A plastic container having improved crush resistance through the inclusion of a window and column design which is principally intended to increase its load bearing ability and/or a series of circumferential ribs intended to improve the container's circumferential strength to inhibit deformation during vacuum filling. The plastic container can be used in place of glass containers of similar volume.
CONTAINER WITH IMPROVED CRUSH RESISTANCE

CROSS REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/698,534, filed Jul. 12, 2005, the entire disclosure of which is herein incorporated by reference.

BACKGROUND

[0002] 1. Field of the Invention

[0003] This disclosure relates to the field of containers, particularly to plastic containers with improved crush resistance.

[0004] 2. Description of the Related Art

[0005] Containers are ubiquitous for the sale of goods in society. The sale of many products such as liquids or products provided in liquid is essentially impossible without containers in which to transport the products. While the concept of bulk foods (where a user supplies their own container which is filled from a larger container) is popular for some items, most items in today’s society are prepackaged in disposable or recyclable containers for sale. In this way, a consumer can simply grab a single container of product for easy transport, purchase and storage.

[0006] While the container in which items are sold is often of relatively little import to the end consumer, the design of a container can sometimes have an effect on the product that will influence the consumer due to specific benefits provided by the container. For a manufacturer, however, performance of the container under certain conditions allows for the product to be provided to the consumer easier or less expensively which can have a dramatic effect on both profitability of the manufacturer and resultant retail price of the product. Both of these can result in increases in the manufacturers’ profitability and can influence the consumer in purchasing.

[0007] Modern container filling machines in a wide variety of industries rely on vacuum filling whereby a container is placed over a nozzle or spigot which will release the product to be placed in the container when a sufficient pressure vacuum is obtained inside the container. Once the vacuum is achieved, the nozzle will open allowing the material to dispense into the container. This type of filling provides for safe and secure packaging of product at the high rate of speed required for modern manufacturing plants.

[0008] Vacuum filling, however, places significant demands on the container. In particular, the container will need to maintain its rigidity throughout the process to insure that the container is filled correctly, and the resultant product and container has an attractive appearance to facilitate sale of the product. This has traditionally been a problem for plastic containers which are more susceptible to being crushed than glass containers which are heavier and more rigid. The problem is particularly acute because plastic containers made to be inexpensive and disposable, which are usually desirable traits in consumer product packaging, often have relatively thin and flexible walls.

[0009] A second problem of product containers is their packing and storage. Once containers are packed with product they are stored and shipped to the ultimate point of sale. In many cases, this can require transport over great distance and warehousing for storage. The product inside the containers will generally weigh significantly more than the container itself and the products often need to be stacked for both efficient storage and transport.

[0010] The concern is that many plastic containers lack the rigidity to support additional filled containers being placed on top of them. The weight of the upper containers, pressing down from above on a container, can easily become sufficient that the container will crush under the weight resulting in deformed, or worse damaged, product.

[0011] Because of these and other problems in the art, many products, particularly those which are liquid or have significant liquid components, are packed and shipped in glass containers. Glass is a fairly rigid material and can provide both resistance to deformation during vacuum filling and can provide for significant load bearing strength due to its thickness and rigidity. While glass containers are a useful solution, glass containers have some specific problems. In particular, glass containers are generally much more breakable than plastic containers are, which can lead to their being less popular amongst consumers.

[0012] In some cases, a more major problem is that glass containers are generally significantly heavier than plastic containers of a similar volume. This additional weight can lead to dramatic increases in shipping and transport cost for the resultant product. In particular, a glass container filled with product is often more difficult to handle due to its weight, and can be more expensive to transport, particularly over large distances.

SUMMARY

[0013] Because of these and other problems in the art, discussed herein is a plastic container having improved crush resistance. In an embodiment, the container serves as a replacement for a glass container of similar volume and may be able to be used in a manufacturing process designed to operate on glass containers without modification to the process. The container preferably includes two structural devices. The first device is the inclusion of a window and column design which is principally intended to increase its load bearing ability. The second device is a series of circumferential ribs and is principally intended to improve the containers circumferential strength to inhibit deformation during vacuum filling.

