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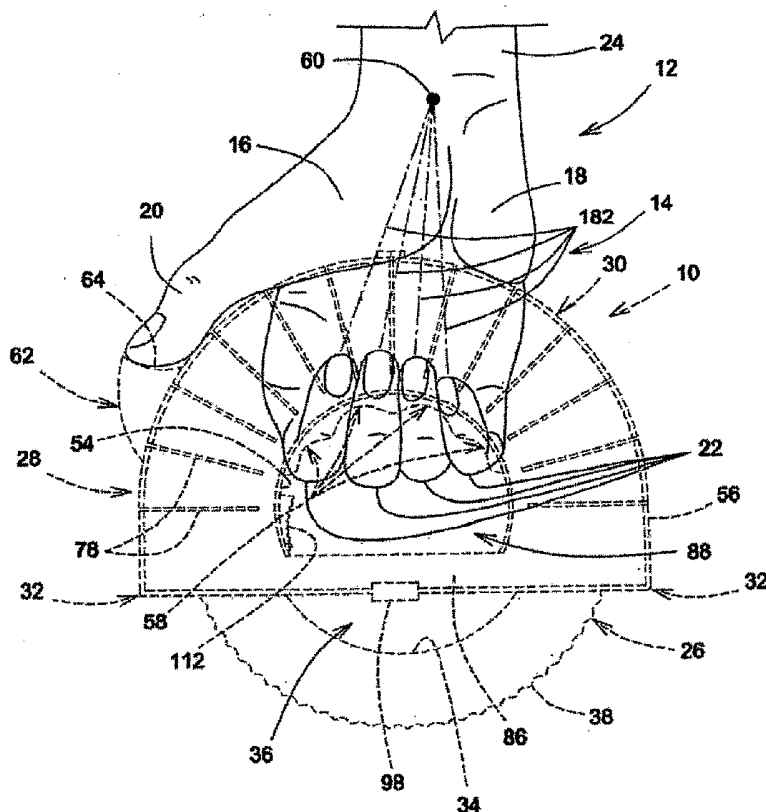
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(54) Title: ROTARY-TYPE CUTTING IMPLEMENT



(57) Abstract: A cutting implement (10) including an annular blade (26) defining a central blade aperture and a circular cutting edge (38). The annular blade is rotatably mounted in a handle (30) covering a covered arc segment (46) of the blade (26) while allowing an outer arc segment (48) of the blade (26) to protrude from the handle (30). The device may be held through the use of a palm grip wherein some of the fingers of the user are inserted through the blade aperture and press the handle against the palm (14) of the hand. A mechanism may be provided for selectively restraining the rotation of the blade (26) relative to the handle (30).

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TITLE OF THE INVENTION

Rotary-type cutting implement

FIELD OF THE INVENTION

The present invention relates to the general field of cutting
5 implements and is particularly concerned with a cutting implement having a rotary
blade.

BACKGROUND OF THE INVENTION

There exists a plurality of situations wherein it is desirable to
manually cut objects. A sub-set of such situations includes various operations
10 performed using various types of knives during the processing or preparation of
various types of food products. Throughout the following disclosure, the present
invention is mostly disclosed, by way of example, as being used for cutting
foodstuff. It should however be understood that the present invention could also
be used in numerous other contexts and applications wherein a rotary-type knife
15 is suitable such as for cutting vitreous, ceramic or other types of objects.

Some of the numerous shapes and styles of knives commonly used
in the kitchen environment include French Chef's knives, Chinese Chef's knives,
paring knives, slicing knives, utility knives, bread knives, hand knives, cook's
knives, cleaver knives, boning knives, filet knives, clam/oyster knives, mezzaluna
20 knives and pizza knives. Most of these knives use a generally elongated blade
fixedly extending from a handle. Such knives typically sever food products
through a sawing-like action.

So-called pizza knives or rotary-type knives or cutters, however, typically include a rotary blade rotatably attached to a handle adjacent a longitudinal end thereof by an axle allowing rotation in a plane generally perpendicular to the surface being cut. During use of such knives, a user grasps the handle and presses the peripheral cutting edge of the rotary blade against the material to be cut.

As the rotary blade is rolled under pressure, the material is severed in the path traced by the rotary blade. The amount of pressure to be applied to the blade for accommodating various consistencies and thicknesses of objects is typically varied by modifying the angle at which the handle is positioned relative to the material being cut.

By way of example, pizza knives are typically used for diametrically cutting pizzas, pies, various types of dough and the like several times into pie shaped sections prior to serving the latter. It is well known that the crust and/or contents of the pizza or pie, particularly when hot, make it difficult to perform the cutting operation due to the consistency of the crust and/or contents.

When knives having a stationary elongated blade are used with a sawing action, the cutting action tends to drag the filling and, hence, spoil the appearance of the pizza for serving. This problem is compounded adjacent the central area of the pizza pie where all the cuts intersect.

Conventional pizza knives using a rotary blade rotatably attached to a handle at least partially solve the hereinabove mentioned drawbacks associated with conventional knives using a stationary elongated blade. Indeed, the rolling

action, changes the dynamic interaction and the direction of the frictional force between the cutting blade and the foodstuff. These modifications, in turn, prevent at least partially, pizza or pie contents such as the topping from being pulled along the cutting path.

5 Although the prior art rotary-type cutters have proven to be somewhat satisfactory in certain specific settings they nevertheless suffer from numerous drawbacks. One major problem associated with conventional rotary-type cutters is that the cutting blades are often mounted so as to be unstable under the pressure applied thereon during cutting.

10 Often, the thickness and size of prior art rotary blades as well as the size and position of the handle of prior devices limit the amount of force that can be applied during cutting. Also, with most prior art rotary-type cutters, the blade is free to wobble from side to side during the cutting process, reducing efficiency and potentially producing an uneven cut. Indeed, such conventional blade
15 designs typically contend with the competing objectives of allowing free rotation of and giving suitable support for the rotary blade.

In some instances, a higher degree of accuracy in straightness and perpendicularity of the cut surface are required. To meet this requirement, it is necessary to form a slit that is sufficiently smooth, straight and deep. To form a
20 deep slit, the cutting blade has to penetrate deeply into the product to be cut. Most conventional rotary-type cutters have proven to be unsuitable for performing deep slits because of their inability to sustain hard pressure exerted thereon.

Furthermore, the location of the rotary cutter blade of conventional rotary-type cutters limits the size of the wheel being used. Hence, most conventional rotary-type cutters are provided with a relatively small cutting blade having a diameter in the range of two inches. This, in turn, further precludes the ability of the rotary-type cutter to perform deep slits.

Another problem associated with most prior art rotary-type cutters is that the elongated handles of such conventional cutters and the position of the rotary blade relative to the handle require that the intended user grasp the handle firmly in often non-ergonomic positions. In particular, the positioning of the blade precludes ergonomical use of prior art rotary-type cutters as the cutting motion by hand-wise movement therewith is often clumsy especially during rapid stroking thereof.

Positioning of the cutting wheel at a distal end of a handle of conventional rotary-type cutters also increases the moment of inertia when the direction of the cutting wheel needs to be changed. This, in turn, leads to increased strain on the hand and wrist of the intended user. Also, the configuration and position of the handle of such prior devices limit the amount of force that can be ergonomically applied during cutting, often requiring the user to exert added energy to make a single cut.

Constant repetition of the same hand or wrist actions, particularly in an non-ergonomical position, can strain and inflame nerves and muscles as well as tendons (tenosynovitis, tendonitis) and/or cause severe wrist pains (for example as with carpal tunnel syndrome). Because the musculo-skeletal strain from repeatedly flexing the wrist when applying arm-wrist-finger force does not

cause observable injuries, it often takes months or years for users such as workers working in high volume kitchens to detect damages that may be difficult to heal.

Prior art rotary-type cutters are not only susceptible of causing
5 repetitive stress-type of injuries but may also potentially cause overt-type of injuries. Indeed, the configuration of most prior art rotary-type cutters is such that the hand of the intended user grasping the handle may easily slip down the handle towards the cutting blade and unwillingly contact the latter.

Furthermore, most prior art rotary-type cutters fail to provide a
10 shield for protecting the fingers of the intended user from the blade. Hence, the fingers of the intended user may contact the blade potentially causing a serious injury thereto. The problem is compounded in situations wherein the handle is slippery due to contact with contextual food products such as sauces, toppings, cheese, flour and dough.

15 Also, most conventional pizza cutters fail to provide a shield of some type for preventing the hand of the intended user from contacting the pizza or other foodstuff. This may cause a messy situation and may even lead to a burning injury. This problem is compounded in situations wherein the angle between the handle and the pizza is relatively small.

20 Most prior art rotary-type cutters eventually further suffer from problems associated with wear or damage to their cutting blade. Since smaller wheels are used, each segment of the cutting edge is used more often for a given cutting action leading to accelerated wear of the cutting edge. Also, most prior art

rotary-type cutters fail to provide a means of protecting the cutter edge against dulling when not in use.

Problems associated with damaged blades are compounded by the fact that most conventional prior art rotary cutters are provided with cutter blades that are permanently mounted to the handle. Hence, they do not allow for easy replacement of the cutter blade leading, in turn, to a decreased life cycle of the cutting implements since the implement must often be discarded in the event that the blade becomes dulled or otherwise damaged.

Also, the design of most prior art pizza cutters and, in particular, the type of mechanical attachment of the cutting wheel to the handle often precludes adequate hygienic cleaning of the cutting device sometimes leading to potentially unsanitary conditions.

Most prior art rotary-type cutters further suffer from a lack of versatility. Indeed, notwithstanding the herein above-mentioned drawbacks, although some prior art rotary-type cutters have proven to be somewhat satisfactory when used to slice standard thin crust pizzas, most have proven to be unsatisfactory for other varieties of available pizzas including so-called "pan", "stuffed" and "deep dish" pizzas. For example, most prior art devices have proven to be awkward and clumsy to use particularly with pizzas having a thicker crust or a thicker layer of toppings such as stuffed and pan pizzas at least in part because of the relative instability of the blades relative to the handles.

Furthermore, in instances wherein the foodstuffs, such a pizza or pie, is baked in a pan of either the shallow or deep type, conventional rotary-type

cutters are often ineffective to completely separate the pieces at the corners where the bottom of the pan joins the sides. Indeed, because of the diameter of most conventional rotary type cutting implements is relatively small, difficulty may be encountered in cutting a close-fitting pizza crust right up to the edge of a pan
5 in which it is prepared.

In this event, spatulas or other serving tools may be too limber or unsuitably configured to reach into the pan corners and, hence, another household utensil such as an elongated blade knife needs to be employed in order to completely separate the pizza pieces at the corners. The sawing action
10 of conventional knives is also often better suited to cut the edges of the pizza crust where the cheese becomes tougher than that of the pizza body.

Hence, in order to properly sever individual pieces from a pizza or pie, up to two types of knives are needed when conventional rotary-type cutters are used. Accordingly, the two conventional utensils must be cleaned, leading to
15 an increased workload. Furthermore, these two utensils must be stored individually thus leading to an increased required storage space. Furthermore, the risk of misplacing at least one of the two utensils is also increased. Also, since two types of knives are used sequentially, there exists an increased risk of being unintentionally injured by the blade of one of the knives.

20 It would thus be desirable to provide a single utensil that can be used for cutting various sections of foodstuffs having different consistencies such as a single utensil that can be used for cutting the crust edges, the corner and body parts of a pizza.

The prior art as shown at least one patent attempting to circumvent at least some of the hereinabove mentioned drawbacks associated with most conventional rotary-type cutters. U.S. Patent 6,438,850 naming Michael W. K. Young et al. as inventors, issued August 27 2002, discloses a roller cutter having
5 a partially circular housing. The housing is provided with a slit extending therein for receiving a rotary cutter wheel.

The cutter wheel can be selectively shifted between an extended cutting position and a retracted position enclosed within the housing through the use of a push button component operating a latch release allowing shifting
10 between these positions. The slide bar mounting the cutting wheel for shifting movement is itself held in a slot in the housing. The slide bar is releasably held allowing removal in cleaning of the cutting wheel. A substantially tangential grip is provided as the top of the housing.

While at least partially circumventing some of the hereinabove
15 mentioned drawbacks associated with other conventional rotary-type cutters, the implement disclosed in U.S. Patent 6,438,850 still suffers from major drawbacks. Indeed, the hand grip extending generally tangentially along the top of the circular housing does not allow an intended user to manipulate the cutter using a sturdy and suitable grip such as a power or palm grip wherein opposing fingers press
20 that grip against the palm of the hand.

Failure to allow for such a palm-type grip results in an increased risk of slippage of the cutting implement particularly when the latter needs to be angled relative to the surface to be cut. Slippage of the cutting implement during use, in turn, leads an increased risk of injury to the user and/or spoilage of the
25 product being cut and/or its immediate environment. Failure to allow for a palm-

type grip also potentially leads to non-ergonomical handling of the cutting device which, in turn, potentially leads to overt and/or repetitive type of injuries.

Furthermore, the cutting implement disclosed in U.S. Patent 6,438,850 fails to provide additional useful features such as a means for
5 increasing the versatility of the cutting implement by selectively allowing and preventing rotation of the cutting blade.

Accordingly, there exists a need for an improved rotary-type cutting implement. It is therefore a general object of the present invention to provide an improved rotary-type cutting implement.

10

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a cutting implement, the cutting implement being operable by a hand of an intended user, the hand
15 having digits including a thumb extending from a palm, the cutting implement comprising: a substantially annular blade and a casing, the casing defining a handle, the handle defining a pair of substantially opposed handle end segments, the handle having a handle channel extending therethrough between the handle end segments, the handle channel defining a pair of corresponding opposed
20 channel ends; the blade defining an inner arc segment extending through the handle channel and an integrally extending outer arc segment extending outwardly from the casing; the blade defining a blade rotation axis and being rotatably mounted within the handle channel for rotation relative thereto.

Preferably, the cutting implement further comprises a rotation restraining means extending between the blade and the casing for allowing the intended user to selectively restrain the rotation of the blade relative to the handle channel.

- 5 Conveniently, the cutting implement further comprises a guiding means extending between the blade and the casing for guiding the rotational movement of the blade relative to the handle channel and preventing translational relative movement therebetween.
- 10 Typically, the cutting implement further comprises the guiding means also acts as a friction reducing means for reducing the frictional force between the blade and the casing when the blade rotates relative to the handle channel.

Conveniently, the cutting implement further comprises a wiping means extending
15 therefrom for wiping at least a portion of the blade as the blade rotates relative to the handle channel.

Typically, the cutting implement further comprises a casing sealing means extending therefrom for sealing the handle channel so as to prevent the entry of
20 foreign objects therein.

Conveniently, the cutting implement further comprises a contact prevention means extending from the handle for preventing the hand from coming into contact with the outer arc segment when the hand grasps the handle.

In one embodiment of the invention, the contact prevention means includes a casing bridging section extending substantially diametrically between the handle end segments so that the casing has a substantially "D"-shaped configuration.

- 5 Typically, the handle has a circumferentially interrupted substantially annular configuration extending within a predetermined circumferential range between the handle end segments, the handle channel having a corresponding circumferentially interrupted substantially annular configuration.
- 10 Conveniently, the handle defines a radially innermost located handle inner edge and a radially outermost located handle outer edge, the blade defining a radially innermost located blade inner edge and a substantially opposed and radially outermost located blade outer edge, the handle inner edge being located radially inwardly relative to the blade inner edge and the handle outer edge being located
- 15 radially outwardly relative to the blade outer edge.

