Nestable container having integral hinged lid.

A nestable container comprises a receptacle (10) and an integral, hinged lid (12). The receptacle (10) has a base (16), and open top, and walls (18, 20, 22) extending from the open top to the base (16) in an inwardly tapered fashion. The lid (12) is shaped to conform to the open top of the receptacle and can be folded open against the rear wall (22) to co-extend with the rear wall (22) such that like containers can be nested one within the other with the lid (12) extending into the receiving receptacle. In one embodiment, the lid (12) is shaped to be releasably held against the rear wall (at 38), while in other embodiments, the lid is shaped to lie flat against the rear wall when nested within a second container.
NESTABLE CONTAINER HAVING INTEGRAL HINGED LID

This invention relates to nestable containers with integral lids, and in particular to a container having a lid which may be folded open against the rear wall of the receptacle portion of the container and the container then nested within a second similar container with the lid seated against the inside face of the rear wall of the nesting container.

There are many forms of containers including lids which are shaped to nest within one another for shipping and storage purposes. Typically, when such a container includes an integral lid, the containers are nested with the receptacle portion of each container nested one within the other and the lids likewise nested one within the other. Thus, a stack of nested containers having integral lids in accordance with the prior art would, in a side elevation, have the lids of the containers nested one within the other and extending transversely outwardly from a stack of containers.

Often, it is desirable to avoid having the lid extending outwardly from the container when stored. Thus,
typically, the container lid is closed and the containers are stacked one upon the other. However, in this form, the containers do not nest and therefore a good deal of space is occupied by the stacked containers.

The invention provides a nestable container having an integral lid which can be folded against one wall of the container and then the container, with the lid so folded, nested within a similar container. The container includes a receptacle having a base, an open top, and side walls extending from the open top to the base in an inwardly tapered fashion. The side walls define between them the width of the receptacle. In some embodiments, the receptacle has an expanded portion joined to the side walls and extending from the open top toward the base. The expanded portion forms at least part of a rear wall for the receptacle and includes a distention in each side wall, the width of the receptacle between the distentions being the maximum width of the receptacle. In other embodiments, the receptacle is triangular in cross section with one wall of the triangular receptacle being joined to the hinge and one edge of the triangular lid. A lid is hingedly secured to the open top of the receptacle at the rear wall, and is shaped to conform to the open top to cover the open top to seal the receptacle when the lid is closed on the receptacle. The lid is also shaped to co-extend with and lie substantially against the rear wall of the receptacle when the lid is fully opened against the rear wall.

When closed, the lid is shaped to be locked on the receptacle. In accordance with a first embodiment of the invention, the receptacle has an inwardly-angled neck about its open top and the lid has a peripheral border shaped to engage the neck in a snap-lock fashion when the lid is closed. In a second embodiment, the locking of the lid to the receptacle is accomplished by an inner peripheral groove in the receptacle adjacent the open top and a corresponding bead formed in the outer periphery of
the lid. The bead snaps into the peripheral groove when
the lid is closed. A shoulder may be included in the
receptacle adjacent to and beneath the groove to support
the lid when closed. A tab on the lid may be used to
facilitate opening of the container in this embodiment.
Other embodiments have flanges and especially shaped
mating configurations of the outer periphery of the lid
and the lip around the receptacle near the open top.

In the first embodiment of the invention, the lower
portion of the rear wall includes a transverse indentation
adjacent the base and the lid includes a protruding border
portion in registration with and engageable with the
indentation when the lid is opened co-extensive with the
rear wall. The border portion and indentation are shaped
such that the border portion is releasably retained within
the indentation. The lid thus held in place facilitates
nesting of like containers with the lid of each nested
container lying against the inner surface of the rear wall
of the adjacent nesting container.

In the first embodiment of the invention, a front
wall joins the side walls to complete the container. In
the second embodiment of the invention, the side walls are
curved toward one another and are joined to form a unitary
receptacle wall. In all embodiments of the invention, the
base is flat and the container itself is preferably
integrally formed of plastic with the hinge securement of
the lid to the receptacle being a living hinge.

The invention is described in greater detail in the
following description of the preferred embodiments, taken
in conjunction with the drawings, in which:

Figure 1 is a top plan view of one embodiment of a
container according to the invention with the container
lid being opened,

Figure 2 is a side elevational illustration of the
container of Figure 1, showing the closure of the
container lid in a phantom fashion,

Figure 3 is an enlarged partial cross-sectional
illustration of the interlocking of the lid and receptacle of the container of Figure 1 when the lid is closed.

Figure 4 is a side elevational illustration, with portions in cross section, showing one container according to Figure 1 with its lid secured against its rear wall and nested within a second container shown partially in phantom fashion.