[0014] There is described herein, among other things, a container comprising: a main body comprised of plastic, said main body including a top section, a middle section, and a bottom section arranged vertically and enclosing an internal volume; a rim through which material can be placed in said internal volume, said top section interconnecting said rim and said middle section; and a base, said bottom section interconnecting said base and said middle section; wherein said middle section is generally cylindrical about a center axis; and wherein, at least one of said top section and said bottom section include a window and column structure comprising; at least two windows arranged circularly symmetrically about said center axis, each of said windows being a portion of said main body recessed into said internal
volume; and at least two columns, a column being arranged between any two adjacent windows, each of said columns having an outer surface and two transition surfaces; wherein each of said transition surfaces is rounded.

[0015] In an embodiment of the container, both said top section and said bottom section include said window and column structure. Both sections may have the same number of windows and columns and each of said transition surfaces on said top section may be vertically aligned with a transition section on said bottom section.

[0016] In an embodiment of the container said at least two windows comprises between five and eleven windows, between seven and nine windows or exactly eight windows.

[0017] In an embodiment of the container the middle section further comprises at least three ribs arranged circumferentially about said center axis, each of said ribs comprising a groove recessed into the structure of the middle section. The groove may comprises a flat bottom surface and two rounded side surfaces. There may be at least four ribs which may be arranged to form a middle rib arrangement and a flanking rib arrangement wherein said middle rib arrangement is symmetrical about a predetermined point, or said flanking rib arrangement is symmetrical about a different predetermined point. In such an arrangement, said middle rib arrangement may comprise four ribs and said flanking rib arrangement comprises two ribs.

[0018] In an embodiment of the container, if further comprises a cylinder connected to said rim and including at least one protrusion positioned so as to allow a lid to be screwed onto said cylinder. The container may be barrel-shaped.

[0019] There is also described herein, a container comprising: a main body comprised of plastic, said main body including a top section, a middle section, and a bottom section arranged vertically and enclosing an internal volume; a rim through which material can be placed in said internal volume, said top section interconnecting said rim and said middle section; and a base, said bottom section interconnecting said base and said middle section; wherein said middle section is generally cylindrical about a center axis; and wherein, said middle section comprises at least three ribs arranged circumferentially about said center axis, wherein each of said ribs comprising a groove recessed into the structure of the middle section; and wherein said groove comprises a flat bottom surface and two rounded side surfaces.

[0020] In an embodiment of the container, the middle section further comprises at least four ribs which may be arranged to form a middle rib arrangement and a flanking rib arrangement wherein said middle rib arrangement is symmetrical about a predetermined point, or said flanking rib arrangement is symmetrical about a different predetermined point. In such an arrangement, said middle rib arrangement may comprise four ribs and said flanking rib arrangement comprises two ribs.

[0021] In an embodiment of the container, at least one of said top section and said bottom section include a window and column structure comprising; at least two windows arranged circularly symmetrically about said center axis, each of said windows being a portion of said main body recessed into said internal volume, and at least two columns, a column being arranged between any two adjacent windows, each of said columns having an outer surface and two transition surfaces. These transition surfaces may be rounded.

[0022] In an embodiment of the container, both said top section and said bottom section include said window and column structure. Both sections may have the same number of windows and columns and each of said transition surfaces on said top section may be vertically aligned with a transition section on said bottom section.

[0023] In an embodiment of the container said at least two windows comprises between five and eleven windows, between seven and nine windows or exactly eight windows.

[0024] In an embodiment of the container, it further comprises a cylinder connected to said rim and including at least one protrusion positioned so as to allow a lid to be screwed onto said cylinder. The container may be barrel-shaped.

BRIEF DESCRIPTION OF THE FIGURES

[0025] FIG. 1 Provides a perspective view of an embodiment of a first embodiment of a container.

[0026] FIG. 2 Provides a side view of the embodiment of FIG. 1.

[0027] FIG. 3 Provides a top view of the embodiment of FIG. 1.

[0028] FIG. 4 Provides a bottom view of the embodiment of FIG. 1.

[0029] FIG. 5 Provides a perspective view of a second embodiment of a container.