In accordance with the present invention, there is also provided a cutting implement for cutting an object, the cutting implement comprising: an annular blade defining a blade aperture extending therethrough and an outer blade

20 peripheral cutting edge, the cutting implement also including a handle covering a covered arc segment of the blade while allowing an outer arc segment of the blade to protrude therefrom, the covered arc segment being rotatably mounted within the handle

The present invention also relates to a method for allowing an intended user having a hand to cut an object using a cutting implement, the cutting implement including an annular blade defining a blade aperture extending therethrough and an outer blade peripheral cutting edge, the cutting implement also including a
5 handle covering a covered arc segment of the blade while allowing an outer arc segment of the blade to protrude therefrom, the covered arc segment being rotatably mounted within the handle, the method comprising: holding the covered arc segment using the handle; moving the blade peripheral cutting edge across at least a portion of the object.

10

Preferably, the covered arc segment is held by grasping the handle with at least a portion of the hand inserted in the blade aperture. Typically, handle is grasped using a palm grip.

15 In accordance with one aspect of the method, the blade peripheral cutting edge is moved across at least a portion of the object by rotating the covered arc segment relative to the handle.

In accordance with another aspect of the method, the blade peripheral cutting
20 edge is moved across at least a portion of the object while maintaining the covered arc segment stationary relative to the handle.

Advantages of at least some of the proposed embodiments of the invention include that the proposed cutting implement allows for handling thereof
25 in an ergonomical fashion through the use of a power or palm-type grip wherein

opposing fingers at least partially encircle the cutting blade for added stability and maneuverability while pressing the handle against the hand of the intended user.

Also, the proposed invention allows for ergonomic positioning of the
5 thumb of the intended user so that the latter may contribute to the manipulation of the device in an ergonomic fashion.

Furthermore, the proposed device allows for increased versatility thereof compared to conventional rotary-type cutters. In at least some
10 embodiments thereof, the proposed implement provides a selective rotation restraining mechanism allowing selective restraining of the rotation of the rotary cutting blade thereby increasing the versatility of the cutting implement. The cutting implement may hence be used as a rotary knife allowing free rotation of the cutting blade, as a rotating knife allowing restrictive rotation of the cutting
15 blade or as a mezzaluna-type or slicing-type knife having a blade in a fixed relationship relative to the handle. Furthermore, switching between operational modes is allowed through a set of quick and ergonomical steps without requiring manual dexterity or without requiring that the cutting operation be impeded.

20 Still furthermore, the proposed invention provides a means for wiping the cutting blade during use thereof so as to prevent entrainment of soiling objects within the casing housing of the cutting blade. The wiping means also allows the cutting edge of the blade to remain free of debris during the cutting operation so as to increase the efficiency thereof.

Also, the proposed invention provides a means for guiding the rotation of the cutting blade during use thereof so as to prevent wobbling of the cutting blade and so as to reduce wear thereon. An increased cutting pressure may hence be exerted on the cutting implement against leading to improved cutting efficiency and to the possibility of making deeper and more accurate cuts.

Furthermore, the proposed invention also provides a friction-reducing means for reducing the friction between the cutting blade and the housing during rotation of the cutting blade, again improving the ergonomics of the implement while reducing wear on its components.

Also, the proposed invention is provided with a blade contact prevention means for preventing the hand of the intended user from coming into contact with the exposed segment of the blade and/or the product being cut when the device is used.

Still furthermore, the proposed invention is optionally further provided with a means for protecting the exposed blade against dulling when not in use. The proposed cutting implement is still further designed so that its components most subjected to wear, including the blade, may be easily replaced through a set of quick and ergonomic steps. The proposed cutting implement allows replacement and/or maintenance of its components with reduced risks of damaging or otherwise altering adjacent components and without the need for special tooling or manual dexterity.

Also, the proposed invention is designed so as to be aesthetically pleasing and relatively easy to clean again through a set of quick and ergonomic steps without requiring special cleaning implements or manual dexterity. In addition, the exterior surface of the proposed invention is typically smooth and preferably uninterrupted so that it prevents accumulation of food residues thereon. Furthermore, the material of the outer surface is typically compatible with food and of a material approved for food use.

Furthermore, the proposed device is designed so as to be manufacturable through conventional forms of manufacture using conventional materials and components so as to provide a cutting implement that will be economically feasible, long-lasting and relatively trouble-free in operation.

Other advantages of the present invention will become apparent from a careful reading of the detailed description provided herein, within appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the present invention will now be disclosed, by way of example, in reference to the following drawings in which:

Figure 1, in a partial front elevational view with sections taken out, illustrates a cutting implement in accordance with an embodiment of the present invention, the cutting implement is shown in phantom lines being held by a hand of an intended user shown in full lines;

Figure 2A, in a right side elevational view with sections taken out, illustrates the cutting implement shown in Fig. 1 being grasped by the hand of an intended user;

Figure 2B, in a left side elevational view with sections taken out,
5 illustrates the cutting implement shown in Fig. 1 being grasped by the hand of an intended user;

Figure 3, in a perspective view, illustrates a cutting implement in accordance with an embodiment of the present invention, the cutting implement being shown with a blade cover about to be mounted thereon;

10 Figure 4, in a perspective view, illustrates a cutting implement in accordance with an embodiment of the present invention, the cutting implement being shown with its casing in an opened configuration allowing visualization of some of the internal components of the cutting implement;

Figure 5, in a partial perspective view with sections taken out,
15 illustrates part of a casing section of a cutting implement in accordance with an embodiment of the present invention having guiding pins extending therefrom;

Figure 5A, in a partial perspective view with sections taken out, illustrates part of a blade and of a guiding component used for guiding the blade;

Figure 5B illustrates part of a blade and another alternative
20 embodiment of a guiding component for guiding the latter;

Figure 5C, illustrates part of a blade and yet another alternative embodiment of a guiding components for guiding the latter;

Figure 5D, illustrates part of a blade and yet still another alternative embodiment of a guiding components for guiding the latter;

Figure 6A, in a partial exploded view with sections taken out, illustrates an alternative embodiment of a guiding mechanism for guiding a cutting blade within a blade receiving channel, only a section of the cutting blade and of the blade receiving channel being shown;

5 Figure 6B, in a partial perspective view with sections taken out, illustrates a section of a cutting blade having yet an alternative embodiment of part of a blade guiding mechanism about to be attached thereto;

Figure 7, in a partial exploded view with sections taken out, illustrates yet another embodiment of a guiding component about to be mounted
10 to part of a casing;

Figure 8A, in a partial exploded view with sections taken out, illustrates part of a cutting blade about to be inserted within an alternative embodiment of a guiding component part of a guiding mechanism;

Figure 8B, in a partial exploded view with sections taken out,
15 illustrates part of a cutting blade about to be inserted within an alternative embodiment of a guiding component part of a guiding mechanism;

Figure 8C, in a partial exploded view with sections taken out, illustrates part of a cutting blade about to be inserted within an alternative embodiment of a guiding component part of a guiding mechanism;

20 Figure 9, in a partial exploded view with sections taken out, illustrates a cutting blade about to be mounted on an alternative embodiment of a guiding mechanism part of a cutting implement in accordance with an embodiment of the present invention;

Figure 10, in a partial perspective detailed view taken along arrows 10 of Fig. 9, illustrates a roller mounting structure part of the guiding mechanism shown partly in Fig. 9;

Figure 11, in a partial front view with sections taken out, illustrates
5 part of a rotation-restraining mechanism for restraining rotation of a cutting blade both part of a cutting implement in accordance with an embodiment of the present invention;

Figure 12, in a perspective view, illustrates a cutting implement
10 having a casing design in accordance with an alternative embodiment of the present invention;

Figure 13, in a transversal cross-sectional view taken along arrows 13-13 of Fig. 12, illustrates yet another embodiment of a blade guiding mechanism;

Figure 14, in a partial perspective view with sections taken out,
15 illustrates some of the interior components of the embodiment shown in Figs. 12 and 13.

DETAILED DESCRIPTION

Referring to Fig. 1, there is shown a cutting implement 10 in
20 accordance with an embodiment of the present invention being manipulated by a hand 12 of an intended user. The hand 12, illustrated by way of example, has a palm region 14 including thenar and hypothenar eminences 16, 18. The hand 12 also has digits including a thumb 20 and four opposing fingers 22. As shown more specifically in Figures 2a and 2b, the four opposing fingers 22 are typically

flexible separately about respective metacarpophalangeal joints 180 as well as respective proximal and distal inter-phalangeal joints 70, 72.

In Figure 1, the hand 12 is shown in full lines while the cutting implement 10 is shown in phantom lines to allow better visualization of the ergonomical relationship therebetween. Some of the features allowing for this
5 ergonomical relationship between the hand 12 and the cutting implement 10 will be hereinafter disclosed in greater details.

Figs. 1, 2a and 2b illustrate the hand 12 manipulating the cutting implement 10 using a power or palm grip wherein the opposing fingers 22
10 maintain part of the cutting implement 10 against the palm 14. The opposing fingers 22 are flexed and the wrist 24 is in ulnar deviation and extended. It should however be understood that the cutting implement 10 could be used in other contexts and using other types of power or precision grips including a three-point chuck, a lateral grip, a tip pinch or any other suitable type of grip without
15 departing from the scope of the present invention.

The cutting implement 10 includes a substantially annular blade 26 and a casing 28. The casing 28 defines a handle 30. In turn, the handle 30 defines a pair of substantially opposed handle end segments 32.

As illustrated more specifically in Fig. 4, the annular blade 26
20 typically defines a blade inner edge 34 delimiting a blade aperture 36. Although the blade inner edge 34 and the blade aperture 36 are shown throughout the figures as having respectively a substantially annular and a substantially disc-shape configuration, it should be understood that both the blade inner edge 34 and the blade aperture 36 could have other suitable configurations without
25 departing from the scope of the present invention.

The blade 26 also defines a peripheral cutting or outer edge 38. The blade outer edge 38 is typically given cutting characteristics such as a relatively thin cross-section and is typically made out of a suitable hardened material allowing for cutting therewith. Throughout most of the figures, the blade outer edge 38 is shown with serrations formed thereon. It should however be understood that the blade outer edge 38 could be provided without serrations and could present other configurations and cutting characteristics without departing from the scope of the present invention.

The blade 26 also defines a pair of opposed blade lateral surfaces 40 (only one of which is shown in Fig. 4). Typically, the blade lateral surfaces 40 have a substantially flat configuration. Figs. 8b, 12 and 13 illustrate at least one of the blade lateral surfaces 40 having at least one groove formed therein.

It should be understood that although the blade lateral surfaces 40 are shown throughout the figures as having a substantially flat configuration, the blade lateral surfaces 40 could have other configurations and cross-sectional profiles including grooves, ridges and other topographical characteristics without departing from the scope of the present invention. Also, the blade lateral surfaces 40 could be provided with apertures (not shown) extending therethrough in order to decrease the overall weight of the blade 26 or for other purposes without departing from the scope of the present invention.

The handle 30 has a handle channel 42 extending therethrough between the handle end segments 32. The handle channel 42 defines a pair of corresponding opposed channel ends 44.

The blade 26 defines an inner blade covered or inner arc segment 46 extending through the handle channel 42 and an integrally extending blade

uncovered or outer arc segment 48 extending outwardly from the casing 28. The blade 26 also defines a blade rotation axis 50 and is rotatably mounted within the handle channel 42 for rotation relative thereto.

As shown more specifically in Figures 3 and 12, the handle 30 typically has a circumferentially interrupted substantially annular configuration extending within a predetermined circumferential range 52 between the handle end segments 32. As shown more specifically in Figures 4 through 6a, 7, 9 and 14, the handle channel 42 also typically has a corresponding circumferentially interrupted substantially annular configuration.

It should be understood that, although throughout the figures the handle 30 is shown as having substantially the configuration of an annular segment, the handle 30 could have other suitable configurations without departing from the scope of the present invention. In other words, the configuration of the outer surfaces of the handle 30 may differ from that of the handle channel 42 for aesthetic, structural, manufacturing or other purposes without departing from the scope of the present invention.

As illustrated more specifically in Fig. 1, the handle 30 typically defines a radially innermost located handle inner edge 54 and a radially outermost located handle outer edge 56. The handle inner edge 54 is located radially inwardly relative to the blade inner edge 34 and the handle outer edge 56 is located radially outwardly relative to the blade outer edge 38.

The handle inner edge 54 typically has a substantially arcuate and concave configuration. Also, typically, the handle inner edge 54 is provided with at least one and preferably a set of indentations 58 formed therein for receiving at least some and preferably all of the opposing fingers 22.

It should be understood that the handle inner edge 54 could assume other configurations such as a substantially rectilinear or a substantially convex configuration without departing from the scope of the present invention. As shown more specifically in figure 1, the handle inner edge 54 is typically given
5 a suitable configuration so that when the four opposing fingers 22 are flexed separately at the metacarpophalangeal joint 180 and proximal inter-phalangeal joints 70, their respective flexed finger axes 182 converge ergonomically towards the scaphoid tubercle 60.

Typically, the handle outer edge 56 has a substantially arcuate and
10 convex configuration. It should be understood that the handle outer edge 56 could have other configurations such as a substantially rectilinear, concave or other suitable configurations without departing from the scope of the present invention.

The handle outer edge 56 is typically configured and sized for
15 substantially fittingly abutting against the palm 14 of the hand 12 when the latter grips the handle 30 through the use of a palm-type grip. Typically, although by no means exclusively, the handle outer edge 56 is designed so as to substantially conform to the substantially concave and arcuate configuration of the corresponding abutting surfaces of the thenar and hypothenar eminences 16, 18
20 when the hand 12 holds the cutting implement 10 using a palm or power grip. The radius of the handle inner and outer edges 54, 56 when the latter have a substantially arcuate configuration is typically sized so as to accommodate the characteristics of a hand 12 having average anthropometric values for selected market groups so that the handle 30 will provide a comfortable and ergonomical
25 grip for these groups.

The handle outer edge 56 is preferably provided with a thumb rest 62 extending therefrom for supporting the thumb 20. The thumb rest 62 defines a thumb abutment surface 64. When the handle outer edge 56 has a substantially arcuate configuration curving in a first curve direction, the thumb abutment surface 64 typically also has a generally arcuate configuration but curving in a second curve direction substantially opposite to the first curve direction.

The thumb abutment surface 64 is typically configured and sized for substantially fittingly accommodating the distal pulp of the thumb 20. The thumb rest 62 is also typically positioned so that when the handle 30 is grasped substantially about the apex thereof an anthropometrically average thumb 20 in a substantially stretched state and abutting against handle outer edge 56 will reach the thumb abutment surface 64.

The handle 30 includes a pair of handle lateral walls 66 extending in a substantially radial direction between the handle outer and inner edges 56, 54. As shown more specifically in Figures 2a and 2b, the handle lateral walls 66 are typically in a spaced apart relationship relative to each other so as to define a lateral wall spacing 68 therebetween.