Figure 5 is a perspective view of the container of Figure 1 with the lid closed,

Figure 6 is a rear cross-sectional illustration taken along lines 6-6 of Figure 4,

Figure 7 is an enlarged cross-sectional illustration of the interengagement of the lid and the indentation of the rear wall of the receptacle taken along lines 7-7 of Figure 6,

Figure 8 is a perspective view of a second embodiment of the invention, showing three of the containers nested one within the other,

Figure 9 is a perspective view of one of the containers of Figure 8 with the lid extending transversely outwardly from the receptacle portion of the container,

Figure 10 is an enlarged cross-sectional illustration of the interengagement of the lid and receptacle portion of the container of the second embodiment of the invention when closed,

Figure 11 is a perspective view, partially broken away, of another embodiment of the invention,

Figure 12 is a side view, partially broken away, showing a pair of the containers of Figure 11 nested together,

Figure 13 is a perspective view, partially broken away, showing the container of Figure 11 as it may be packaged for marketing with a protective sterile covering,

Figure 14 is a view like that of Figure 13 showing a complete urine specimen collection kit as packaged for sale in sterile condition,

Figure 15 shows a container in accordance with the
invention with the hinged lid in sealing engagement on the container cup, and

Figure 16 illustrates in schematic form a variety of alternative configurations (a) through (1) for sealing the lid of the container to the container lip flange.

A first embodiment of a nestable container 10 according to the invention is shown in Figures 1 through 7. The container 10 includes a lid 12 which is hingedly secured to a receptacle 14.

The receptacle 14 has an open top, a base 16, opposite sides walls 18, a front wall 20, and a rear wall 22. The walls 18 through 22 are integrally joined to one another and to the base 16. All of the walls 18 through 20 are tapered inwardly from the open top of the receptacle 14 to its base 16.

A neck 24 is formed in the receptacle 14 adjacent its open top. The neck 24 also preferably includes an outwardly protruding rim 26. The neck 24 is angled inwardly toward the open top, as best shown in Figure 3, to provide a locking interengagement with the lid 12, as described in greater detail below.

The receptacle 14 also has an expanded portion comprising a distention 28 in each side wall 18 immediately adjacent the rear wall 22. In this embodiment of the invention, each of the distentions 28 extends from the open top of the receptacle to the base 16 and, as illustrated, the width of the receptacle between the distentions is the maximum width of the receptacle.

The lid 12 is shaped to conform to the open top of the receptacle 14 in order to seal the receptacle when the lid 12 is closed on the receptacle 14. The outer border of the lid 12 includes a leg 30 extending upwardly from the periphery of the lid 12 and an outwardly protruding flange 32 extending from the periphery of the leg 30. As best shown in Figure 3, the leg 30 is parallel to and abuts the neck 24 when the lid 12 is closed. At the same time, the flange 32 abuts the rim 26. The flange 32
extends slightly beyond the rim 26 to permit easy opening of the container 10.

An integral or "living" hinge 34 secures the lid 12 to the receptacle 14. The hinge 34 extends between the flange 32 of the lid 12 and the rim 26 of the receptacle 14. The hinge 34 is composed of two hinge portions rather than a single elongated hinge extending the width of the rear wall 22 since, normally, a hinge of such length is unnecessary and is often undesirable since the plastic material of the container 10 can be rather stiff in such long lengths, making it relatively difficult to close the lid 12 on the receptacle 14.

The rear wall 22 includes a transverse recess 36 having a ledge 38 as shown. The recess 36 is located in registration with a portion of the outer border of the lid 12 when the lid is fully opened against the rear wall 22 such that the leg 30 of the lid 12 releasably engages the ledge 38 to retain the lid 12 in a fully-opened orientation. With the lid 12 thus held in place, the containers 10 can be nested one within the other, as shown in Figures 4 and 6, with the width of the flange 32 determining the depth to which each container 10 is inserted within the next-lower container 10.

Container 40 of a second embodiment of the invention is shown in Figures 8 through 10. The container 40 includes a lid 42 hingedly secured to a receptacle 44.

The receptacle 44 includes a flat base (not illustrated) and side walls 46 which are tapered inwardly from the open top of the receptacle 44 to its base. In this embodiment of the invention, the opposite side walls 46 are curved toward one another and joined to form a unitary receptacle wall.

The container 40 includes an expanded portion comprising a distention 48 in each of the side walls 46. The expanded portion defines at least part of a rear wall 50 for the receptacle 40, with the width of the receptacle 44 between the distentions 48 being the maximum width of
the receptacle 44.

