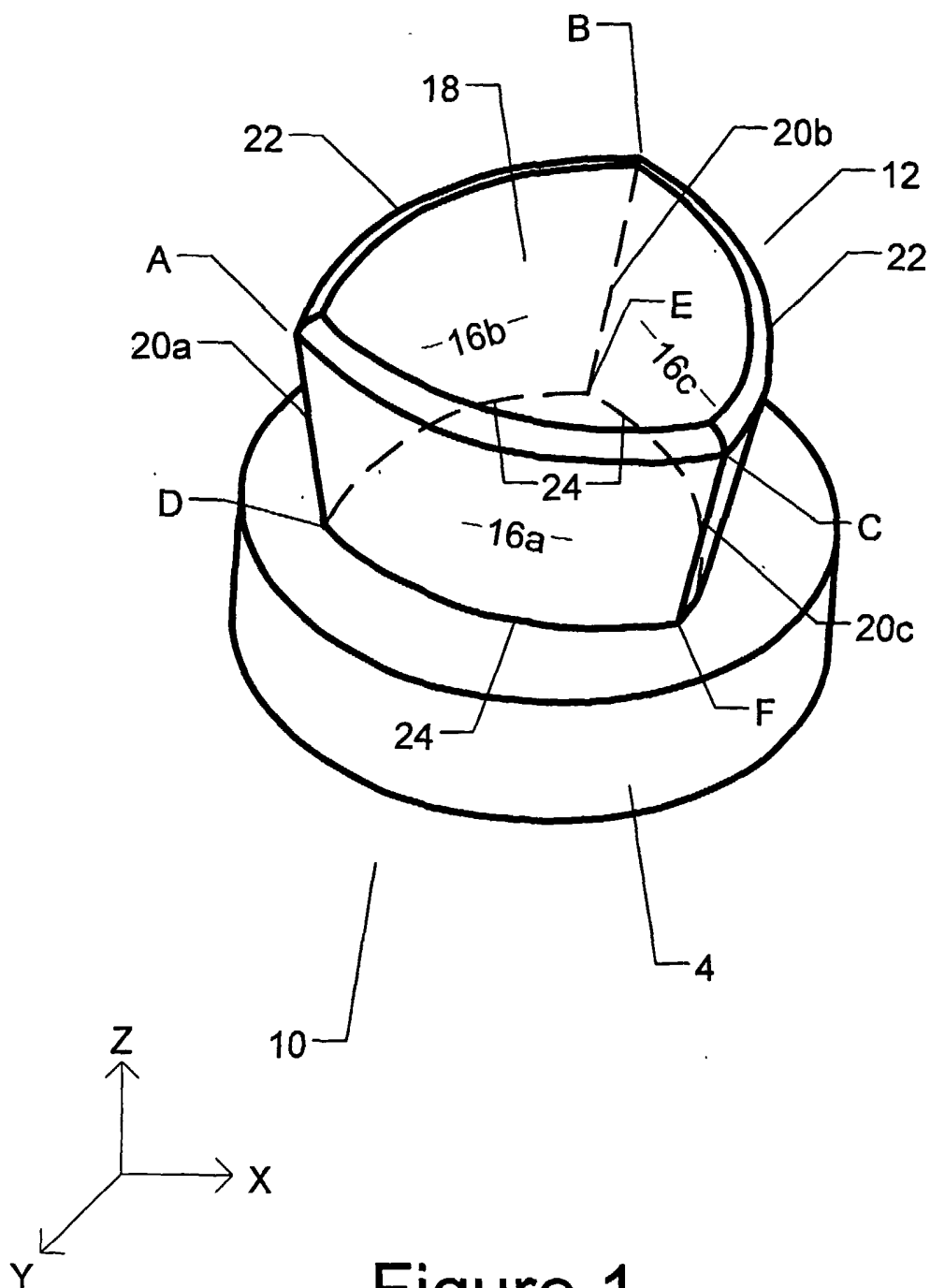


Figure 1