Each handle lateral wall 66 typically has a substantially flat configuration. Also, typically, the handle lateral walls 66 extend in a substantially parallel relationship relative to each other. It should however be understood that the handle lateral walls 66 could assume other configurations without departing from the scope of the present invention.

For example, the handle lateral walls 66 could have an outwardly concave or convex configuration, could each have separate or distinct configurations, could be in a convergent or divergent relationship relative to each

other or could assume any other suitable configuration. Typically, the lateral walls spacing 68 is adjusted so as to facilitate ergonomical grasping through a palm grip with the proximal and distal interphalangeal joints 70, 72 located in a substantially outward and proximal relationship relative to the handle lateral walls 66 on each side of the latter.

In alternative embodiments of the invention (not shown) the handle outer and inner edges 56, 58 may be defined solely by the corresponding outer and inner edges of the lateral walls 66 without any wall segments extending therebetween adjacent the handle outer and inner edges 56, 58. In the embodiments shown throughout the figures, the handle also includes an inner abutment wall 74 extending between the handle lateral walls 66 substantially adjacent the handle inner edge 58 for abuttingly contacting at least one of the opposing fingers 22. When the inner abutment wall 74 is present, the latter is typically provided with the indentations 58 formed integrally therein or superposed thereon.

In the embodiments shown throughout the figures, the handle 30 is also provided with an outer abutment wall 76 extending between the handle lateral wall 66 substantially adjacent or in register with the handle outer edge 56 for abuttingly contacting the palm 14 of the hand 12. When the outer abutment wall 76 is present, the thumb rest 62 typically extends integrally therefrom or is superposed thereon.

As illustrated more specifically in Figures 1, 2a and 2b, the handle 30 is optionally further provided with handle grooves 78 formed on the outer surface of the handle lateral walls 66 and/or the outer abutment wall 76. The handle grooves 78 typically extend in a generally radial direction.

As illustrated more specifically in Fig. 12, the handle 30 may be provided with a differently textured palm contacting segment 80 for facilitating ergonomical grasping thereof. In such instances, the handle grooves 78 may be formed in the palm contacting segment 80. The handle grooves 78 typically improve the overall structural rigidity of the handle 30 while increasing the frictional coefficient of the latter as well as providing a pleasing visual effect.

When both an inner and an outer abutment wall 74, 76 are present, the handle lateral wall 66 together with the handle inner and outer abutment walls 74, 76 substantially encompass at least a portion of the inner arc segment 46. As shown more specifically in Fig. 4, the cutting implement 10 typically further includes an end wall 82 extending across the handle channel 42 adjacent each of the channel ends 44.

Each end wall 82 extends between corresponding portions of the inner and outer abutment walls 74, 76 and between corresponding segments of the handle lateral wall 66. Each end wall 82 is provided with a corresponding end wall aperture 84 extending therethrough for allowing through passage therein of the blade 26.

In the embodiments shown throughout the figures, the cutting implement 10 further includes a casing bridging section 86 extending substantially diametrically between the handle end segments 32 giving the casing 28 a substantially D-shaped configuration. The casing bridging section 86 provides a contact prevention means for preventing the hand 12 from coming into contact with the outer arc segment 48 when the hand 12 grasps the handle 30. The handle bridging section 86 also increases the structural rigidity of the casing 28.

The handle bridging section 86 further allows for a more cognitively ergonomic visual assessment of the handle 30 since it provides a visual reference structure facilitating insertion of part of the hand 12 through the casing aperture 88 defined between the handle 30 and the casing bridging section 86.

5 The casing bridging section 86 also facilitates storing of the cutting implement 10 since it facilitates hooking of the latter to conventional anchoring hooks with reduced risks of having the cutting implement fall off the latter. Furthermore, the casing bridging section 86 also acts as a cutting depth limiting means by abuttingly limiting the depth of the cut made by the blade 26 during use thereof.

10 Typically, the handle bridging section 86 extends integrally into the end walls 82. Alternatively, the handle bridging section 86 may be releasably attached too the handle 30. The handle bridging section 86 defines a bridging section outer wall (90) 90 located generally opposite the handle 30. In the embodiment shown in Figs. 1 through 11, the bridging section outer wall (90) 90
15 has a substantially rectilinear configuration. In the embodiment shown in Figs. 12 through 14, the bridging section outer wall (90) 90 has a substantially convex configuration.

Also, in the embodiment shown in Figs. 1 through 11, the sides of the handle 30 and of the bridging section 86 are such that the inner arc segment
20 46 spans across substantially $2/3$ of the overall diameter of the blade 26. In the embodiment shown in Figs. 12 through 14, the size and configuration of both the handle 30 and the bridging section 86 are such that the inner arc segment 46 spans across less than $1/2$ of the overall diameter of the blade 26.

It should however be understood that the circumferential span of the
25 inner and outer arc segments 46, 48 as well as the general configuration of both

the handle 30 and the bridging section 86 could vary without departing from the scope of the present invention.

As shown more specifically in Figure 4, the casing 28 is typically made out of two casing pieces 92, 94. The casing pieces 92, 94 are selectively
5 at least partially detachable and attachable to and from each other for respectively allowing and preventing lateral access to the handle channel 42 from a direction substantially perpendicular relative to the radial orientation of the handle 30. In the embodiments shown throughout the figures, the handle pieces 92, 94 are pivotally attached together by a hinge 96 about their respective
10 apexes.

The handle pieces 92, 94 are pivotally attached so as to be pivotable relative to each other between a handle open configuration shown in Fig. 4 and a handle closed configuration shown in Figs. 1 through 3, 12 and 13 for respectively allowing and preventing lateral access to the handle channel 42
15 from a direction substantially perpendicular relative to the radial orientation of the handle 30.

Typically, the cutting implement 10 further includes a handle piece locking means or mechanism for selectively and reversibly locking the handle pieces 92, 94 in the handle closed configuration. The handle piece locking
20 means may take any suitable form.

For example, the handle piece locking means shown throughout the figures and illustrated in greater details in Figure 4 includes a generally L-shaped locking tongue 98 extending from a portion of the bridging section outer wall (90)
90 formed in the casing piece 92 and a corresponding locking groove 100 formed
25 in a portion of the bridging section outer wall (90) 90 of the casing piece 94. The

locking tongue 98 is resiliently deformable and configured for selective insertion of a portion thereof within the locking groove 100 when the casing pieces 92, 94 are pivoted together towards their closed configuration.

The locking tongue 98, being made of a substantially resilient
5 material, may be selectively released from the locking groove 100 to allow pivoting of the casing pieces 92, 94 towards their opened configuration. Typically, the casing pieces 92, 94 are separable about a separation line 102 extending along the inner and outer abutment walls 74, 76, the end walls 82 and the casing bridging section 86.

10 Typically, the casing 28 is provided with a wiping means positioned substantially adjacent at least one and preferably both of the end walls 82 for wiping at least a portion and preferably most of the blade 26 as the latter rotates relative to the handle channel 42. Typically, the wiping means includes at least one and preferably two blade contacting components 104 mounted within the
15 handle channel 42 or adjacent thereto so as to be in contact with the blade 26 as the latter rotates relative to the handle channel 42. The blade contacting components 104 are typically located adjacent each of the channel ends 44 for contacting the blade lateral surfaces 40 as the blade 26 rotates.

The casing 28 is typically further provided with a casing sealing
20 means positioned substantially adjacent at least one and preferably both the casing end walls apertures 84 for sealing the casing 28 so as to prevent the entry of foreign objects through the end wall apertures 84. Typically, the casing sealing means includes having both blade contacting components 104 extend across the respective blade-to-peripheral edge spacing spanning between the blade 26 and
25 the peripheral edges of the end wall apertures 84. The blade contacting

components 104 hence typically preclude entrainment of foreign objects into the handle channel 42 by the blade 26 as the latter rotates relative to the handle channel 42.

Preferably, each of the blade contacting components 104 is made
5 out of substantially resiliently deformable material. Also, preferably, each blade contacting component 104 is mounted so as to be in a resiliently compressed state when contacting the blade 26. Although the blade contacting components 104 are shown as having generally parallelepiped configurations, it should be understood that the blade contacting components 104 could have other
10 configurations without departing from the scope of the present invention.

Typically, an interrupted bridging section inner wall 106 extends in an inwardly spaced relationship relative to the bridging section outer wall (90) 90. Also, typically, bridging section spacing walls 108 extend between the bridging section inner and outer walls 106, 90 in a substantially perpendicular relationship
15 relative thereto. The bridging section inner and outer walls 106, 90 and the bridging section spacing walls 108 typically define corresponding contacting component receiving compartments 110 for receiving the blade contacting components 104.

The cutting implement 10 typically further includes a rotation
20 restraining means extending between the blade 26 and the casing 28 for allowing an intended user to selectively restrain the rotation of the blade 26 relative to the handle channel 42. The rotation restraining means may be used for selectively preventing the rotation of the blade 26 or for restraining the free rotation thereof so that the rotation of the blade 26 is slowed down or only allowed to rotate when

a predetermined rotational force applied thereto exceeds a predetermined threshold level.

The rotation restraining means may take any suitable form. Typically, in the embodiments shown throughout the figures and illustrated more specifically in Fig. 11, the rotation restraining means includes a restraining component 112 movably attached to the casing 28 for movement between a non-restraining configuration illustrated in full lines wherein the restraining component 112 is spaced relative to the blade 26 and a restraining configuration illustrated in phantom lines wherein the restraining component 112 frictionally contacts the blade 26.

Typically, a restraining component aperture 114 extends through the inner abutment wall 74 for receiving the restraining component 112 and allowing movement thereof between the non-restraining and restraining configurations. Also, typically, the restraining component 112 is pivotally attached by a restraining component hinge 116 to a segment of the inner abutment wall 74 adjacent the restraining component aperture 114 allowing for pivotal movement between the contacting and non-contacting configurations.

Furthermore, the restraining component 112 typically defines a restraining component digit contacting surface 118 for contacting at least one of the opposing fingers 22 and a substantially opposed restraining component blade contacting surface 120 for contacting the blade 26. The restraining component blade contacting surface 120 may optionally be provided with a friction-enhancing means attached thereto for enhancing the frictional force between the blade 26 and the restraining component 112 when the latter is in the restraining configuration. The friction-enhancing means may take any suitable form such as

a friction-enhancing block 122 made out of friction-enhancing material and typically releasably attached to the restraining component blade contacting surface 120 for allowing easy replacement thereof.

Typically, the restraining component 112 is positioned generally in register with the thumb rest 62 so as to allow easy and ergonomical access thereto by the index finger, part of the opposing fingers 22 of the hand 12. It should however be understood that the restraining component could be located at other locations without departing from the scope of the present invention.

Typically, the cutting implement 10 further includes a guiding means extending between the blade 26 and the casing 28 for guiding the rotational movement of the blade 26 relative to the handle channel 42. Optionally, the guiding means may also act as a friction reducing means for reducing the frictional force between the blade 26 and the casing 28 when the blade 26 rotates relative to the handle channel 42.

Various types of guiding means may be used. Figs. 4 through 6 illustrate various embodiments wherein the guiding means includes at least two and preferably three guiding components 124 extending from the casing 28. The guiding components 124 are positioned for contacting the blade inner edge 34 about distinct locations so as to prevent translational relative displacement between the blade 26 and the handle channel 42.

Typically, a main guiding component 124' is positioned adjacent the apex of the handle inner edge 34 and an auxiliary guiding component 124 is positioned adjacent each of the channel ends 44. Also, typically, the main and auxiliary guiding components 124', 124 are positioned between the handle and blade inner edges 54, 34. Furthermore, the main and auxiliary guiding

components 124', 124 typically extend between the handle lateral walls 56. Optionally, guiding components sleeves 126 extend from the inner surface of one of the handle lateral walls 66 for receiving the tip of corresponding guiding components 124 extending from the inner surface of the handle lateral wall 66
5 when the casing pieces 92, 94 are in the closed configuration.

In the embodiment shown in Fig. 4, each guiding component 124 has a generally cylindrical configuration and is substantially fixedly attached to outer surface of a corresponding handle lateral wall 66. The outer surface of the guiding components 124 may be coated or otherwise provided with a friction-
10 reducing texture.

In the embodiment shown in Fig. 5A, the guiding component 124 includes a guiding pin 128 extending substantially perpendicularly from the inner surface of one of the handle lateral wall 66 and a guiding sleeve 130 rotatably mounted on the guiding pin 128. The guiding sleeve 130 defines a guiding
15 sleeve outer surface for contacting the blade inner edge 34.

In the embodiment shown in Fig. 5B, an inner ball-bearing ring 132 is mounted between the guiding pin 128 and the guiding sleeve 130. In the embodiment shown in Fig. 5C, an outer ball-bearing ring 134 is mounted on the guiding sleeve outer surface 130 for contacting the blade inner edge 34.

20 In the embodiment shown in Fig. 5D, a guiding block 136 is mounted on the guiding pin 128. The guiding block 136 defines a guiding block outer surface provided with a guiding block groove 138 formed therein for slideably receiving the blade inner edge 34. Although the guiding block 136 is shown as having a substantially triangular cross-sectional configuration, and the
25 guiding block groove 138 is shown as being formed in one of the guiding block

apexes, it should be understood that the guiding block 136 and the guiding block groove 138 could have other configurations and locations respectively without departing from the scope of the present invention.

In the embodiments shown in Figs. 6a and 6b, the guiding sleeve
5 outer surface is provided with sleeve gear teeth 140 extending therefrom. The blade inner edge 34 is provided with complementary blade gear teeth 142 extending therefrom for operationally engaging the sleeve gear teeth 140. In the embodiment shown in Fig. 6a, the blade gear teeth 142 are formed integrally in the blade inner edge 34.

10 In the embodiment shown in Fig. 6b, the blade includes a blade lining strip 144 positionable over the blade inner edge 34. The blade lining strip 144 is provided with the blade gear teeth 142. The blade lining strip 144 is typically releasably attached to the blade inner edge 34 so as to allow easy replacement thereof in the event that the blade gear teeth 142 become worn out.

15 In the embodiments shown in Figs. 7 and 8a through 8c, the guiding means includes a guiding rail 146 extending from the casing 28. The guiding rail 146 is positioned for contacting the blade inner edge 34 so as to prevent translational relative displacement between the blade 26 and the handle channel 42.

20 In the embodiment shown in Fig. 7, the guiding rail has a circumferentially interrupted substantially annular general configuration and a substantially U-shaped cross-sectional configuration for slidably and substantially fittingly receiving the blade inner edge 34. Typically, the guiding rail 146 is positioned adjacent the handle inner abutment wall 74.

As illustrated more specifically in Figs. 8a through 8c, the guiding rail 146 typically defines a pair of guiding rail legs 148 maintained in a spaced apart relationship relative to each other by a guiding rail spacing leg 150. In the embodiment shown in Fig. 6a, at least one and preferably both guiding rail main legs 148 are provided with a main leg outer groove 152 formed on the external surface thereof for improving the structural characteristics of the guiding rail main legs 148.

In the embodiment shown in Fig. 8b, at least one and preferably both guiding rail main legs 148 are provided with a guiding rail anchoring flange 154 extending therefrom in a direction leading generally towards the other guiding rail main leg 148. Correspondingly, at least a corresponding one and preferably both blade lateral surfaces 40 are provided with an annular anchoring groove 156 formed therein for slidably and substantially fittingly receiving the guiding rail anchoring flanges 154.