[0030] FIG. 6 Provides a side view of a number of different embodiments of containers, arranged by size.

DESCRIPTION OF PREFERRED EMBODIMENT(S)

[0031] FIGS. 1 through 4 show a first embodiment of a container (100) designed to provide for improved crush resistance by including both the above devices. The container (100) in the depicted embodiment comprises a screw-top jar of generally barrel-shaped construction. This shape of jar is common in food service and other industries and is of the type often used for packaging flowable liquids or products including flowable liquids such as, but not limited to, pickled vegetables, fruits in syrup, mayonnaise, or mustard. There is no requirement that the container (100) be used for food service products and may be used for any type of product, but food service is a likely industry in which it would be useful. Additionally, there is no requirement that the container (100) be a jar having a screw-top lid or generally barrel-shape, the devices may be used on any container of any shape and having any sealing attachment. The screw-top lid and barrel-shape is, however, a popular general design for a variety of products. The container (100) may be of any size but the devices are particularly valuable for larger containers such as those with a volume over 64 fluid oz.

[0032] The container (100) in the depicted embodiment of FIGS. 1 through 4 includes a main body (103) having a generally barrel-shaped design as discussed above. The design will generally not have as large as ends as a traditional barrel-shape, but will still comprise a center cylinder,
with ends tapered in to a resultant circle of decreased diameter. When looking at the container (100), the main body (103) can be considered to include three main sections, a top section (105), a middle section (107), and a bottom section (109). The division into sections is arbitrary and is done simply for ease of discussion of structures located generally in such sections. The container (100) will generally be molded as a single monolithic piece. The top section (105) and bottom section (109) generally are shaped to smoothly taper from the middle section (107) toward a circular center therein. While this design is generally preferable from an aesthetic point of view, the top section (105) and bottom section (109) may instead taper linearly or using any other form of taper in alternative embodiments.

[0033] The top section (105) will generally connect to the middle section (107) by an arched ring (157). Another arched ring (179) may connect between the middle section (107) and the bottom section (109). These rings will generally curve outward from the container, but may be only slightly raised from the main surface of the container.

[0034] At the top of the top section (103) there is located a rim (501). The rim (501) surrounds an opening (503) into the container (100) which is generally circular and is generally centered in the top section. The rim (501) will generally have attached thereto a hollow low cylinder (507) which includes at least one protrusion (505) on its outer surface. The protrusion (505) is positioned so as to allow a lid (not shown) to be screwed onto the low cylinder (507) to seal the container (100). The low cylinder (507) may also have a raised ring (509) which can act as a stop or lower seal for the lid (not shown) when it is screwed into position.

[0035] The top section (105) is generally curved or bent inward from the middle section (107) providing for a shoulder connecting the middle section (107) to the rim (501). The top section (105) includes a plurality of windows (511). The windows (511) comprise shaped indentations which are recessed into the volume of the container (100). The exact number of windows (511) is variable but the number is preferably between five and eleven, more preferably between seven and nine and most preferably exactly eight. The windows (511) are evenly distributed about the top section (105) so that, as shown in FIG. 3 the windows (511) are arranged circularly symmetrically about the center axis (707) of the middle section (and, therefore, also about the rim (501)).

[0036] The windows (511) are specifically sized and shaped to provide for improved structural strength to the container (100). In particular, the windows (511) are arranged so that the outer surfaces (522) of the columns (521) located between adjacent windows (511) are generally in the shape of a parallelogram. Specifically, they are preferably either rectangular or square. Generally, this will give the windows (511) a slightly trapezoidal shape. The windows (511) are not openings in the main body (103) but instead constitute recessed panels (513) where the material of the container (100) sits back a distance from the main outer surface of the container (100). Therefore, the top section (105) is effectively made up of three different levels of material, the outer surfaces (522) of columns (521) which are generally near the main surface of the container (100), the recessed panels (513) of the windows (511) which are pushed “into” the container (100), and the transition surfaces (533) between a column (521) and the neighboring window (511). The window (511), column (521), and transition surfaces (533) arrangement is generally referred to herein as a window and column structure.