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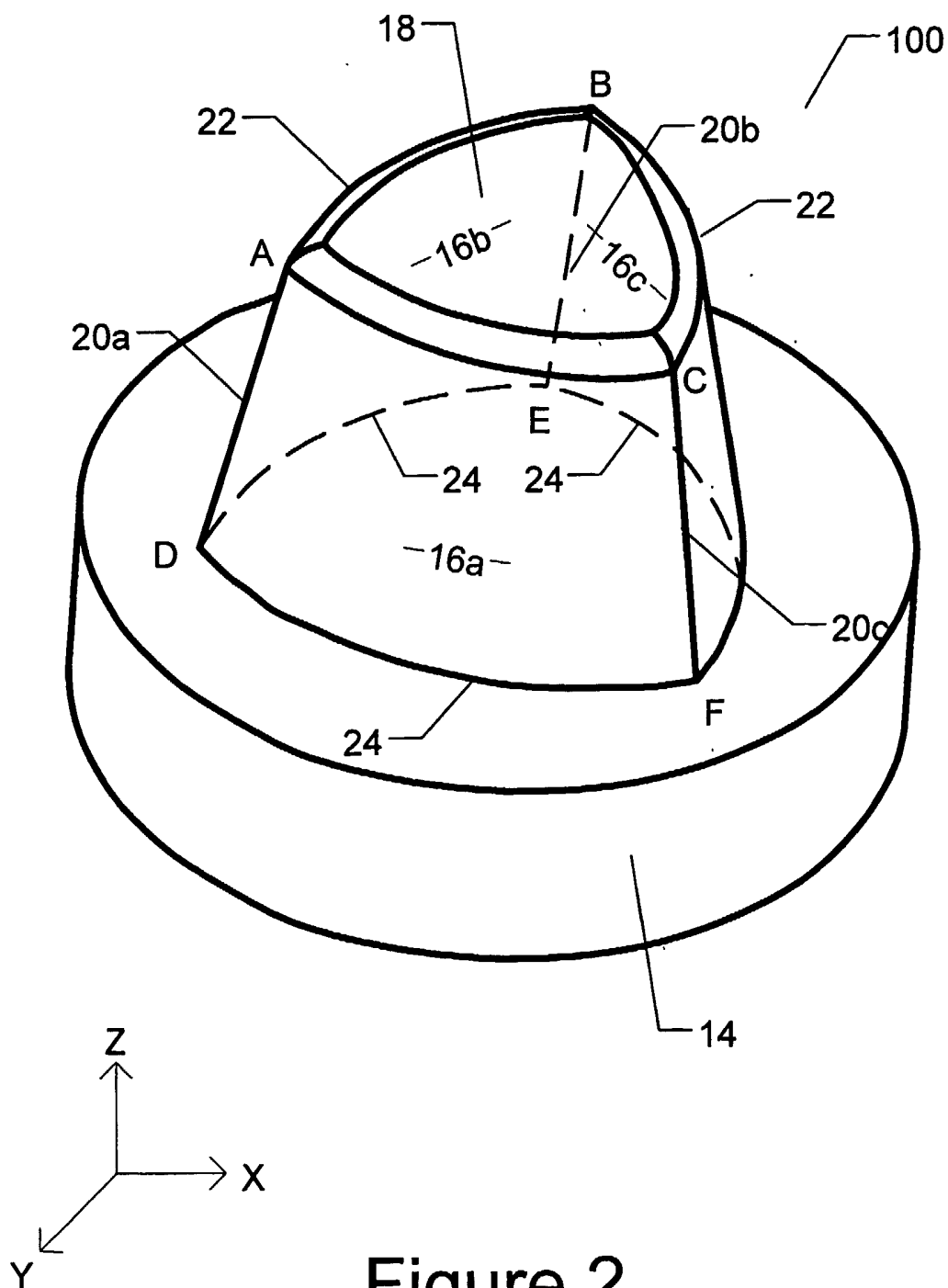