It should be understood that although the guiding rail anchoring flanges 154 in the annular anchoring grooves 156 are shown as having a generally rectangular cross-sectional configuration, both the guiding rail anchoring flanges 154 and the annular anchoring grooves 156 could have other cross-sectional configurations without departing from the scope of the present invention.

In the embodiment shown in Fig. 8c, at least one and preferably both of the blade lateral surfaces 40 are provided with a blade anchoring flange 158 extending substantially outwardly therefrom. The guiding rail 146 is configured and sized for slidably and substantially fittingly receiving the blade anchoring flanges 158. Typically, each blade lateral surface 40 has a

substantially triangular blade flange 158 extending therefrom. The inner blade edge 34 hence has a substantially frusto-triangular configuration. The guiding rail main legs 148 taper towards each other in a direction leading away from the guiding rail spacing leg 150 so as to form a guiding rail 146 having a
5 corresponding frusto-triangular configuration.

In the embodiments shown in Figs. 9 and 12 through 14, the guiding means includes at least one and preferably a set of guiding components positioned for contacting at least one and preferably both of the blade lateral surfaces 40 so as to prevent translational relative displacement between the
10 blade 26 and the handle channel 42.

In the embodiments shown in Figs. 9 and 10, the guiding means includes a set of lateral cylinder bearings 160 mounted on the handle 30 for contacting both blade lateral surfaces 40. Typically, each cylinder bearing 160 includes a substantially cylindrical bearing body 162 and a bearing axle 164
15 extending from opposed longitudinal ends thereof. The casing 28 is provided with corresponding bearing axles supporting components 166 extending typically from the inner surface of the handle lateral walls 66 at the handle inner and outer edges 54, 56 for rotatably supporting the bearing axles 164.

In the embodiment shown in Figs. 12 through 14, the guiding means
20 includes a set of lateral ball-bearings 168 mounted on the handle 30 for contacting at least one and preferably both blade lateral surfaces 40. The lateral ball-bearings are preferably mounted in corresponding lateral ball-bearing tracks 170 extending from the inner surface of the handle lateral walls 66.

As illustrated more specifically in Fig. 3, the cutting implement 10
25 optionally further includes a blade cover 172 releasably attachable to the casing

28 for selectively covering at least a portion and preferably most of the outer arc segment 48. Typically, the blade cover 172 includes a circumferentially interrupted substantially annular blade covering sleeve 174 provided with attachment flanges 176 at each end thereof. The attachment flanges 176 are
5 configured and sized for substantially fittingly receiving and frictionally retaining a segment of the casing 28 insertable therein. Prehension tongues 178 typically extend laterally from the prehension sleeve for facilitating manipulation of the blade cover 172.

In use, the cutting implement 10 is preferably manipulated using the
10 palm or power grip wherein the opposing fingers 22 extend at least partially through the casing aperture 88 to maintain the palm 14 against the palm abutment surface. Hence, typically, a covered or inner arc segment 46 is held by the hand 12 using the handle 30.

The present invention also relates to a method for allowing an
15 intended user to cut an object using the hereinabove described cutting implement. The method involves holding the covered arc segment 46 using the handle 30 and moving the blade peripheral cutting edge 38 across at least a portion of the object. Typically, the covered arc segment 46 is held by grasping the handle 30 with at least a portion of the hand 12 inserted in the inner blade
20 aperture 88. Also, preferably, the handle is grasped using a palm or power grip.

The peripheral cutting edge 38 may be moved across at least a portion of the object by rotating the covered arc segment 46 relative to the handle 30. Hence, the cutting implement 10 may be used as a rotary knife providing a cutting action substantially similar to that of a conventional pizza knife.

Alternatively, the blade peripheral cutting edge 38 may be moved across at least a portion of the object while maintaining the covered arc segment 46 stationary relative to the handle 30. In such instances, the rotation restraining means is typically used to prevent the rotation of the blade 26 relative to the handle channel 42. The cutting implement 10 may then be used as a slicing
5 knife, a mezzaluna-type knife, a chopper or other type of knife wherein the blade is substantially stationary relative to the handle.

The rotation restraining means allows for the knife to be selectively used as a rotary or non-rotary knife. Also, the rotation of the blade 26 relative to
10 the handle channel 42 may be partially restrained while still allowing rotation thereof against a resistive force when the latter reaches a predetermined threshold. In such situations, the rotation restraining component 112 is put into contact with the blade 26 so as to provide a frictional braking force without preventing rotation of the latter.

The casing 28 may be made out of any suitable material including a suitable food graded polymeric resin. The casing 28 is typically manufactured using a suitable manufacturing process such as a conventional injection molding or a thermoforming manufacturing process. The cutting blade 26 may be made
15 out of any suitable material such as high carbon steel, high carbon stainless steel, stainless steel, titanium, ceramic, a polymeric resin or any other suitable
20 material. The cutting blade 10 may be manufactured using a conventional manufacturing process such as being forged, stamped, sintered or otherwise manufactured. The blade contacting components 104 are typically manufactured using a suitable resilient material such as a suitable elastomeric or spongy
25 material.

I claim:

1. A cutting implement (10), said cutting implement (10) being operable by a hand (12) of an intended user, said hand (12) having digits including a thumb (20) extending from a palm (14), said cutting implement (10) comprising:
5 a substantially annular blade (26) and a casing (28), said casing (28) defining a handle (30), said handle (30) defining a pair of substantially opposed handle end segments (32), said handle (30) having a handle channel (42) extending therethrough between said handle end segments (32), said handle channel (42) defining a pair of corresponding opposed channel ends (44); said blade (26) defining an inner arc segment (46) extending through said handle channel (42) and an integrally extending outer arc segment (48) extending outwardly from said casing (28); said blade (26) defining a blade (26) rotation axis and being rotatably mounted within said handle channel (42) for rotation relative thereto.
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2. A cutting implement (10) as recited in claim 1 further comprising a rotation restraining means extending between said blade (26) and said casing (28) for allowing said intended user to selectively restrain the rotation of said blade (26) relative to said handle channel (42).
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3. A cutting implement (10) as recited in claim 1 further comprising a guiding means extending between said blade (26) and said casing (28) for guiding the rotational movement of said blade (26) relative to said handle channel (42) and preventing translational relative movement therebetween.
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4. A cutting implement (10) as recited in claim 3 wherein said guiding means also acts as a friction reducing means for reducing the frictional force between said blade (26) and said casing (28) when said blade (26) rotates relative to said handle channel (42).

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5. A cutting implement (10) as recited in claim 1 wherein said casing (28) is provided with a wiping means extending therefrom for wiping at least a portion of said blade (26) as said blade (26) rotates relative to said handle channel (42).

10 6. A cutting implement (10) as recited in claim 1 wherein said casing (28) is provided with a casing sealing means extending therefrom for sealing said handle channel (42) so as to prevent the entry of foreign objects therein.

15 7. A cutting implement (10) as recited in claim 1 wherein said casing (28) also includes a contact prevention means extending from said handle (30) for preventing said hand (12) from coming into contact with said outer arc segment (48) when said hand (12) grasps said handle (30).

20 8. A cutting implement (10) as recited in claim 7 wherein said contact prevention means includes a casing bridging section (86) extending substantially diametrically between said handle end segments (32) so that said casing (28) has a substantially "D"-shaped configuration.

25 9. A cutting implement (10) as recited in claim 8 wherein said handle (30) defines a radially innermost located handle inner edge (58) and a radially outermost

located handle outer edge (56), said blade (26) defining a radially innermost located blade inner edge (34) and a substantially opposed and radially outermost located blade outer edge (36), said handle inner edge (58) being located radially inwardly relative to said blade inner edge (34) and said handle outer edge (56) being located radially outwardly relative to said blade outer edge (36); said handle (30) including a pair of handle lateral walls (66) extending in a substantially radial direction between said handle outer and inner edges (56) and (58), said handle lateral walls (66) being in a spaced apart relationship relative to each other so as to define a lateral wall spacing therebetween; said casing (28) including both an inner and an outer abutment wall (74) and (76) extending between said handle lateral walls (66) respectively adjacent said handle inner and outer edges (56) and (58) for abuttingly contacting respectively at least one of said digits and said palm (14), said inner and outer abutment walls (74) and (76) and said handle lateral walls (66) substantially protectively encompassing at least a portion of said inner arc segment (46); said casing (28) including an end wall (82) extending across said handle channel (42) adjacent each of said channel ends (44), each of said end walls (82) extending between corresponding portions of said inner and outer abutment walls (74) and (76) and between corresponding segments of said handle lateral walls (66), each of said end walls (82) being provided with a corresponding end wall aperture (84) extending therethrough for allowing passage therein of said blade (26); said casing (28) also including a casing bridging section (86) extending substantially diametrically between substantially opposed segments of said handle (30) gripping section located substantially adjacent said channel ends (44) so that said handle (30) has a

substantially "D"-shaped configuration; said handle (30) bridging section extends integrally into said end walls (82).

10. A cutting implement (10) as recited in claim 8 wherein said casing bridging
5 section (86) defines a bridging section outer wall (90), said bridging section outer wall (90) located generally opposite said handle (30), said bridging section outer wall (90) having a substantially rectilinear configuration.

11. A cutting implement (10) as recited in claim 10 wherein said casing bridging
10 section (86) has a substantially arcuate configuration, said casing bridging section (86) defining a bridging section outer wall (90) located generally opposite said handle (30), the orientation of said bridging section (86) being such that said bridging section outer wall (90) has a substantially convex configuration.

15 12. A cutting implement (10) as recited in claim 1 wherein said casing (28) is made out of two casing pieces (92) and (94), said casing pieces (92) and (94) being selectively at least partially detachable and attachable for respectively allowing and preventing lateral access to said handle channel (42) from a
20 direction substantially perpendicular relative to the radial orientation of said handle (30).

13. A cutting implement (10) as recited in claim 1 wherein said handle (30) is configured and sized so as to be graspable using a palm grip wherein said digits maintain said handle (30) against said palm (14).

14. A cutting implement (10) as recited in claim 1 wherein said handle (30) has a circumferentially interrupted substantially annular configuration extending within a predetermined circumferential range between said handle end segments (32), said handle channel (42) having a corresponding circumferentially interrupted
5 substantially annular configuration.

15. A cutting implement (10) as recited in claim 14 wherein said handle (30) defines a radially innermost located handle inner edge (58) and a radially outermost located handle outer edge (56), said blade (26) defining a radially
10 innermost located blade inner edge (34) and a substantially opposed and radially outermost located blade outer edge (36), said handle inner edge (58) being located radially inwardly relative to said blade inner edge (34) and said handle outer edge (56) being located radially outwardly relative to said blade outer edge (36).

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16 A cutting implement (10) as recited in claim 15 wherein said handle inner edge (58) has a substantially arcuate configuration.

17. A cutting implement (10) as recited in claim 15 wherein said handle inner
20 edge (58) is provided with at least one indentation (58) formed therein for receiving at least one of said digits.

18. A cutting implement (10) as recited in claim 15 wherein said handle inner
25 edge (58) has a generally arcuate configuration and is provided with a set of indentations (58) formed therein for receiving at least some of said digits.

19. A cutting implement (10) as recited in claim 15 wherein said handle outer edge (56) has a substantially arcuate configuration.

5 20. A cutting implement (10) as recited in claim 19 wherein said handle outer edge (56) is configured and sized for substantially fittingly abutting against said palm (14) of said hand (12) when the latter grips said handle (30).

21. A cutting implement (10) as recited in claim 15 wherein said handle outer
10 edge (56) is provided with a thumb rest (62) extending therefrom for supporting said thumb (20).

22. A cutting implement (10) as recited in claim 15 wherein said handle outer
edge (56) has a substantially arcuate configuration curving in a first curve
15 direction, said handle outer edge (56) being provided with a thumb rest (62) extending therefrom for supporting said thumb (20), said thumb rest (62) defining a thumb abutment surface (64), said thumb abutment surface (64) having a generally arcuate configuration curving in a second curve direction substantially opposite said first curve direction.

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23. A cutting implement (10) as recited in claim 15 wherein said handle (30) includes a pair of handle lateral walls (66) extending in a substantially radial direction between said handle (30) outer and inner edges (56) and (58), said handle lateral walls (66) being in a spaced apart relationship relative to each
25 other so as to define a lateral wall spacing therebetween.

24. A cutting implement (10) as recited in claim 23 wherein each of said handle lateral walls (66) has a substantially flat configuration and wherein said handle lateral walls (66) extend in a substantially parallel relationship relative to each other.

25. A cutting implement (10) as recited in claim 23 wherein said handle (30) also includes an inner abutment wall (74) extending between said handle lateral walls (66) substantially adjacent said handle inner edge (58) for abuttingly contacting at least one of said digits.

26. A cutting implement (10) as recited in claim 25 further comprising a rotation restraining means extending between said blade (26) and said casing (28) for allowing said intended user to selectively restrain the rotation of said blade (26) relative to said handle channel (42), said rotation restraining means including a restraining component (112) pivotally attached to said casing (28) for movement between a non-restraining configuration wherein said restraining component (112) is spaced relative to said blade (26) and a restraining configuration wherein said restraining component (112) frictionally contacts said blade inner edge (34), said restraining component (112) defining a restraining component (112) digit contacting surface for contacting at least one of said digits and a substantially opposed restraining component blade contacting surface for contacting said blade inner edge (34), said inner abutment wall (74) being provided with a component receiving aperture formed therein for receiving said restraining

component (112) and allowing movement thereof between said non-restraining and restraining configurations.

27. A cutting implement (10) as recited in claim 25 wherein said inner abutment wall (74) is provided with at least one indentation (58) formed therein for receiving at least one of said digits.

28. A cutting implement (10) as recited in claim 23 wherein said handle (30) also includes an outer abutment wall (76) extending between said handle lateral walls (66) substantially adjacent said handle outer edge (56) for abuttingly contacting said palm (14) of said hand (12).

29. A cutting implement (10) as recited in claim 28 wherein said outer abutment wall (76) is provided with a thumb rest (62) extending therefrom.

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30. A cutting implement (10) as recited in claim 23 wherein said handle (30) also includes both an inner and an outer abutment wall (74) and (76) extending between said handle lateral walls (66) respectively adjacent said handle inner and outer edges (56) and (58) for abuttingly contacting respectively at least one of said digits and said palm (14), said inner and outer abutment walls (74) and (76) and said handle lateral walls (66) substantially protectively encompassing at least a portion of said inner arc segment (46).

31. A cutting implement (10) as recited in claim 30 further comprising an end wall (82) extending across said handle channel (42) adjacent each of said channel

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ends (44), each of said end walls (82) extending between corresponding portions of said inner and outer abutment walls (74) and (76) and between corresponding segments of said handle lateral walls (66), each of said end walls (82) being provided with a corresponding end wall aperture (84) extending therethrough for
5 allowing passage therein of said blade (26).

32. A cutting implement (10) as recited in claim 31 further comprising a casing bridging section (86) extending substantially diametrically between said handle end segments (32) so that said casing (28) has a substantially "D"-shaped
10 configuration, said casing (28) being made out of two casing pieces (92) and (94), said casing pieces (92) and (94) being selectively at least partially detachable and attachable for respectively allowing and preventing lateral access to said handle channel (42) from a direction substantially perpendicular relative to the radial orientation of said handle (30), said casing pieces (92) and (94) being
15 separable about a separation lines extending along said inner and outer abutment walls (74) and (76), said end walls (82) and said casing bridging section (86).