[0037] The columns (521) preferably do not include any extra material and are not of any significantly greater thickness in their actual structure than the other portions of the container (100). In particular, it should be recognized that container (100) is preferably formed by known plastic molding techniques. Therefore, the entire surface of the container (100) is of a relatively uniform thickness. However, by creating the windows (511), the resulting columns (521) end up having an essentially three-sided hollow structure with an outer surface (523) formed at or near the level of the major outer surface of the container (100) and two transition surfaces (533) arranged to extend into the volume of the container (100) and connect to the recessed panel (513) of the window (511).

[0038] The transition surfaces (533) shown in the depicted embodiment are rounded convexly outward from the outer surface (523) to the recessed panel (513) so as to produce an arcuate transition between the column (521) outer surface (523) and the recessed panel (513). This is by no means necessary, but is generally preferred for both ease of molding and to provide additional strength to the columns (521). A curved structure requires more force to bend across its major surface than a linear one as is well understood in the art. Therefore, by making the transition surfaces arcuate, the load bearing of the columns (521), and therefore the container (100) may be increased.

[0039] It should be recognized that transition surfaces (533) do not need to be that significant in size. In an embodiment, the transition surfaces (533) may only be about as wide or as deep as the plastic forming the container (100) is thick. However, virtually any depth of penetration of the recessed panel (513) may be used providing for various different widths of transition surface (533). As should be apparent from the FIGs., the transition surfaces (533), in this embodiment, surround the recessed panel (513), however, it is by no means necessary and there can only be transition surfaces (533) in the vertical direction in an alternative embodiment.

[0040] In the depicted embodiment, the bottom section (109) is constructed similarly to the top section (105) also including a plurality of windows (911) of similar design and forming similar columns (921) to those of the top section (105). The bottom section (109) also includes a circular rim (901), but as opposed to the rim (501) on the top section (105), there is no low cylinder (507). Instead the rim is connected to a base (907). Generally, the base (907) will be of greater diameter than the low cylinder (507) and the base (907) may therefore interact with the bottom section (109) to create a smaller shoulder. Because of this, the windows (911) on the lower section (109) will often be smaller than those on the top section (105), but the principle of the construction of windows (911) and windows (511) is the same. The base (907) is generally of hemispherical or other generally rounded construction including revolved parabolae or hyperbolae extending into the volume of container (100). Such rounded bases are understood by those of ordinary skill in the art.

[0041] It is preferred, but not required, that the bottom section (109) have the same number of windows (911) as the
top section (511), and that the windows (911) (and thus the columns (921)) on the bottom section (109) be vertically aligned with those of the top section (105). By aligning the columns (521) and (921), force is transferred from the column (521), through the middle section (107), is not transferred to a weaker point in the bottom section (109), but is instead transferred to a column (921) on the bottom section (109). The similar is true for force applied from the bottom of the container (100) due to the container (100) resting on a surface.

[0042] While applicants are not limited by a proposed manner of operation, it is believed that the additional load bearing strength of the container is provided because the transition surfaces (933) and (533) of both the bottom section (109) and top section (105) run vertically and linearly relative to the container (100) when the container (100) is placed on its base. The columns (521) and (921), therefore generally align to each other to form a roughly U-shaped elongated support, with the “U” being arranged facing into the center of the container (100). When a load is applied in a vertical direction, the load is generally directed downward onto the support is such a way that the column will only flex by the legs of the U being bent in a line which require compression of material in the legs (the transition surfaces (533)). As the legs necessarily resist such compression, they therefore provide a significant resistance to such bending.

[0043] This structure essentially serves to provide increased rigidity to the container (100) during the imposition of a vertical load. In particular, the columns (521) and (921) provide for support to prevent collapse of either rim (501) or (901) into the container (100). When force is exerted in a downward direction on the rim (511), the force must overcome the bending resistance of the columns (521) and (921) before it will deform.