Figure 2

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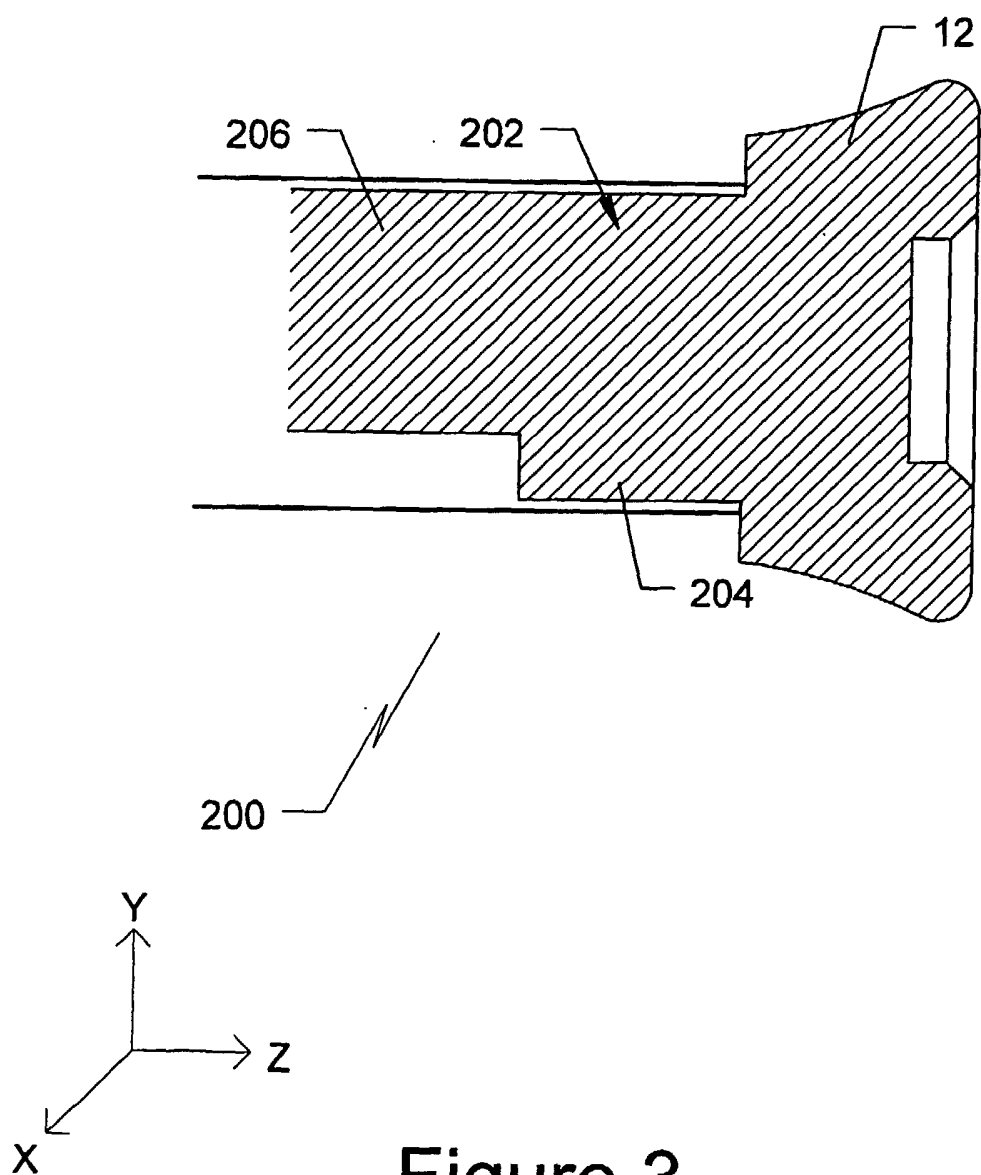