33. A cutting implement (10) as recited in claim 31 wherein said casing (28) is
20 provided with a wiping means positioned substantially adjacent at least one of said end walls (82) for wiping at least a portion of said blade (26) as the latter rotates relative to said handle channel (42).

34. A cutting implement (10) as recited in claim 33 wherein said wiping means
25 includes a blade (26) contacting component mounted within said handle channel

(42) so as to be in contact with said blade (26) as the latter rotates relative to said handle channel (42).

35. A cutting implement (10) as recited in claim 34 wherein said blade (26)

5 defines a pair of opposed blade (26) lateral surfaces, said wiping means including a pair of blade contacting components (40) mounted in said handle channel (42) adjacent each of said channel ends (44) for contacting said blade (26) lateral surfaces as said blade (26) rotates relative to said handle channel (42).

10 36. A cutting implement (10) as recited in claim 31 wherein said casing (28) is provided with a casing sealing means positioned substantially adjacent at least one of said end wall apertures (84) for sealing said casing (28) so as to prevent the entry of foreign objects through said at least one end wall aperture (84).

15 37. A cutting implement (10) as recited in claim 36 wherein said blade (26) defines a pair of opposed blade (26) lateral surfaces and wherein each of said end wall apertures (84) defines a corresponding end wall aperture (84) peripheral edge, said blade (26) being spaced from each of said end wall aperture (84)s by a corresponding blade (26)-to-peripheral edge spacing, said handle (30) sealing
20 means including a pair of blade contacting components (40) mounted in said handle channel (42) adjacent each of said channel ends (44) so as to substantially extend across said blade (26)-to-peripheral edge spacings.

38. A cutting implement (10) as recited in claim 36 wherein each of said blade
25 contacting components (40) is made out of a substantially resiliently deformable

material, said blade contacting components (40) being mounted so as to be in a compressed state when contacting said blade (26).

39. A cutting implement (10) as recited in claim 15 further comprising a rotation
5 restraining means extending between said blade (26) and said casing (28) for
allowing said intended user to selectively restrain the rotation of said blade (26)
relative to said handle channel (42), said rotation restraining means including a
restraining component (112) movably attached to said casing (28) for movement
10 between a non-restraining configuration wherein said restraining component
(112) is spaced relative to said blade (26) and a restraining configuration wherein
said restraining component (112) frictionally contacts said blade (26).

40. A cutting implement (10) as recited in claim 39 wherein said restraining
component (112) is pivotally attached to said casing (28) substantially adjacent
15 said handle inner edge (58) for pivotal movement between said non-restraining
and restraining configurations, said restraining component (112) frictionally
contacting said blade inner edge (34) when in said restraining configuration.

41. A cutting implement (10) as recited in claim 39 wherein said restraining
20 component (112) defines a restraining component (112) digit contacting surface
for contacting at least one of said digits and a substantially opposed restraining
component (112) blade (26) contacting surface for contacting said blade (26),
said restraining component (112) blade (26) contacting surface being provided
with a friction enhancing means attached thereto for enhancing the frictional force

between said blade (26) and said restraining component (112) when the latter is in said restraining configuration.

42. A cutting implement (10) as recited in claim 15 further comprising a guiding
5 means extending between said blade (26) and said casing (28) for guiding the
rotational movement of said blade (26) relative to said handle channel (42), said
guiding means including at least two guiding components extending from said
casing (28), said guiding components being positioned for contacting said blade
10 inner edge (34) about distinct locations so as to prevent translational relative
displacement between said blade (26) and said handle channel (42).

43. A cutting implement (10) as recited in claim 42 wherein said handle inner
edge (58) defines a handle inner edge (58) apex, said guiding means including a
main guiding component (124') positioned substantially adjacent said handle
15 inner edge (58) apex and an auxiliary guiding component (124) positioned
adjacent each of said channel ends (44), said main and auxiliary guiding
components (124') and (124) being positioned between said handle and blade
inner edges (58) and (34).

20 44. A cutting implement (10) as recited in claim 23 wherein said handle inner
edge (58) defines a handle inner edge apex, said cutting implement (10) further
comprising a guiding means extending between said blade (26) and said casing
(28) for guiding the rotational movement of said blade (26) relative to said handle
channel (42), said guiding means including a main guiding component (124')
25 positioned substantially adjacent said handle inner edge (58) apex and an

auxiliary guiding component (124) positioned adjacent each of said channel ends (44), said main and auxiliary guiding components (124') and (124) extending between said handle lateral walls (66) and between said handle and blade inner edges (58) and (34) for contacting said blade inner edge (34) about distinct
5 locations so as to prevent translational relative displacement between said blade (26) and said handle channel (42).

45. A cutting implement (10) as recited in claim 44 wherein at least one of said guiding components includes a guiding pin (128) extending substantially
10 perpendicularly from the inner surface of one of said handle lateral walls (66) and a guiding sleeve (130) rotatably mounted on said guiding pin (128), said guiding sleeve (130) defining a guiding sleeve outer surface.

46. A cutting implement (10) as recited in claim 45 further comprising a ball-
15 bearing ring (134) mounted between said guiding pin (128) and said guiding sleeve (130).

47. A cutting implement (10) as recited in claim 45 further comprising a ball-
20 bearing ring (134) mounted on said guiding sleeve (130) outer surface.

48. A cutting implement (10) as recited in claim 45 wherein said guiding sleeve (130) outer surface is provided with sleeve gear teeth (140) extending therefrom, said blade inner edge (34) being provided with complementary blade gear teeth (142) extending therefrom for engaging said sleeve gear teeth (140).
25

49. A cutting implement (10) as recited in claim 48 wherein said blade gear teeth (142) are formed integrally in said blade inner edge (34).

50. A cutting implement (10) as recited in claim 48 wherein said blade (26)
5 includes a blade lining strip (144) positionable over said blade inner edge (34),
said blade lining strip (144) being provided with said blade gear teeth (142).

51. A cutting implement (10) as recited in claim 44 wherein at least one of said
guiding components includes a guiding pin (128) extending substantially
10 perpendicularly from the inner surface of one of said handle lateral walls (66) and
a guiding block (136) mounted on said guiding pin (128), said guiding block (136)
defining a guiding block (136) outer surface, said guiding block (136) outer
surface being provided with a guiding block groove (138) formed therein for
slidably receiving said blade inner edge (34).

15

52. A cutting implement (10) as recited in claim 15 further comprising a guiding
means extending between said blade (26) and said casing (28) for guiding the
rotational movement of said blade (26) relative to said handle (30), said guiding
means including a guiding rail (146) extending from said casing (28), said guiding
20 rail (146) being positioned for contacting said blade inner edge (34) so as to
prevent translational relative displacement between said blade (26) and said
handle channel (42).

53. A cutting implement (10) as recited in claim 52 wherein said guiding rail (146)
25 has a circumferentially interrupted substantially annular general configuration and

a substantially "U"-shaped cross-sectional configuration for slidably and substantially fittingly receiving said blade inner edge (34).

54. A cutting implement (10) as recited in claim 53 wherein said blade (26)
5 defines a pair of opposed blade (26) lateral surfaces, said guiding rail (146)
defining a pair of guiding rail main legs (148) maintained in a spaced apart
relationship relative to each other by a guiding rail spacing leg (150), at least one
of said guiding rail main legs (148) having a guiding rail anchoring flange (158)
extending therefrom in a direction leading generally towards the other guiding rail
10 main leg (148), a corresponding one of said blade (26) lateral surfaces being
provided with an annular anchoring groove (156) formed therein for slidably and
substantially fittingly receiving said guiding rail anchoring flange (158).

55. A cutting implement (10) as recited in claim 53 wherein said blade (26)
15 defines a pair of opposed blade lateral surfaces (40), said guiding rail (146)
defining a pair of guiding rail main legs (148) maintained in a spaced apart
relationship relative to each other by a guiding rail spacing leg (148), at least one
of said blade lateral surfaces (40) having a blade anchoring flange (158)
extending substantially outwardly therefrom, said guiding rail (146) being
20 configured and sized for slidably and substantially fittingly receiving said blade
anchoring flange (158).

56. A cutting implement (10) as recited in claim 55 wherein each of said blade
lateral surfaces (40) has a substantially triangular blade flange (158) extending
25 therefrom, said inner blade (26) edge having a substantially frusto-triangular

configuration, said guiding rail main legs (148) tapering towards each other in a direction leading away from said guiding rail spacing leg (148) so as to form a guiding rail (146) having a corresponding frusto-triangular configuration.

5 57. A cutting implement (10) as recited in claim 15 wherein said blade (26) defines a pair of opposed blade lateral surfaces (40), said cutting implement (10) further comprising a guiding means extending between said blade (26) and said casing (28) for guiding the rotational movement of said blade (26) relative to said handle channel (42), said guiding means including at least one guiding
10 component extending from said handle (30), said guiding component being positioned for contacting at least one of said blade lateral surfaces (40) so as to prevent translational relative displacement between said blade (26) and said handle channel (42).

15 58. A cutting implement (10) as recited in claim 57 wherein said guiding means includes a set of lateral ball-bearings (168) mounted on said handle (30) for contacting one of said blade lateral surfaces (40).

59. A cutting implement (10) as recited in claim 58 wherein said handle (30) gripping section also includes a pair of handle lateral walls (66) extending in a
20 substantially radial direction between said handle (30) outer and inner edges (56) and (58), said handle lateral walls (66) being in a spaced apart relationship relative to each other so as to define a lateral wall spacing therebetween, said lateral ball-bearings (168) are mounted in a lateral ball-bearing track (170)
25 extending from a corresponding one of said handle lateral walls (66).

60. A cutting implement (10) as recited in claim 57 wherein said guiding means includes a set of lateral cylinder-bearings (160) mounted on said handle (30) for contacting one of said blade lateral surfaces (40).

5

61. A cutting implement (10) as recited in claim 60 wherein each of said cylinder-bearings (160) includes a substantially cylindrical bearing body (162) and a bearing axle (164) extending from opposed longitudinal ends thereof, said casing (28) being provided with corresponding bearing axle supporting components (166) extending therefrom adjacent said handle inner and outer edges (56) and (58) for rotatably supporting said bearing axles (164).

62. A cutting implement (10) as recited in claim 1 further comprising a blade cover (172) releasably attachable to said casing (28) for selectively covering at least a portion of said outer arc segment (48).

63. A cutting implement (10), said cutting implement (10) being operable by a hand (12) of an intended user, said hand (12) having digits extending from a palm (14), said cutting implement (10) comprising:

20 a casing (28), said casing (28) defining a casing (28) outer peripheral edge, said casing (28) having a casing aperture (88) extending therethrough, said casing aperture (88) being positioned so as to be spaced from said casing (28) outer peripheral edge by a handle (30) allowing said casing (28) to be grasped thereby with at least some of said digits extending at least partially through said casing

25 aperture (88), said casing (28) also having a casing (28) slot formed therein; said

cutting implement (10) also including a substantially annular blade (26), said blade (26) defining an inner arc segment (46) extending through said handle (30) and an outer arc segment (48) extending outwardly from said casing (28) through said casing (28) slot; said blade (26) being rotatably attached to said casing (28)
5 so that said inner arc segment (46) is rotatable through said handle (30).

64. A cutting implement (10) as recited in claim 63 wherein said handle (30) defines a palm abutment surface for abuttingly contacting said palm (14), said handle (30) being graspable using a palm (14) grip wherein said digits extending
10 at least partially through said casing aperture (88) maintain said palm (14) abutment surface against said palm (14).

65. A cutting implement (10) as recited in claim 64 wherein said casing (28) slot includes a pair of slot segments positioned in a spaced apart relationship relative
15 to each other and in a substantially opposite relationship relative to said palm (14) abutment surface.

66. A cutting implement (10) as recited in claim 66 wherein said handle (30) has substantially the general configuration of an annular segment.
20

67. A cutting implement (10) as recited in claim 65 wherein said handle (30) covers substantially two-thirds of the circumference of said blade (26).

68. A cutting implement (10) as recited in claim 63 further comprising a rotation
25 restraining means extending between said blade (26) and said casing (28) for

allowing said intended user to selectively restrain the rotation of said blade (26) relative to said handle (30).

69. A cutting implement (10) as recited in claim 63 further comprising a guiding
5 means extending between said casing (28) and said handle (30) for guiding the rotational movement of said blade (26) relative to said handle (30) and preventing translational relative movement therebetween.

70. A cutting implement (10) as recited in claim 69 wherein said guiding means
10 also acts as a friction reducing means for reducing the frictional force between said blade (26) and said handle (30) when said blade (26) rotates relative to said handle (30).

71. A cutting implement (10) as recited in claim 63 wherein said casing (28) is
15 provided with a wiping means extending therefrom for wiping at least a portion of said blade (26) as said blade (26) rotates relative to said handle (30).

72. A cutting implement (10) as recited in claim 63 wherein said casing (28) is
20 provided with a casing sealing means extending therefrom for sealing said handle (30) so as to prevent the entry of foreign objects therein.

73. A cutting implement (10) as recited in claim 63 wherein said casing (28) also
includes a contact prevention means extending from said handle (30) for
preventing said hand (12) from coming into contact with said outer arc segment
25 (48) when said hand (12) grasps said handle (30).

74. A cutting implement (10) as recited in claim 73 wherein said contact prevention means includes a casing bridging section (86) extending substantially diametrically between handle end segments (32) so that said casing (28) has a
5 substantially "D"-shaped configuration.

75. A cutting implement (10) as recited in claim 63 wherein said casing (28) is made out of two casing pieces (92) and (94), said casing pieces (92) and (94) being selectively at least partially detachable and attachable for respectively
10 allowing and preventing lateral access to said handle (30) from a direction substantially perpendicular relative to the radial orientation of said handle (30).

76. A cutting implement (10) as recited in claim 63 further comprising a blade cover (172) releasably attachable to said casing (28) for selectively covering at
15 least a portion of said outer arc segment (48).

77. A cutting implement (10) comprising:
an annular blade (26) rotatably mounted in a handle (30) having substantially the shape of an annular segment so as to define an inner arc segment (46) located
20 within said handle (30) and an outer arc segment (48) located outside of said handle (30).

78. A cutting implement (10) as recited in claim 77 wherein said handle (30) covers substantially two-thirds of the circumference of said blade (26).

79. A cutting implement (10) as recited in claim 77 further comprising a rotation restraining means extending between said blade (26) and said handle (30) for allowing said intended user to selectively restrain the rotation of said blade (26) relative to said handle (30).

5

80. A cutting implement (10) as recited in claim 77 further comprising a guiding means extending between said handle (30) and said blade (26) for guiding the rotational movement of said blade (26) relative to said handle (30) and preventing translational relative movement therebetween.

10

81. A cutting implement (10) as recited in claim 80 wherein said guiding means also acts as a friction reducing means for reducing the frictional force between said blade (26) and said handle (30) when said blade (26) rotates relative to said handle (30).

15

82. A cutting implement (10) as recited in claim 77 wherein said handle (30) is provided with a wiping means extending therefrom for wiping at least a portion of said blade (26) as said blade (26) rotates relative to said handle (30).