In this embodiment of the invention, the lid 42 also can be locked to the receptacle 42 when closed. The receptacle 44 includes an inner peripheral groove 52 adjacent its open top. A corresponding bead 54 is formed in the outer periphery of the lid which, when closed as shown in Figure 10, directly engages and snaps within the groove 52. A peripheral shoulder 56 is formed in the receptacle 44 adjacent to and beneath the groove 52 to support the lid 42 when closed. Similarly, the lid 42 includes a protruding rim 58 which rests upon the top of the receptacle 44 when the lid 42 is closed.

A tab 60 is included on the lid 42 to facilitate opening of the container 40. Alternatively, the tab 60 can be eliminated so long as the rim 58 in the vicinity of the tab 60 extends beyond the wall of the receptacle 44 to aid opening the container 40.

An integral or "living" hinge 62 secures the lid 42 to the receptacle 44. As in the first embodiment of the invention, the hinge 62 need not extend the entire width of the abutting areas of the receptacle 44 and lid 42.

As shown in Figure 8, the containers 40 are shaped to nest one within the other, each having its lid 42 folded against its rear wall 50 and inserted within the next-lower container 40. As in the first embodiment of the invention, the lid 42 defines the depth to which one container 40 penetrates into the next-lower container 40. The depth of penetration is limited by the front-to-rear outer width of the receptacle 44 plus the thickness of the folded-back lid 42. When this dimension exceeds the front-to-rear width of the opening of the receptacle 42, the container 40 can penetrate no further.

A third embodiment 130 of the invention is depicted in Figure 11 with one side wall partially broken away for purposes of illustration. The nestable container 130 of Figure 11 has a cup 131 which is generally triangular in horizontal cross section with rounded corners. It has a
closed bottom 132, side walls 134 and a top opening 136 generally surrounded by an outwardly extending flange 138 which fairs into a flexible plastic hinge on the back side. Attached to the hinge 140 as an integrally formed part is a lid 142. The container cup 131 is tapered slightly from top to bottom, the bottom being smaller in horizontal cross section than the top. As with the embodiment of Figures 8-10, the lid is provided with a peripheral ring 144 for mating with a corresponding peripheral recess 146 in the container 131 which, in cooperation with the flat surfaces at the sides of the lid 142 and the peripheral flange 148 which contact corresponding surfaces of the container 131, develop an improved seal when the lid is closed. The dimension of the lid 142 in the direction from front to back—that is, in the direction which is orthogonal to the hinge 142—is less than the height of the container 131, thereby enabling the container with lid folded against the back of the container, or simply depending from the hinge 140 as depicted in Figure 11, to stand stably in an upright attitude when set on a flat surface.

Figure 12 shows a pair of containers 131 with lids 142 attached by hinges 140 in a nested configuration, which is the way in which the containers are stacked for shipment and storage. As is apparent from Figure 12, the containers nest together with approximately 75% of the extent of one container set into the next container. The triangular shape of the containers and the lids, together with the taper from top to bottom, makes it possible for the containers to nest together in this manner and to the extent indicated.

Figure 13 depicts an arrangement which is designed to be provided in sterile condition, the sterility being maintained up to the point of use. The arrangement 130' of Figure 13 utilizes a container cup 131 with integral lid 142 attached by a flexible plastic hinge 140, exactly like the unit 130 of Figure 11. In addition, the
combination 130' includes a pair of thin plastic bags for maintaining the unit in a sterile condition. The first bag 150 is indicated by broken line outline and is shown encasing the lid 142. It is open at the upper end adjacent the hinge 140. The entire unit--container 131, lid 142 and lid bag 150--is enclosed within a double pocket bag 152 formed of thin flexible plastic. This bag is about twice as long as the height of the container 131 and the upper end is sealed after the container and lid assembly is placed therein. The upper end is then folded back inside the container 131 so that the unit 130' may nest with other similar units in a configuration similar to that shown in Figure 12. These units are sterilized by irradiation after the outer bags 152 are sealed and are maintained in sterile condition until the bag 152 is opened at the point of use. This unit provides a very cheap, sterile, disposable specimen container or the like which can be used for collection of a urine sample, for example. In use, the user opens and removes the protective bag 152 while maintaining the lid bag 150 in position. After depositing a specimen in the container 131 while using the lid 142 within the lid bag 150 as a handle, the user lays the container 131 on a shelf or table surface, carefully removes the lid bag 150 and, handling the lid 142 only by its outer surface, folds the lid 142 into position to close the opening of the container 131. Thus the specimen collected in the container 131 is maintained free of contamination from handling.