[0044] Further, the columns (521) and (921) provide for particular benefit when a barrel-shaped, or other container (100) where the top section (105) and/or bottom section (109) is contoured inward from the middle section (107), is used. In a barrel-shaped design, when the container (100) is placed on an end and a force is applied vertically, the force is generally focused on the two rims (501) and (901) which provide contact points and support the container (100). Therefore the rims (501) and (901) will often try to depress into the volume of the container (100) under the force. The shoulder section will generally not be able to resist this type of deformation as there is little material to prevent deformation in that direction.

[0045] With the window device, however, as the top section (105) approaches the rim (501), the transition surfaces (533) of the columns become more horizontal, therefore the U is placed in a more inverted vertical position, preserving the requirement that the column be bent compressing the legs of the U for crushing to occur.

[0046] The middle section (107) is designed to be the center section of the barrel and is generally cylindrical about a center axis (705). The middle section (107) will serve both as an attachment point for a label and will provide most of the structure and volume of the container (100).

[0047] While stacking will generally induce a load in the vertical direction on the container (100), vacuum filling will instead generally generate forces trying to push the surfaces of the container (100) in toward its center. Toward the top section (105) and bottom section (109) of the container, the sections will generally be able to resist this type of deformation as the center of the container (100) is generally in the vertical direction and the window device will still inhibit collapsing in the vertical direction of the top section (105) and bottom section (109). The middle section (107), however, has its surfaces generally horizontal to the middle of the container (100). Under a vertical load, the surfaces are generally quite strong as the forces are vertical requiring compression or sharing of the material of the middle section (107), however, during vacuum filling, the force is in a direction whereby the material of the middle section (107) is easier to deform as it is toward the center of the container (100).

[0048] The middle section (107) also is the area where the label for the products in the container (100) is generally applied. Therefore, any attempt to strengthen it cannot inhibit attachment of the label. To provide for a label area, the middle section (107) will generally include an upper label surface (703) and a lower label surface (705). These label surfaces (703) and (705) are designed to have the label attached thereto by glue or by other means as understood by one of ordinary skill in the art. The label attachment surfaces (703) and (705) will generally be positioned so that standard sized labels, as are used in the art, as well as any specific product labels for products the container (100) is produced to carry can be attached to the two label attachment surfaces (703) and (705) by the label’s upper and lower edges. In this way the label is still relatively secure even though only a portion of it surface area is actually attached to the container (100).

[0049] In the embodiment of FIGS. 1 through 4, the two label attachment surfaces (“703) and (705) are positioned on the middle section (107) towards its lower and upper edges. In particular, they are located to either vertical side of the middle rib arrangement (751). In the depicted embodiment, the middle rib arrangement (751) comprises four ribs (753), (755), (757), and (759) which will be arranged in the area between the two label attachment surfaces (703) and (705) and circumferentially about the center axis (707) of the middle section (107). The container (100) of the depicted embodiment includes two further ribs (761) and (763) which are arranged to flank the label attachment surfaces (703) and (705) and are called the flanking ribs to have six ribs in total. This number of ribs is preferred, but is not required. In an alternative embodiment (shown in FIG. 5) the container (1000) only has three ribs. Depending on embodiment, there will generally be at least three ribs with generally no more than eight ribs present.

[0050] Each of the ribs (753), (755), (757), (759), (761), and (763) regardless of whether it is a flanking rib or a member of the middle rib arrangement (751) will generally comprise a groove recessed into the structure of the middle section (107) circumferentially about the middle section (107). The grooves are generally shaped so as comprise flat bottom surfaces (771) and curved or rounded side surfaces (773) often of similar shape to the transition surfaces (533) on the top section (105) and bottom section (109). In such an arrangement, the side surfaces (773) may also be convex from the outer surface of the middle section (107) to the bottom surface (771) as shown in FIG. 2.
Generally, the ribs (753), (755), (757), (759), (761), and (763), will extend a greater distance into the volume of the container (100) than the windows (511) or (911). The ribs (753), (755), (751), (759), (761), and (763) are principally intended to prevent the middle section (107) from collapsing inward. This inward collapse is particularly concerning in the middle section (107) when a vacuum is created inside the container (100) during vacuum filling procedures. The design, however, can also provide improved load bearing from vertical forces by inhibiting the middle section (107) from collapsing inward and allowing the top and bottom section to move toward each other when a vertical load is present.