20

83. A cutting implement (10) as recited in claim 77 wherein said handle (30) is provided with a handle (30) sealing means extending therefrom for sealing said handle (30) so as to prevent the entry of foreign objects therein.

25

84. A cutting implement (10) as recited in claim 77 wherein said handle (30) also includes a contact prevention means extending from said handle (30) for

preventing said hand (12) from coming into contact with said outer arc segment (48) when said hand (12) grasps said handle (30).

85. A cutting implement (10) as recited in claim 84 wherein said contact
5 prevention means includes a bridging section (86) extending substantially diametrically between handle end segments (32).

86. A cutting implement (10) as recited in claim 77 wherein said handle (30) is
made out of two handle pieces (92) and (94), said handle pieces (92) and (94)
10 being selectively at least partially detachable and attachable for respectively allowing and preventing lateral access to said handle (30) from a direction substantially perpendicular relative to the radial orientation of said handle (30).

87. A cutting implement (10) as recited in claim 77 further comprising a blade
15 cover (172) releasably attachable to said handle (30) for selectively covering at least a portion of said outer arc segment (48).

88. A cutting implement (10) comprising:
- a handle (30) for allowing grasping of said cutting implement (10);
20 - a blade (26) defining a substantially annular cutting edge (38), said blade (26) being rotatably mounted to said handle (30) for rotation relative thereto;
- a rotation restraining means extending between said blade (26) and said handle (30) for selectively restraining the rotation of said blade (26) relative to said handle (30); whereby said blade (26) may be used both as a rotary cutter when

said blade (26) is allowed to rotate relative to said handle (30) and as a chopper when said blade (26) is prevented from rotating relative to said handle (30).

89. A cutting implement (10) as recited in claim 88 further comprising a guiding
5 means extending between said handle (30) and said blade (26) for guiding the rotational movement of said blade (26) relative to said handle (30) and preventing translational relative movement therebetween.

90. A cutting implement (10) as recited in claim 89 wherein said guiding means
10 also acts as a friction reducing means for reducing the frictional force between said blade (26) and said handle (30) when said blade (26) rotates relative to said handle (30).

91. A cutting implement (10) as recited in claim 88 wherein said handle (30) is
15 provided with a wiping means extending therefrom for wiping at least a portion of said blade (26) as said blade (26) rotates relative to said handle (30).

92. A cutting implement (10) as recited in claim 88 wherein said handle (30) is
made out of two handle pieces (92) and (94), said handle pieces (92) and (94)
20 being selectively at least partially detachable and attachable for respectively allowing and preventing lateral access to said handle (30) from a direction substantially perpendicular relative to the radial orientation of said handle (30).

93. A cutting implement (10) as recited in claim 88 further comprising a blade cover (172) releasably attachable to said handle (30) for selectively covering at least a portion of said blade (26).

5 94. A cutting implement (10) comprising:

- a handle (30), said handle (30) having a circumferentially interrupted substantially toroid configuration extending within a predetermined circumferential range between a pair of opposed handle (30) circumferential ends, said handle (30) defining a radially innermost located handle inner edge (58) and a

10 substantially opposed and radially outermost located handle outer edge (56), said handle (30) defining a corresponding handle channel (42) extending therethrough, said handle channel (42) having a corresponding circumferentially interrupted substantially toroid configuration;

- a substantially toroidal blade (26), said blade (26) being defining a blade (26) rotation axis, said blade (26) being mounted within said handle channel (42) so as to define an outer arc segment (48) extending outwardly from said handle (30) between said handle (30) circumferential ends and an integrally extending inner arc segment (46) extending within said handle channel (42), said blade (26) being rotatably mounted within said handle channel (42) so as to allow said blade (26) to rotate relative thereto about said blade (26) rotation axis.

15
20

95. A cutting implement (10) for cutting an object, said cutting implement (10) comprising:

an annular blade (26) defining a blade (26) aperture extending therethrough and
25 an outer blade (26) peripheral cutting edge (38), said cutting implement (10) also

including a handle (30) covering a covered arc segment of said blade (26) while allowing an outer arc segment (48) of said blade (26) to protrude therefrom, said covered arc segment being rotatably mounted within said handle (30).

- 5 96. A method for allowing an intended user having a hand (12) to cut an object using a cutting implement (10), said cutting implement (10) including an annular blade (26) defining a blade (26) aperture extending therethrough and an outer blade (26) peripheral cutting edge (38), said cutting implement (10) also including
- 10 a handle (30) covering a covered arc segment of said blade (26) while allowing an outer arc segment (48) of said blade (26) to protrude therefrom, said covered arc segment being rotatably mounted within said handle (30), said method comprising:
- holding said covered arc segment using said handle (30);
 - moving said blade (26) peripheral cutting edge (38) across at least a portion of
- 15 said object.

97. A method as recited in claim 96 wherein said covered arc segment is held by grasping said handle (30) with at least a portion of said hand (12) inserted in said blade (26) aperture.

20

98. A method as recited in claim 97 wherein said handle (30) is grasped using a palm (14) grip.

99. A method as recited in claim 96 wherein said blade (26) peripheral cutting edge (38) is moved across at least a portion of said object by rotating said covered arc segment relative to said handle (30).

- 5 100. A method as recited in claim 96 wherein said blade (26) peripheral cutting edge (38) is moved across at least a portion of said object while maintaining said covered arc segment stationary relative to said handle (30).