Figure 3

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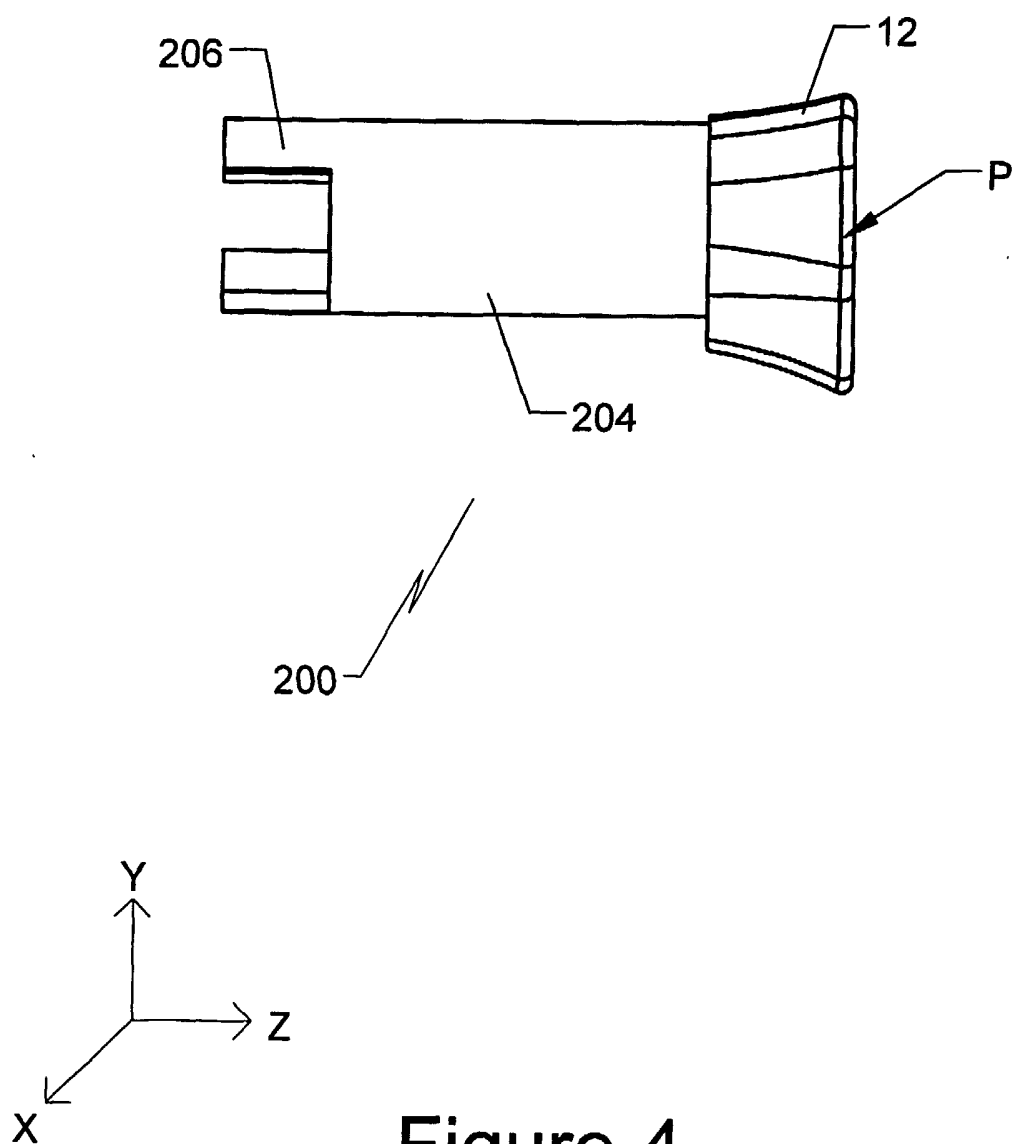
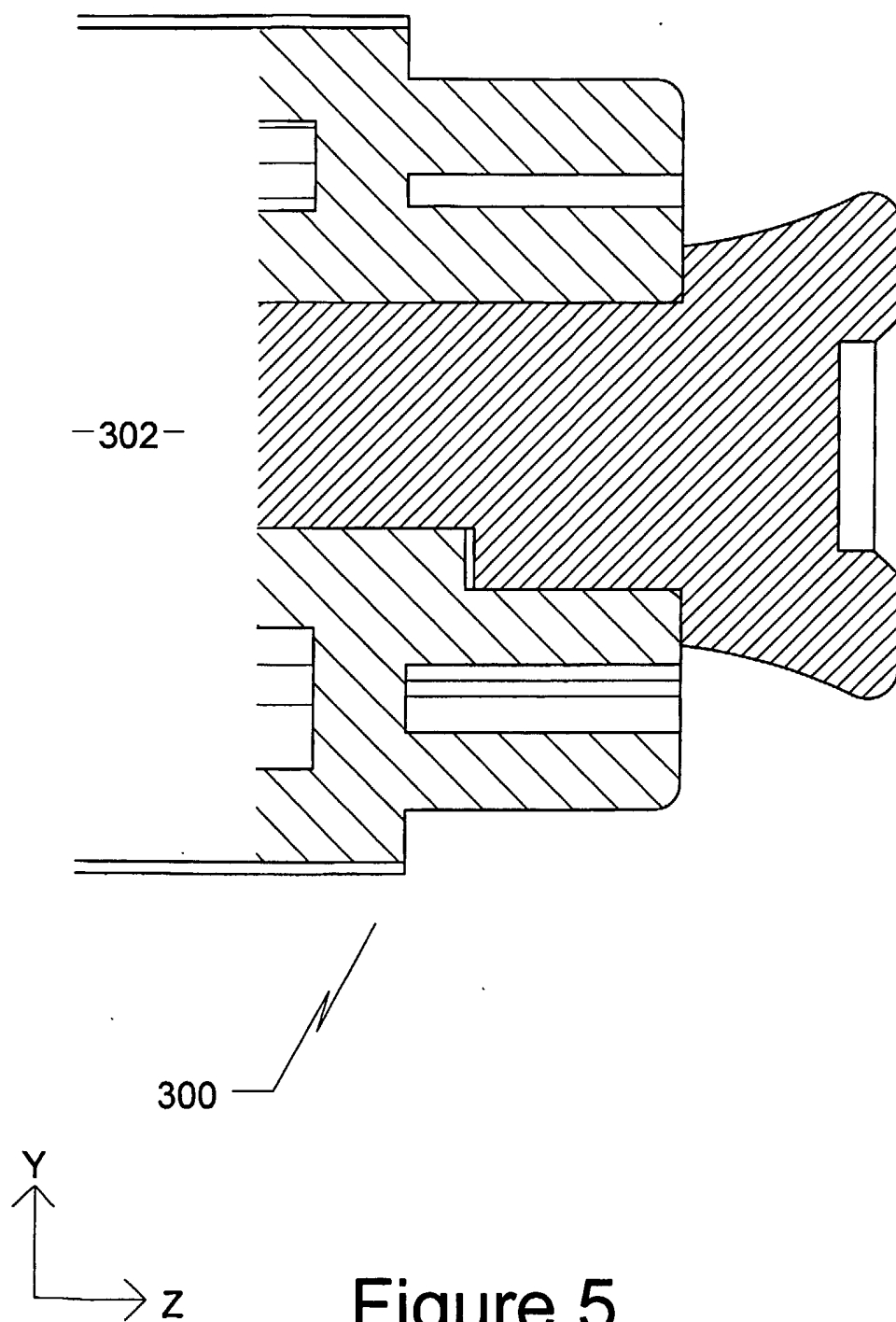