The location of the ribs (753), (755), (757), (759), (761), and (763) is specifically chosen so as to counteract the most likely points where collapse is to occur. One of ordinary skill in the art would recognize that the ribs (753), (755), (757), (759), (761), and (763) will preferably be placed at points where a container (100) of particular size and shape is known to collapse. This can be determined empirically by testing for collapse points on the container (100) through experimental testing. The depicted embodiment of six ribs in the depicted container (100), however, is believed to provide a particularly beneficial arrangement especially when combined with the windows (511) and (911) of the top segment (105) and bottom segment (109) previously discussed.

The arrangement of the ribs (753), (755), (757), (759), (761), and (763) in the depicted embodiment is generally as follows the lowermost rib (763) and uppermost rib (761) which together form the flanking ribs are symmetrical about a predetermined point near the middle of the middle section (107). Generally, this point will be approximately centered in the middle section (107) so that each of the lowermost rib (763) and uppermost rib (761) may be symmetrical, or close to symmetrical, relative to the middle section (107).

The two label attachment surfaces (703) and (705) are then defined as the area between the upper most rib (761) and the top rib (753) of the middle rib arrangement (751), and the area above the lowermost rib (763) and below the bottom rib (759) of the middle rib arrangement (751).

The middle rib arrangement (751) comprises a series of ribs (753), (755), (757), and (759) that are generally located at least partially behind the label when a label is attached. The ribs (753), (755), (757), and (759) in the middle rib arrangement (751) are evenly spaced about their own center point (point of symmetry) so that each of the ribs is preferably equidistant from each adjacent rib in the middle rib arrangement (751) as shown in the FIGS. However, as shown in FIGS. 1 through 4, the middle rib arrangement (751) may actually be offset from the symmetry of the flanking ribs (761) and (763), making the resultant structure asymmetrical. In a preferred embodiment, there is a first symmetry of arrangement of the two outermost ribs (761) and (763) of the flanking ribs and the ribs (753), (755), (757), and (759) of the middle rib arrangement (751) are symmetrical about a different point. In an alternative embodiment, both sets of ribs may be symmetrical about the same point.

In the alternative embodiment of FIG. 5, the two flanking ribs (761) and (763) are eliminated, and the label attachment sections extend above the top rib (1753) in the middle rib arrangement (1751) and below the bottom rib (1759) of the middle rib arrangement (1751). The middle section (1107) also only includes three ribs (1753), (1755), and (1759). This construction is not believed to be as strong as the six rib embodiment shown in FIGS. 1 through 4, but may have sufficient strength for some applications. In this case, there would only be the single symmetry of the middle rib arrangement (1751). FIG. 6 shows a number of other embodiments, indicating certain rib arrangements for different sizes of containers.

In a yet further alternative embodiment, it should be recognized that the window and column structure of the container (100) may be extended through the middle section (107) of the container (100) and the ribs (753), (755), (757), (759), (761), and (763) could either be used in addition to this structure or be eliminated. In this type of arrangement, the windows (511) and (911) may be interconnected through the middle section (107) to provide for a long column extending from the top section (105) to the bottom section (109). Preferably, however, the middle section (107) will include a number of smaller windows, arranged so as to preserve the vertical alignment of the transition surfaces (833) and (933) and of the columns (521) and (921) through the middle section (107) windows. In this arrangement, the label attachment surfaces (703) and (705) can comprise areas vertically between the various groups of windows and placed so that they can accept standard sized or custom labels as discussed above.

While the invention has been disclosed in connection with certain preferred embodiments, this should not be taken as a limitation to all of the provided details. Modifications and variations of the described embodiments may be made without departing from the spirit and scope of the invention, and other embodiments should be understood to be encompassed in the present disclosure as would be understood by those of ordinary skill in the art.