10

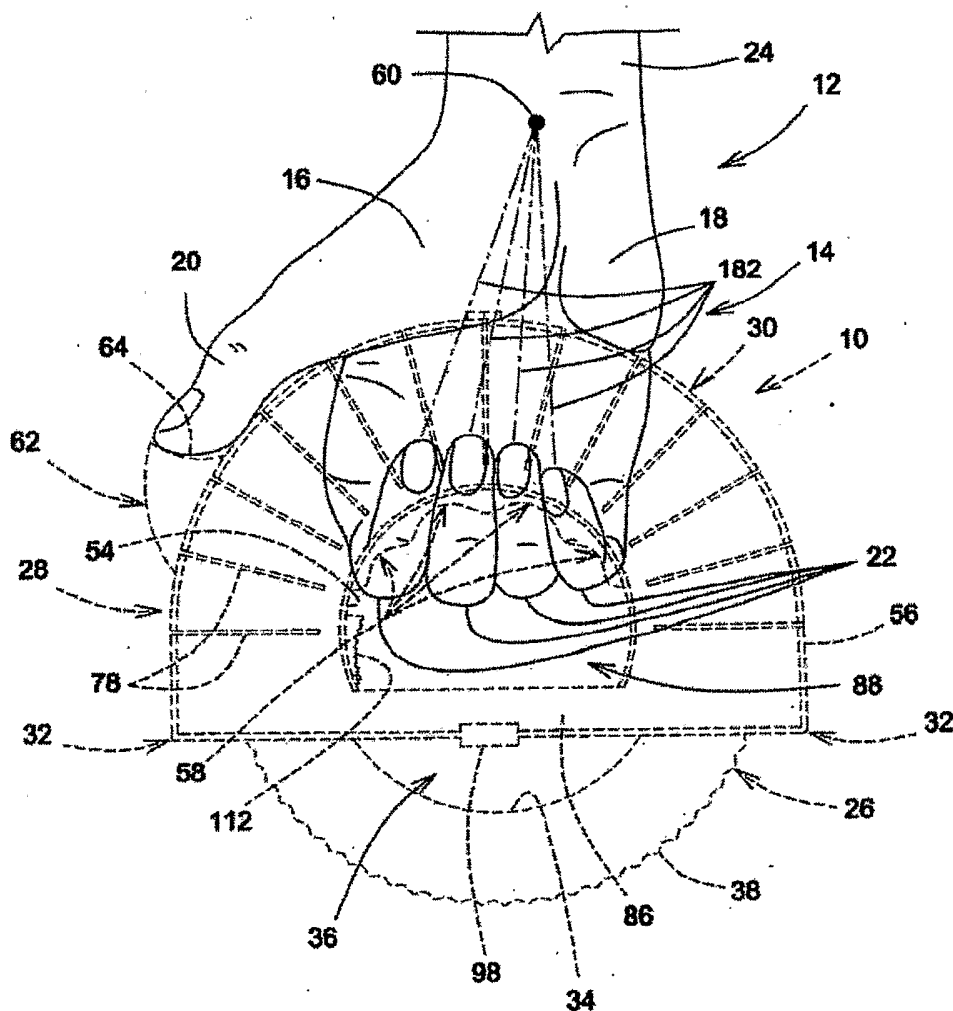


FIG. 1

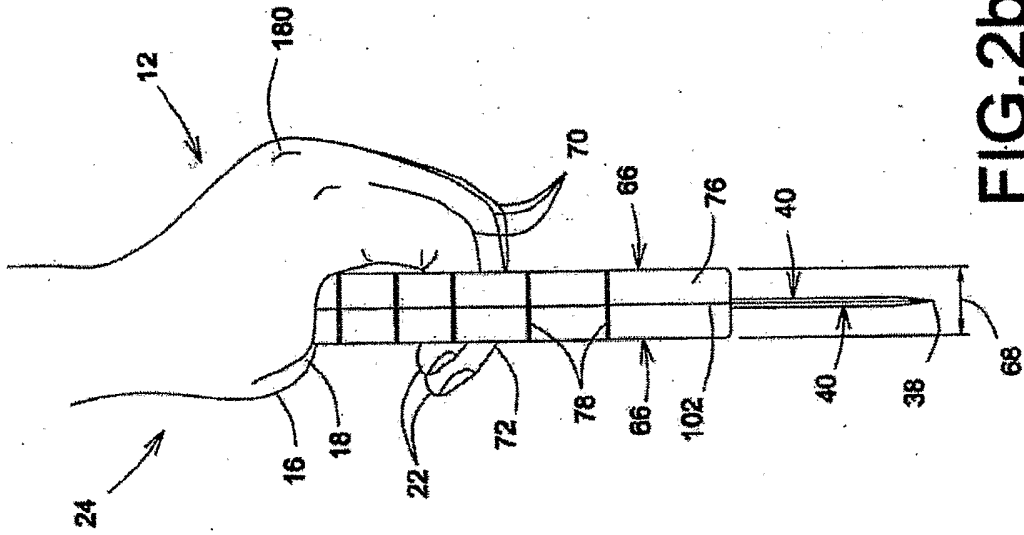


FIG. 2b

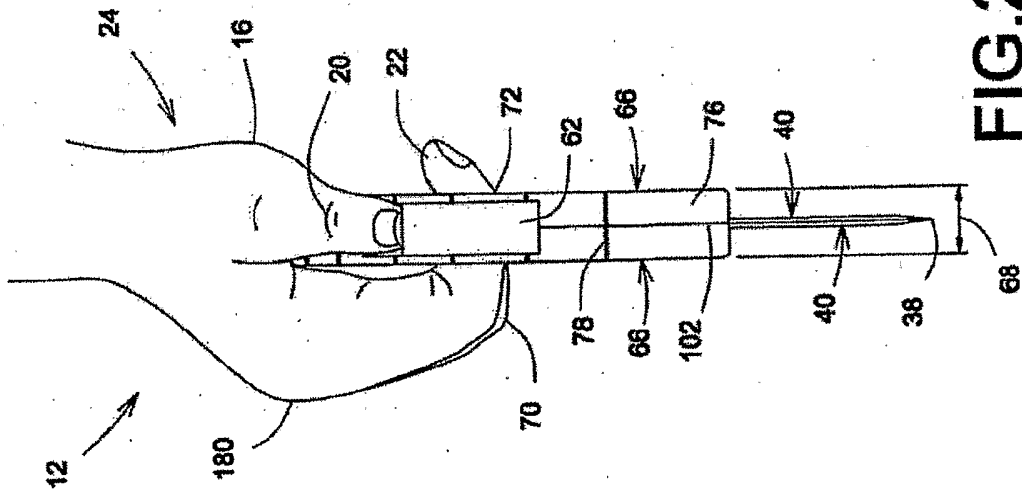


FIG. 2a

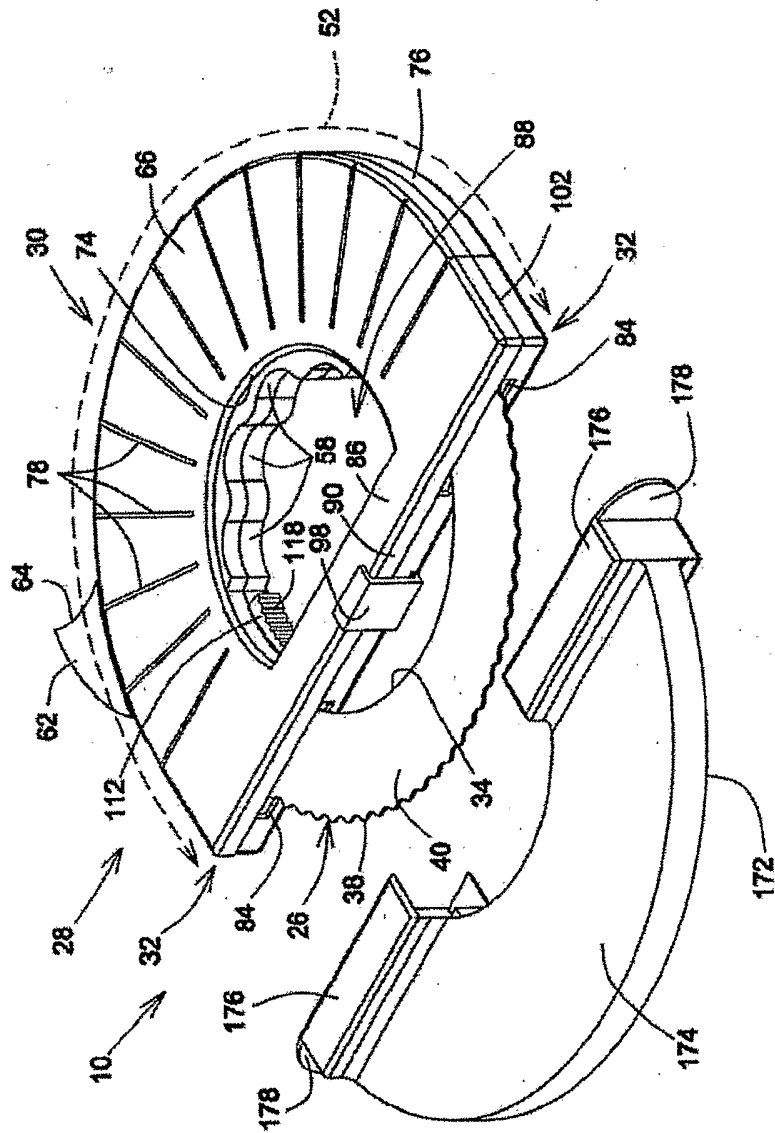


FIG.3

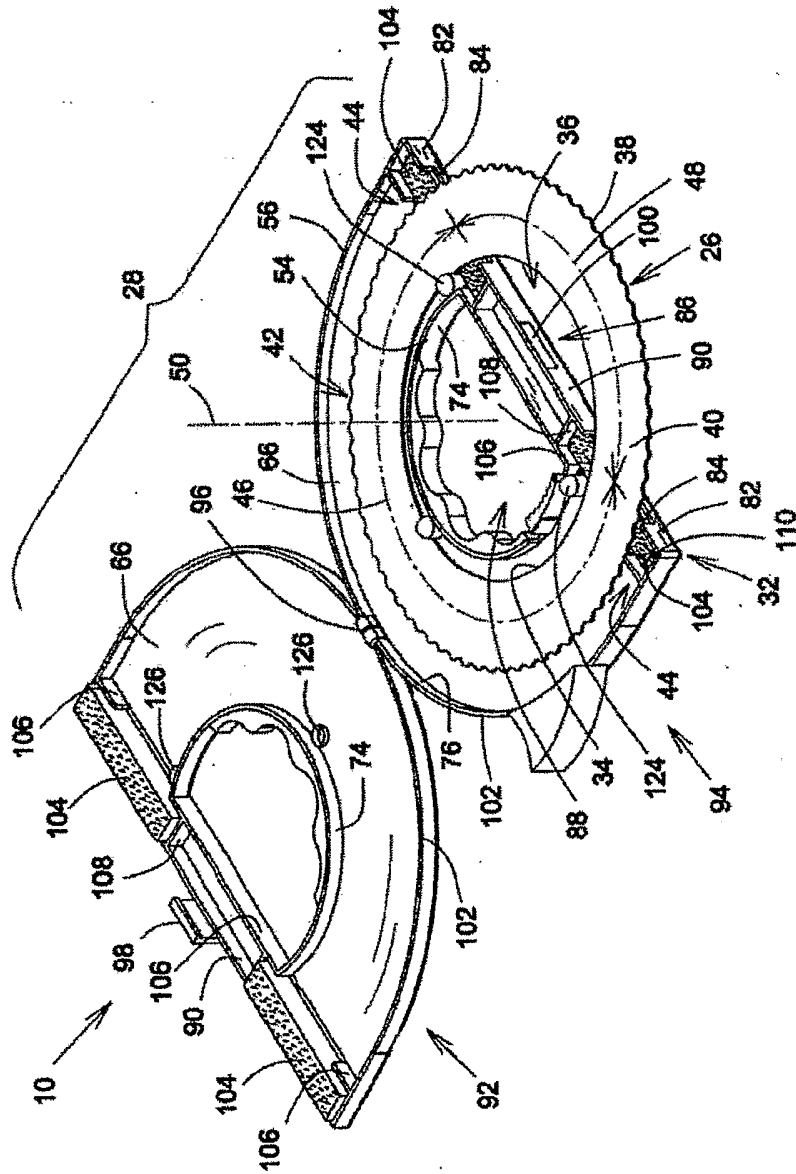
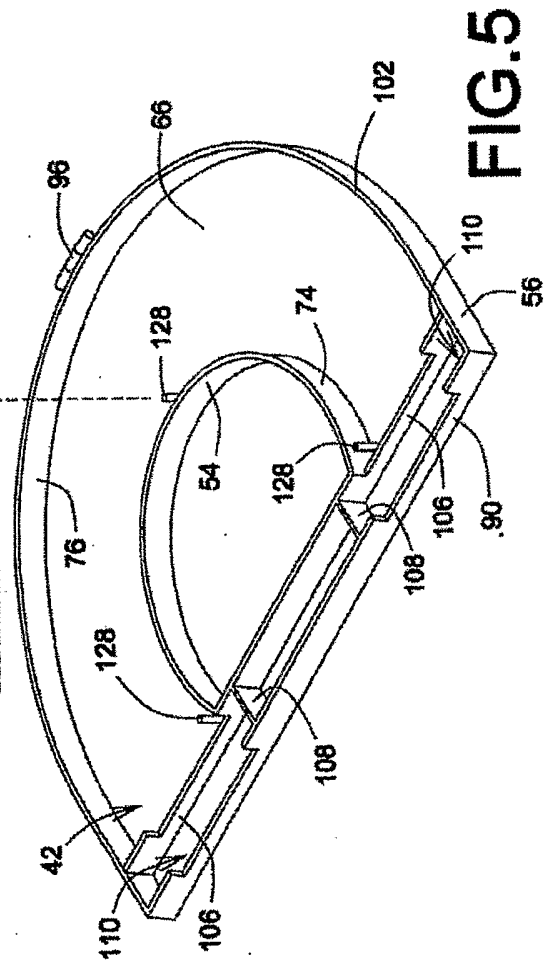
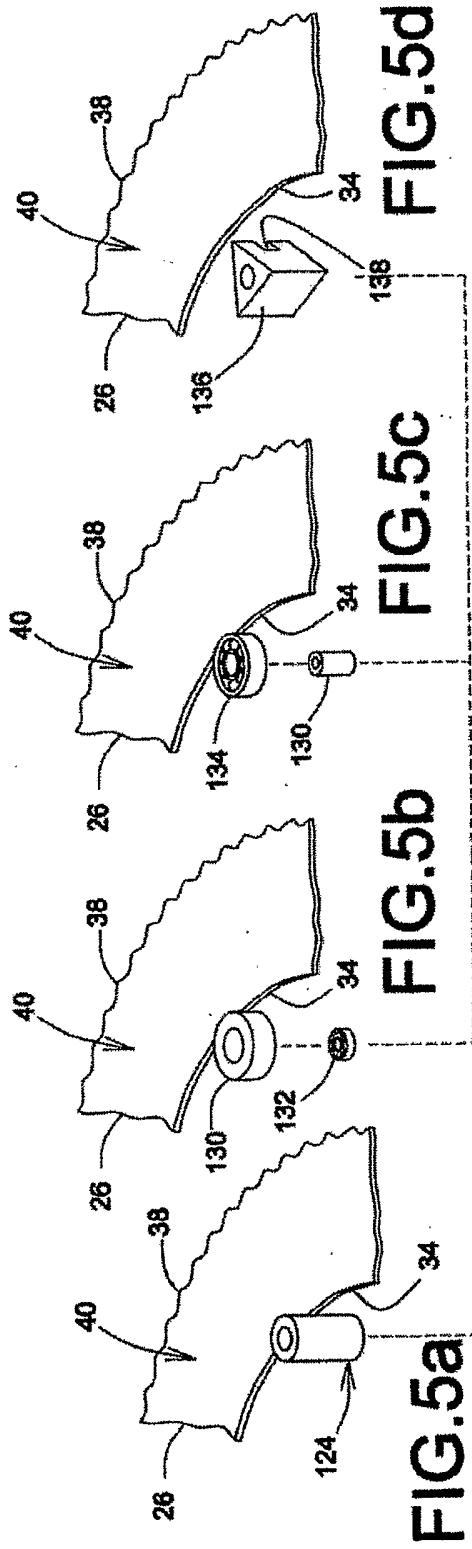


FIG.4



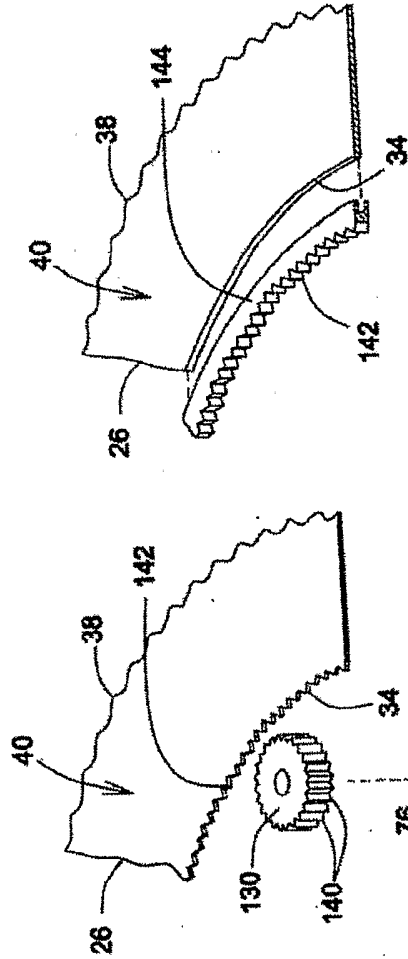


FIG. 6b

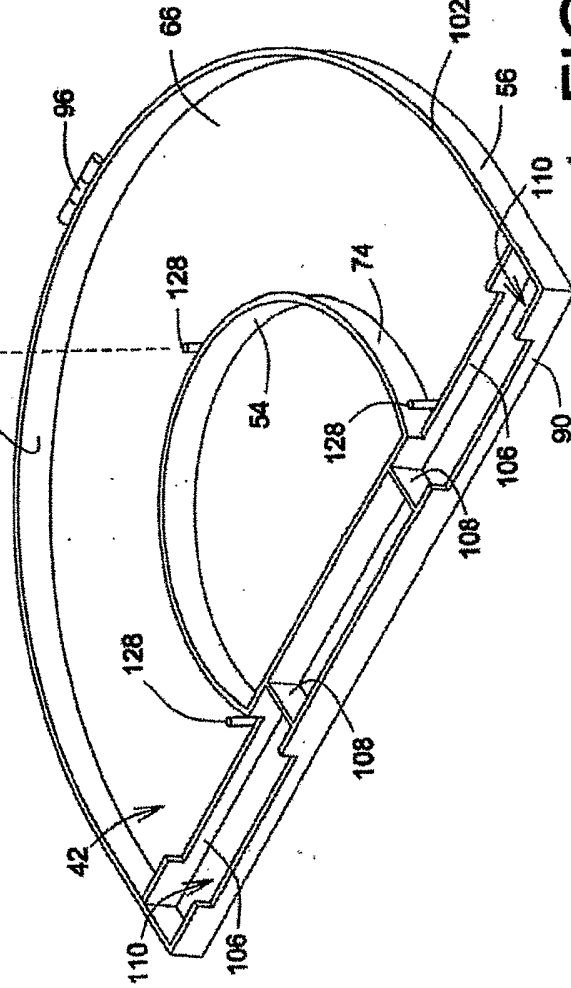
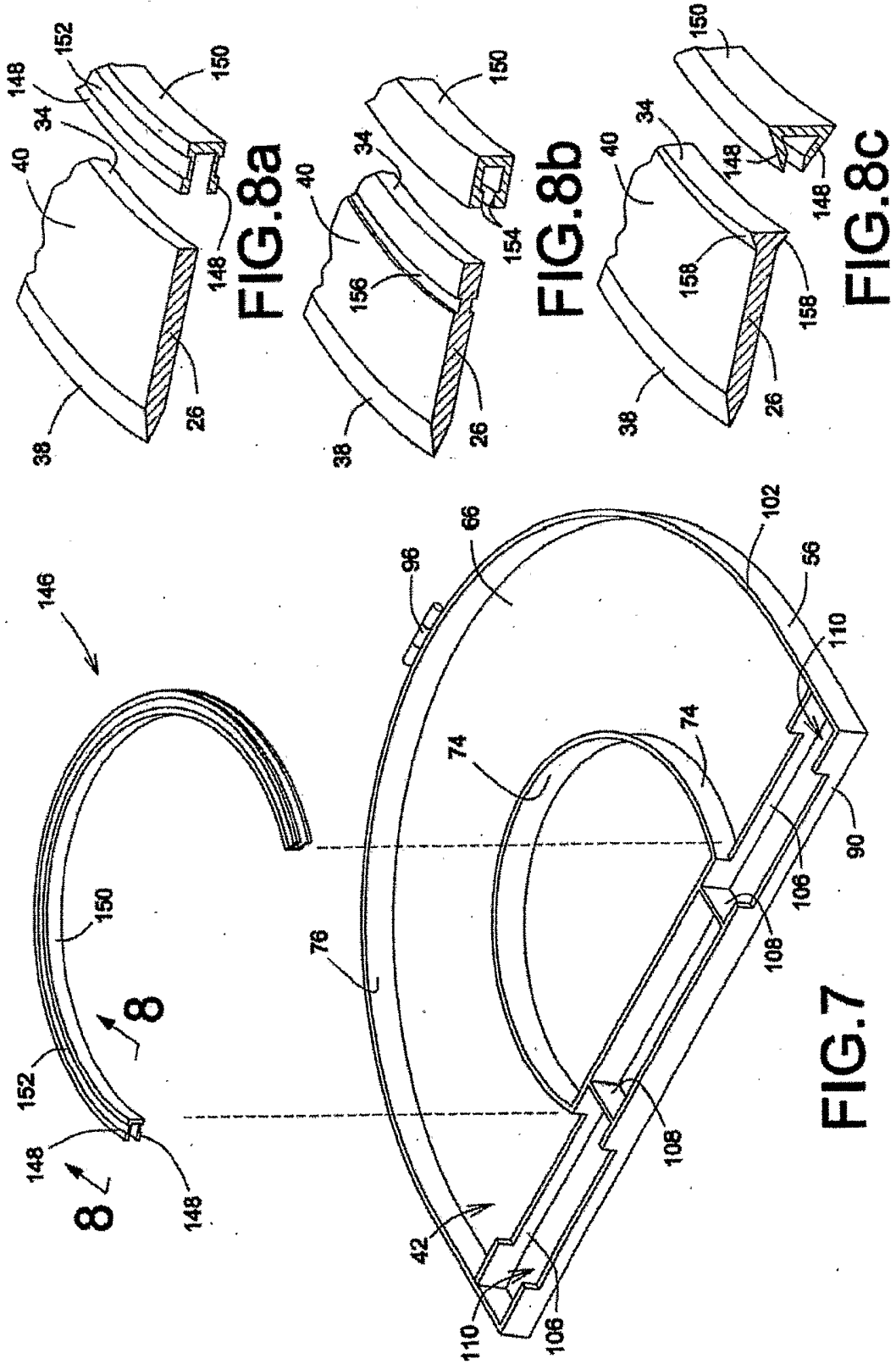