Figure 4

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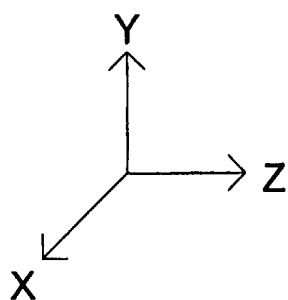
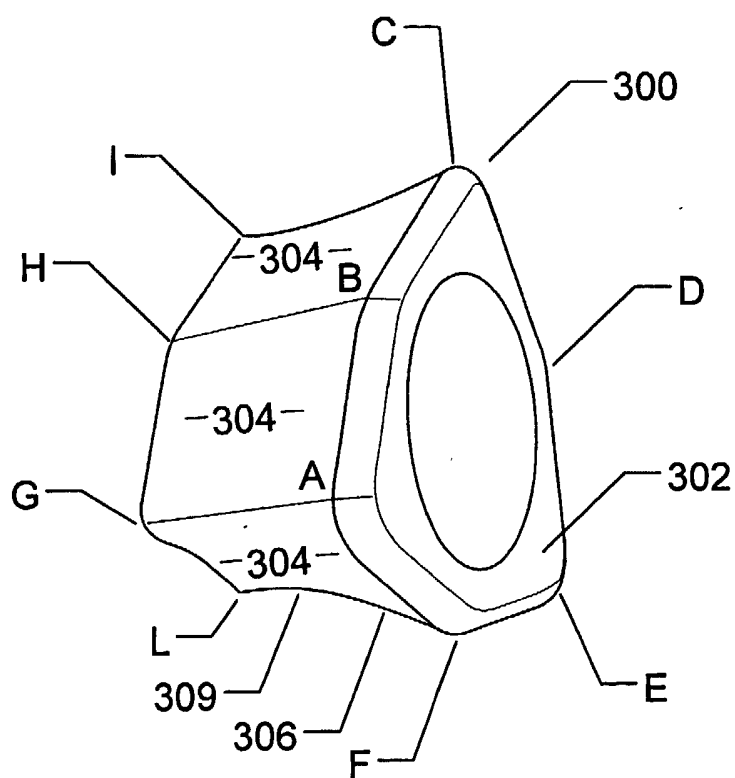
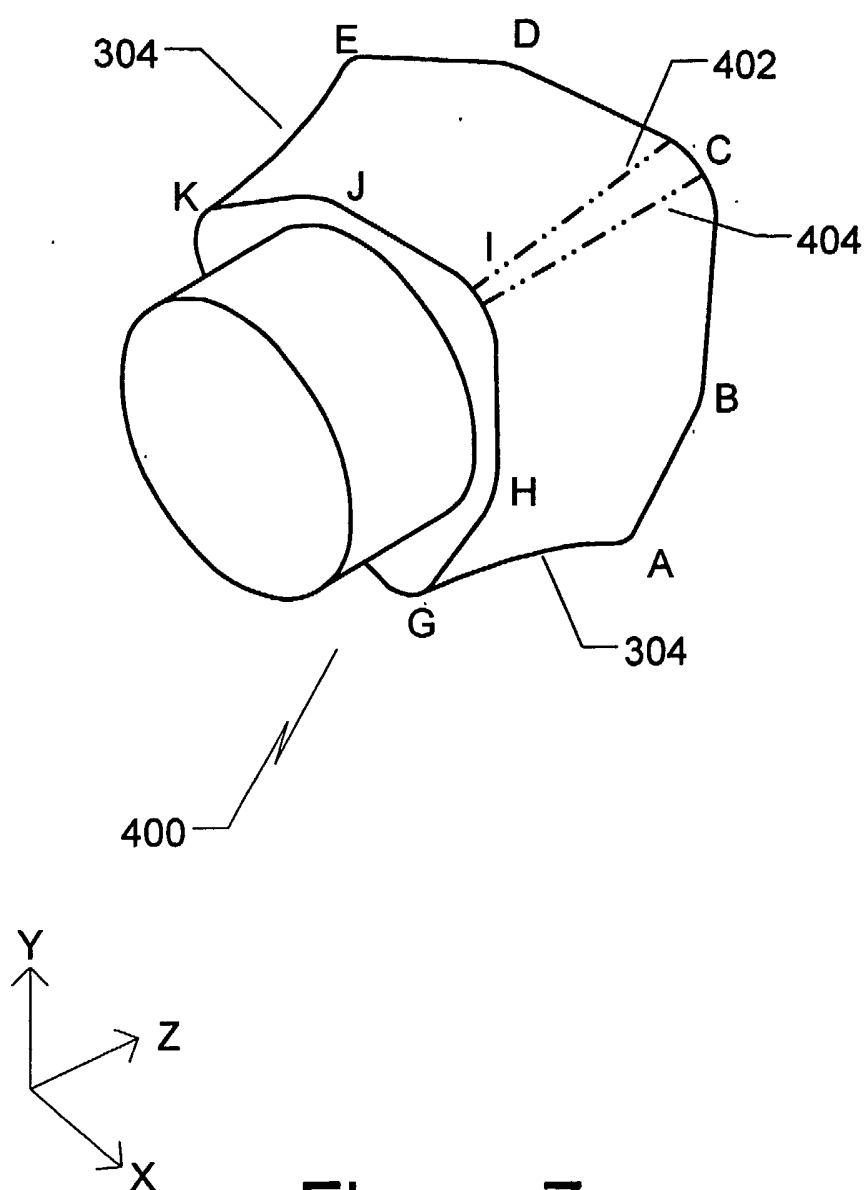