1. A container comprising:
   a main body comprised of plastic, said main body including a top section, a middle section, and a bottom section arranged vertically and enclosing an internal volume;
   a rim through which material can be placed in said internal volume, said top section interconnecting said rim and said middle section; and
   a base, said bottom section interconnecting said base and said middle section;
   wherein said middle section is generally cylindrical about a center axis; and
   wherein, at least one of said top section and said bottom section include a window and column structure comprising;
   at least two windows arranged circularly symmetrically about said center axis, each of said windows being a portion of said main body recessed into said internal volume; and
   at least two columns, a column being arranged between any two adjacent windows, each of said columns having an outer surface and two transition surfaces; wherein each of said transition surfaces is rounded.
2. The container of claim 1 wherein both said top section and said bottom section include said window and column structure.

3. The container of claim 2 wherein said top section has the same number of windows and columns as said bottom section.

4. The container of claim 3 wherein each of said transition surfaces on said top section is vertically aligned with a transition section on said bottom section.

5. The container of claim 1 wherein said at least two windows comprises between five and eleven windows.

6. The container of claim 5 wherein said at least two windows comprises between seven and nine windows.

7. The container of claim 6 wherein said at least two windows comprises exactly eight windows.

8. The container of claim 1 wherein said middle section further comprises at least three ribs arranged circumferentially about said center axis, each of said ribs comprising a groove recessed into the structure of the middle section.

9. The container of claim 8 wherein said groove comprises a flat bottom surface and two rounded side surfaces.

10. The container of claim 9 wherein said ribs comprise at least four ribs.

11. The container of claim 10 wherein said ribs are arranged to form a middle rib arrangement and a flanking rib arrangement.

12. The container of claim 11 wherein said middle rib arrangement is symmetrical about a predetermined point.

13. The container of claim 12 wherein said flanking rib arrangement is symmetrical about a different predetermined point.

14. The container of claim 11 wherein said middle rib arrangement comprises four ribs and said flanking rib arrangement comprises two ribs.

15. The container of claim 1 further comprising a cylinder connected to said rim and including at least one protrusion positioned so as to allow a lid to be screwed onto said cylinder.

16. The container of claim 1 wherein said container is generally barrel-shaped.

17. A container comprising

- a main body comprised of plastic, said main body including a top section, a middle section, and a bottom section arranged vertically and enclosing an internal volume;
- a rim through which material can be placed in said internal volume, said top section interconnecting said rim and said middle section; and
- a base, said bottom section interconnecting said base and said middle section;

wherein said middle section is generally cylindrical about a center axis; and

wherein, said middle section comprises at least three ribs arranged circumferentially about said center axis,

wherein each of said ribs comprising a groove recessed into the structure of the middle section; and

wherein said groove comprises a flat bottom surface and two rounded side surfaces.

18. The container of claim 17 wherein said ribs comprise at least four ribs.

19. The container of claim 18 wherein said ribs are arranged to form a middle rib arrangement and a flanking rib arrangement.

20. The container of claim 19 wherein said middle rib arrangement is symmetrical about a predetermined point.

21. The container of claim 20 wherein said flanking rib arrangement is symmetrical about a different predetermined point.

22. The container of claim 19 wherein said middle rib arrangement comprises four ribs and said flanking rib arrangement comprises two ribs.

23. The container of claim 17 wherein, at least one of said top section and said bottom section include a window and column structure comprising:

- at least two windows arranged circularly symmetrically about said center axis, each of said windows being a portion of said main body recessed into said internal volume; and

- at least two columns, a column being arranged between any two adjacent windows, each of said columns having an outer surface and two transition surfaces;

24. The container of claim 23 wherein each of said transition surfaces is rounded.

25. The container of claim 23 wherein both said top section and said bottom section include said window and column structure.

26. The container of claim 25 wherein said top section has the same number of windows and columns as said bottom section.

27. The container of claim 26 wherein each of said transition surfaces on said top section is vertically aligned with a transition section on said bottom section.

28. The container of claim 27 wherein said at least two windows comprises between five and eleven windows.

29. The container of claim 28 wherein said at least two windows comprises between seven and nine windows.

30. The container of claim 29 wherein said at least two windows comprises exactly eight windows.

31. The container of claim 17 further comprising a cylinder connected to said rim and including at least one protrusion positioned so as to allow a lid to be screwed onto said cylinder.

32. The container of claim 17 wherein said container is generally barrel-shaped.

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