FIG. 6a



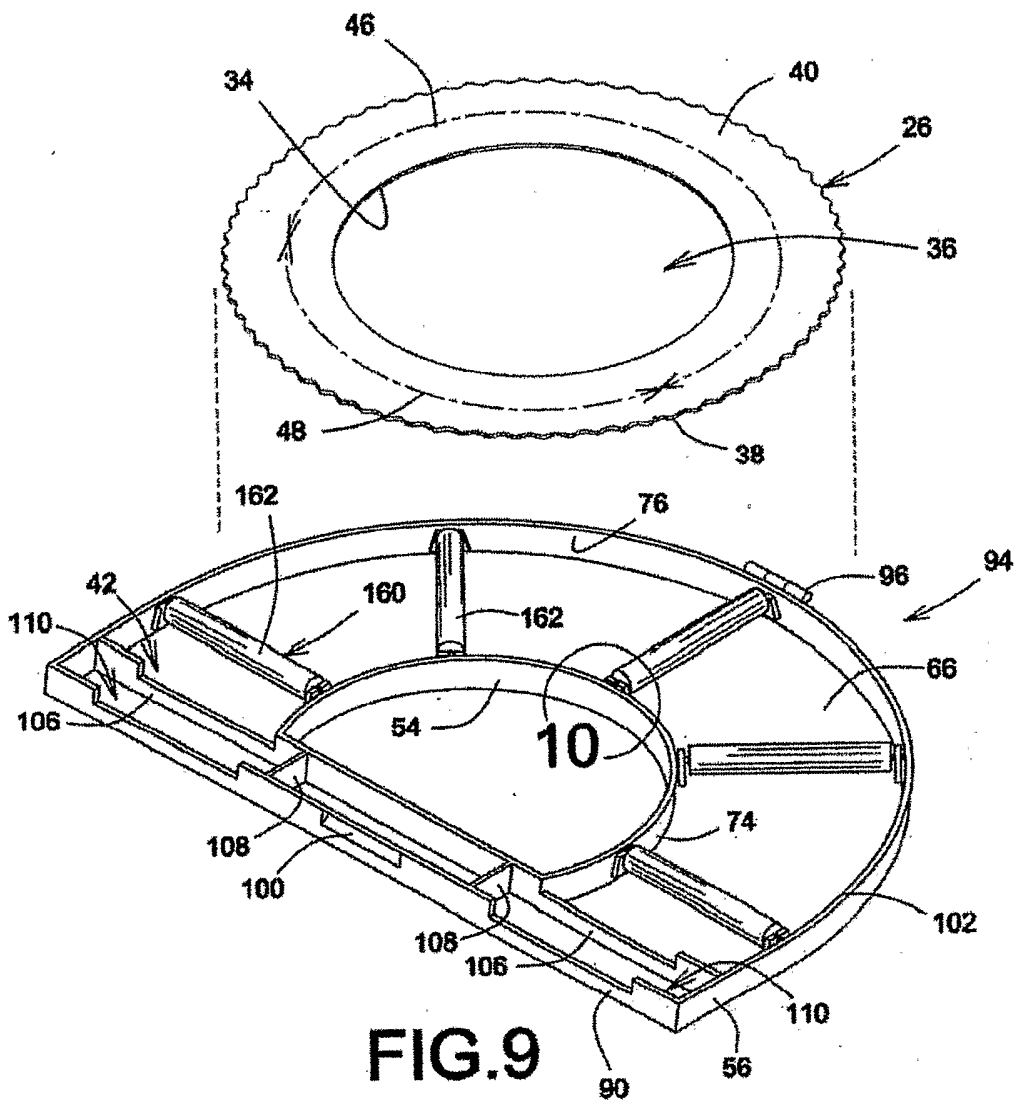


FIG. 9

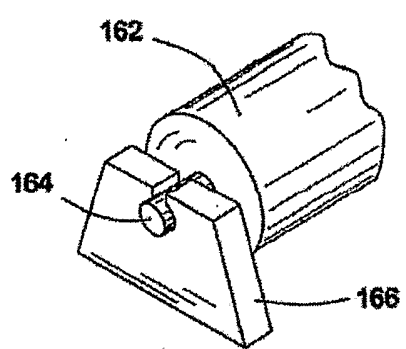


FIG. 10

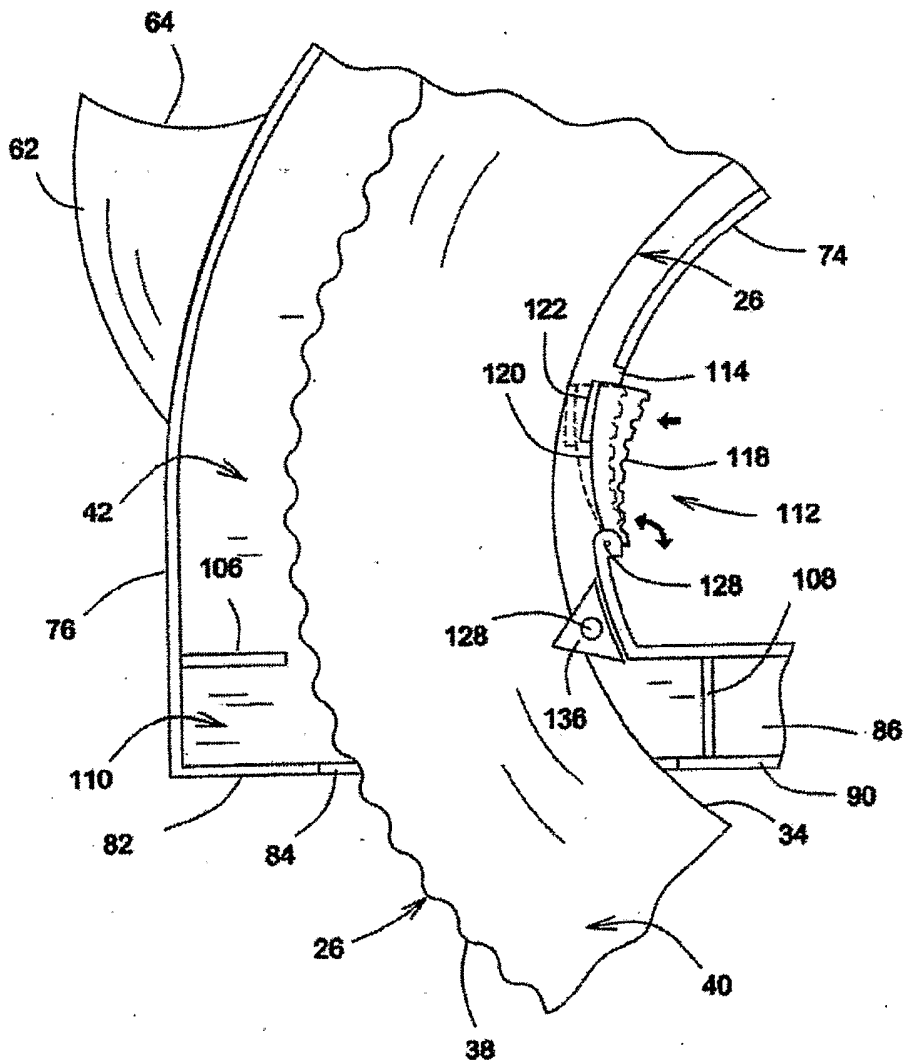


FIG.11

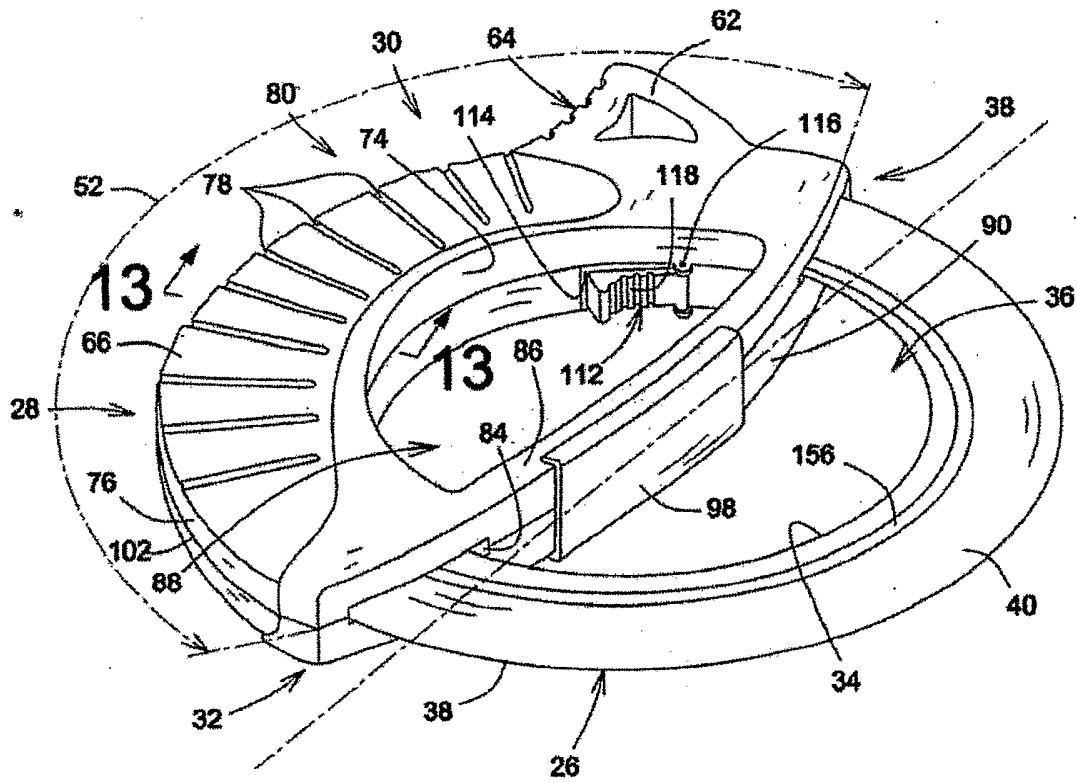


FIG. 12

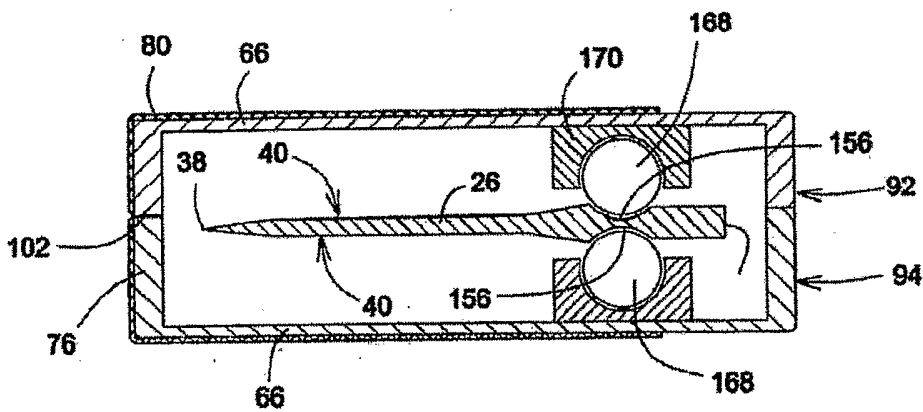


FIG. 13

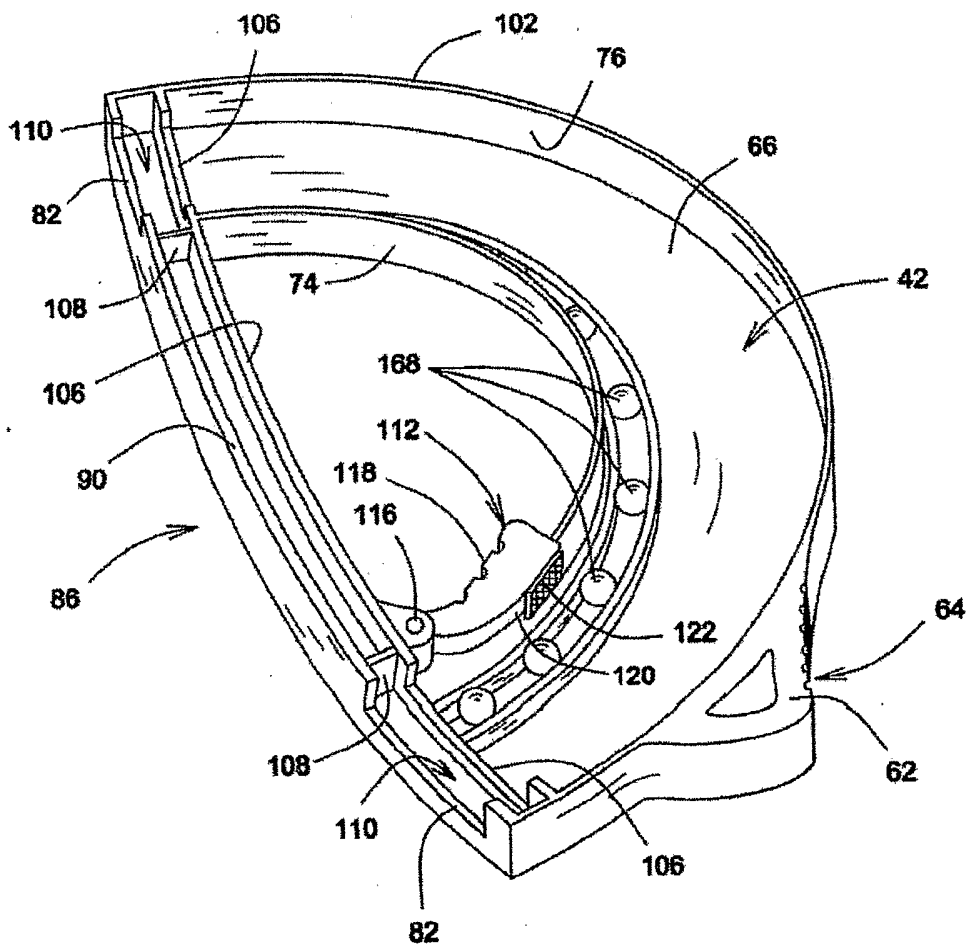


FIG.14

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA2004/000743A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B26B25/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 020 550 A (OKADA YOSHIO) 3 May 1977 (1977-05-03) column 1, line 43 -column 2, line 31 column 3, line 1 -column 10, line 9; figures 1-8	1-4,7, 13,77, 84,95, 96,99, 100
X	BE 1 013 992 A (BOR MARCEL) 14 January 2003 (2003-01-14)	1,7,12, 13,77, 78,84, 86,95, 96,99
A	page 1 -page 2; claims 1-11; figures 1-3 -/--	63,88,94

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents:

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- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

17 September 2004

Date of mailing of the international search report

05/10/2004

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA2004/000743

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 56 013976 A (DOWA SEISHI KK) 10 February 1981 (1981-02-10) the whole document ---	1,77,95, 96
A	JP 52 130089 A (KIMURA MASAO) 1 November 1977 (1977-11-01) the whole document ---	1,77,95, 96
P,A	US 2004/049924 A1 (ROBINOWITZ STACEY ET AL) 18 March 2004 (2004-03-18) the whole document ---	88
A	US 6 094 824 A (TAKESHITA TAKAHIRO) 1 August 2000 (2000-08-01) column 1, line 33 - line 55 column 2, line 33 -column 4, line 48; figures 11-4 ---	2-4, 88-90
A	US 4 432 137 A (OKADA YOSHIO) 21 February 1984 (1984-02-21) column 1, line 5 - line 11 column 2, line 61 -column 5, line 27; figures 1-13 ---	2-4, 88-90
A	US 3 590 483 A (SZCZEPANSKI HARRY) 6 July 1971 (1971-07-06) column 2, line 31 - line 60; claim 1; figures 1-5 -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA2004/000743

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4020550	A	03-05-1977	JP 978229 C 29-11-1979
			JP 51139993 A 02-12-1976
			JP 54011437 B 15-05-1979
			JP 957664 C 14-06-1979
			JP 52012394 A 29-01-1977
			JP 53038795 B 17-10-1978
			DE 2623268 A1 02-12-1976
BE 1013992	A	14-01-2003	BE 1013992 A6 14-01-2003
JP 56013976	A	10-02-1981	JP 1278908 C 29-08-1985
			JP 60001032 B 11-01-1985
JP 52130089	A	01-11-1977	NONE
US 2004049924	A1	18-03-2004	NONE
US 6094824	A	01-08-2000	JP 3343506 B2 11-11-2002
			JP 11300066 A 02-11-1999
			CA 2246898 A1 16-10-1999
			DE 19841647 A1 28-10-1999
US 4432137	A	21-02-1984	JP 58049674 U 04-04-1983
			DE 3269824 D1 17-04-1986
			EP 0075691 A2 06-04-1983
			US RE32501 E 15-09-1987
US 3590483	A	06-07-1971	NONE