Figure 6

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**Figure 7**

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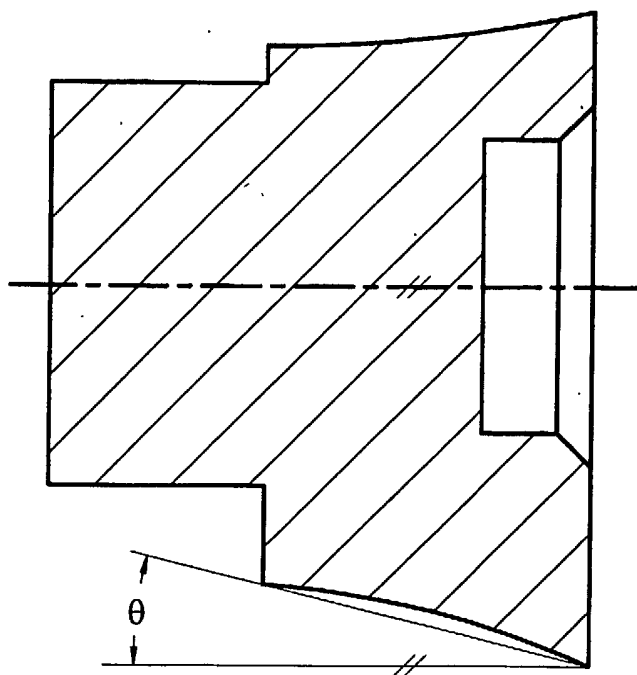


Figure 8

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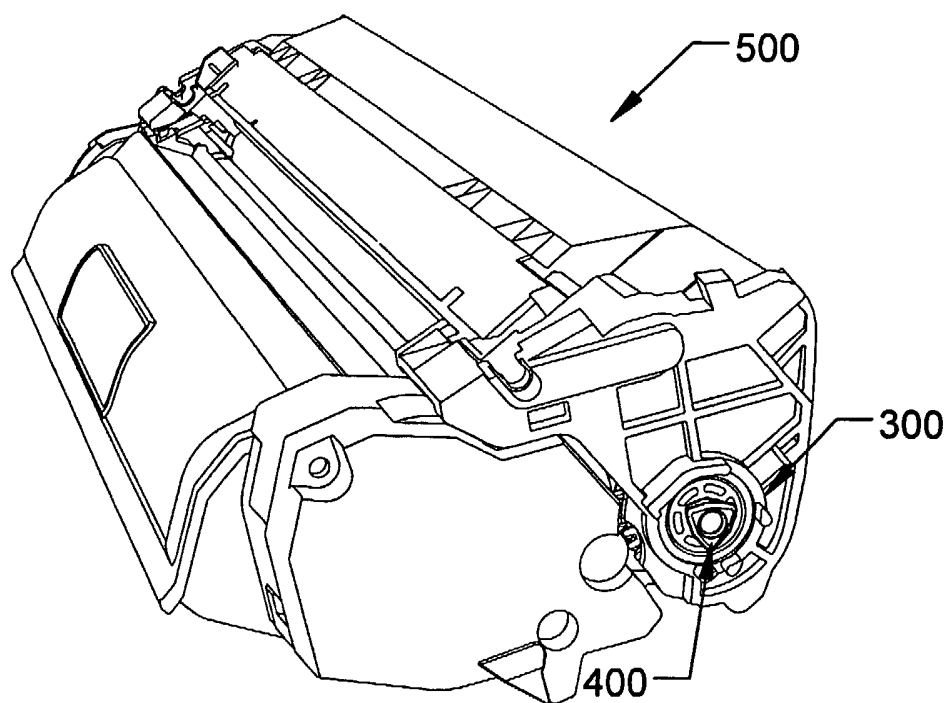


Figure 9

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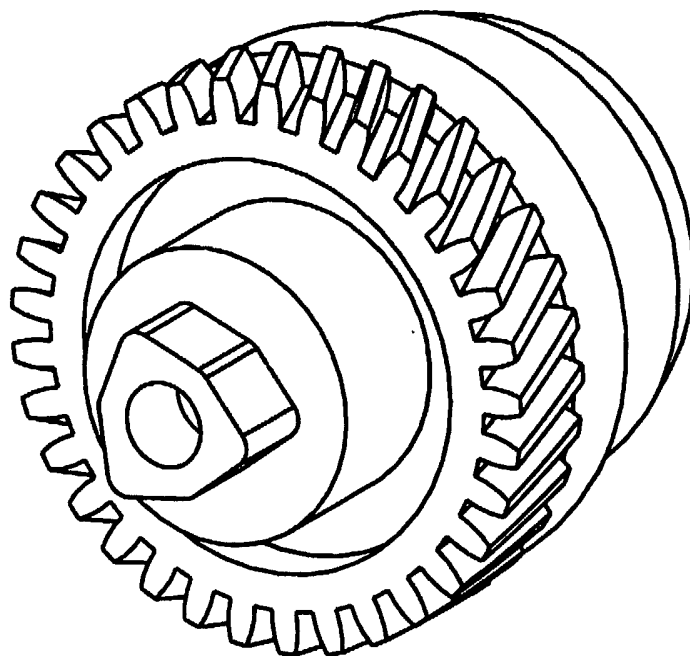


Figure 10

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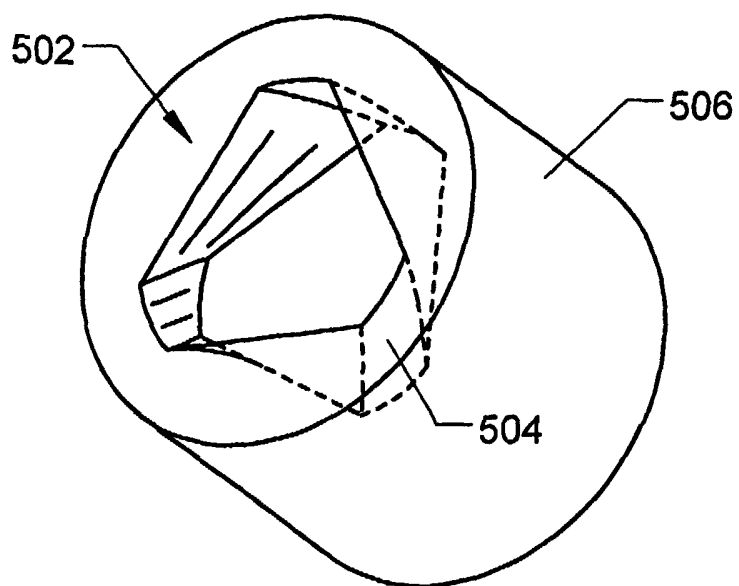


Figure 11a

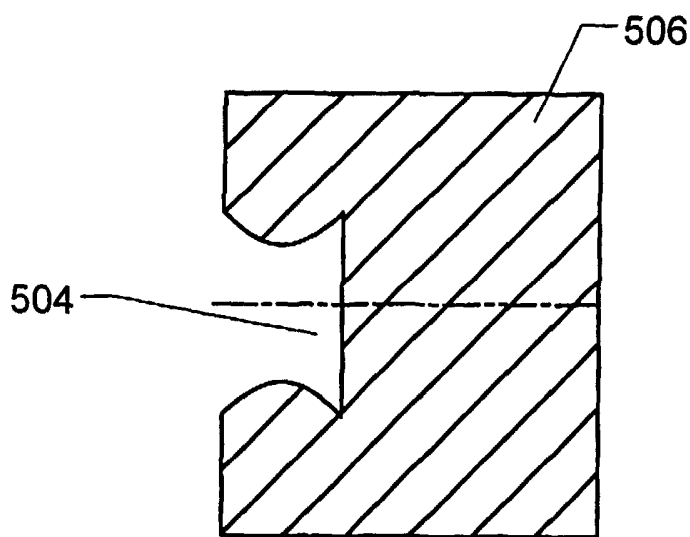


Figure 11b

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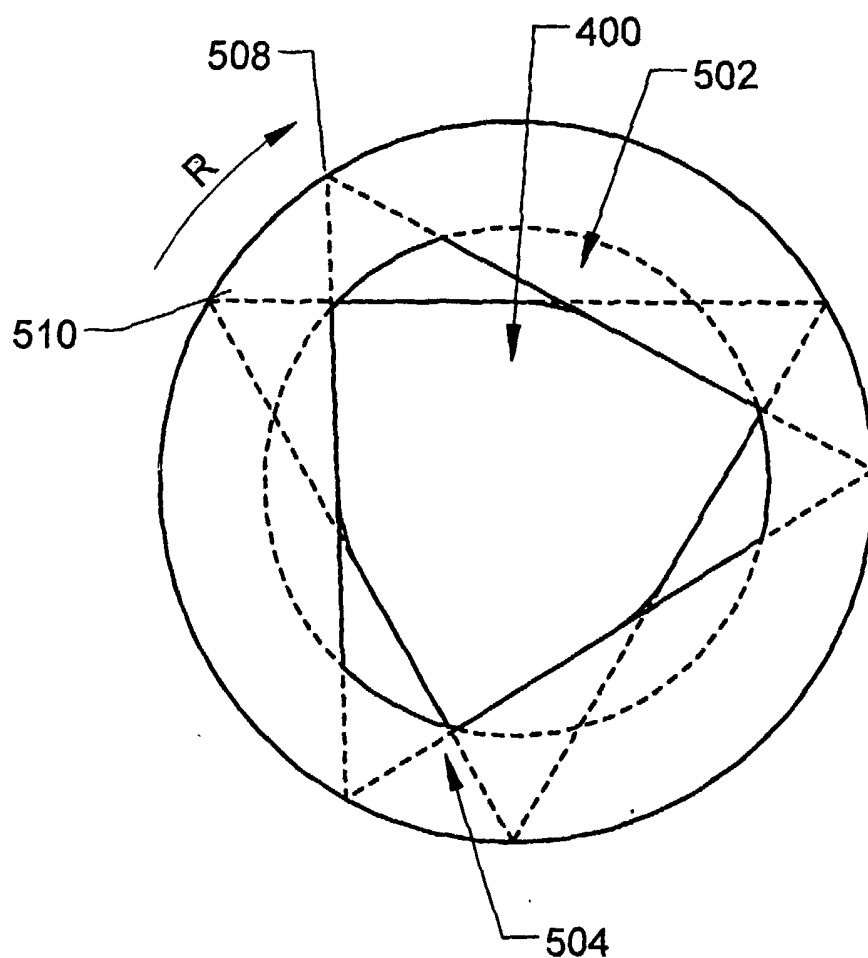


Figure 12

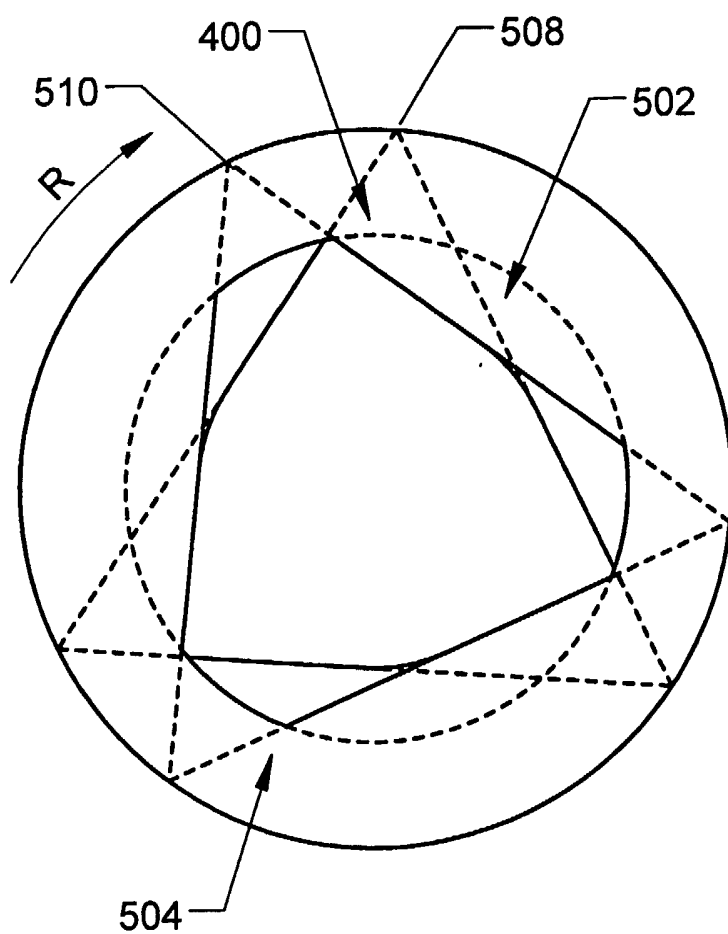


Figure 13