Figure 14 shows an arrangement of a midstream urine specimen collector 160 as a complete clean-catch collector kit. This includes a unit like the unit 130' shown in Figure 13, having a collector 131 and integral lid 142 attached by flexible plastic hinge 140, together with a lid protector bag 150 and the sterile package bag 152, with the addition of a pair of packaged towelettes 162 tucked into the recessed space of the lid 142 adjacent the
back of the container 131. Since these take no additional space, the kits 160 can be nested together in the manner illustrated in Figure 12. In using the kit 160, the user opens the sterile container bag 152 and removes the entire unit from the bag. Using one of the towelettes 162, the user cleanses the area surrounding the urethral opening and voids initially into a toilet or urinal to eliminate the first-voided portion of urine which is more likely to be subject to natural contamination. The midstream portion is then voided into the container 131, after which the container is sealed by closing the opening with the lid 142 in the manner already described. The second towelette is then used to cleanse the user's hands, and the uncontaminated specimen within the collector container is ready for processing.

It will be appreciated that it is important to maintain a good seal between the lid and the container when the lid is closed in the manner shown in Figure 15. This is important to prevent outside contamination from reaching any specimen which may be stored within the container. It is also important to keep any specimen from leaking out of the container, should it be jostled in transporting or tipped from its stable upright orientation. Arrangements of peripheral ring seals have already been shown and described in connection with the embodiments of Figures 8-11. This sealing arrangement may be improved upon in accordance with an aspect of this invention by using particular configurations of the lip of the container surrounding the opening and the mating peripheral edge of the lid 142. In particular, it is preferable to provide a configuration which establishes contacting flat surfaces of the peripheral regions of the container and lid adjacent the actual sealing portions. This makes it more difficult for any liquid, either inside or outside the container 131, to reach the actual sealing elements, thereby insuring that the pressure of any liquid at the seal is minimized. In addition, the effectiveness
of the sealing arrangement may be improved by incorporating a labyrinth portion which further inhibits the traverse of any liquid to the sealing members, or by developing shapes incorporating reentrant elements which squeeze together and maintain a pressure against the entrance of any liquid to or past the sealing portion when the lid 142 is placed on the container 131.

A variety of possible configurations which may be provided for this purpose is shown in Figure 16, views (a)-(l). These views may be considered as alternative sections taken at a line 16-16 of Figure 15, looking in the direction of the arrows. In each of views (a)-(l), the lip of the container 131 is represented by the line on the left and the corresponding mating peripheral portion of the lid 142 is represented by the line to the right.

In view (a) of Figure 16, the peripheral ring 122 on the lid 142 and the peripheral recess 120 of the container cup 131 are shown. On both sides of the seal 120, 122 there are pairs of contacting flat surfaces 166, 168 and 170. These respective pairs of flat surfaces are in contact with each other when the lid 142 is in position to close the opening of the container cup 131. Being in contact with each other, these adjacent flat surfaces serve to prevent or inhibit any liquid from reaching the actual sealing members 120, 122.

View (b) of Figure 16 shows another set of pairs of flat surfaces 166, 168 and 170 similarly arranged relative to the sealing members 120, 122. This configuration, however, also develops the reentrant portion including the surfaces 168 which, because of the negative slant to these surfaces, develops outward pressure from the lid to the cup by virtue of the lid having to be forced into position past the point of intersection of surfaces 166 and 168 of the cup 131, thereby further inhibiting any liquid or other contaminated material from reaching the sealing members 120, 122.

View (c) of Figure 16 shows pairs of flat surfaces.
166, 170 on opposite sides of the sealing members 120, 122. In this configuration, pressure is developed between the adjacent surfaces of the lid 142 and cup 131 by virtue of the fact that the lid 142 is sized to develop a press fit when it is placed in position within the opening of the container 131, thus slightly deforming and stretching the periphery of the lip of the cup.

View (d) of Figure 16 shows another configuration of flat surfaces 166, 168 and 170, arranged by pairs on opposite sides of the sealing members 120, 122. The effect of these flat surfaces is similar to that described above with respect to view (a).

The configuration of view (e) of Figure 16 shows another arrangement of respective pairs of flat surfaces on opposite sides of the sealing members 120, 121 with an additional pair of flat surfaces 169 between surfaces 168 and 170 and at an angle thereto. The surfaces 168, 169 develop a reentrant section which serves to establish a pressure or squeeze between the peripheral portions of the lid 142 and the cup 131, thereby further inhibiting the passage of any liquid to the sealing members 120, 122 from within the container.

View (f) of Figure 16 is like the configuration of view (e), with the addition of a second pair of sealing elements 120', 122'. This double seal afforded by the members 120, 122 and 120', 122' is very effective, since it includes the features of two separate seals, flat contacting surfaces, and reentrant portions to generate a pressure force holding the surfaces in contact when the lid is in the closed position.

View (g) of Figure 16 shows a pair of sealing members 120, 122 which, instead of being slightly rounded as in previous configurations, are formed as intersecting flat surfaces. As in the other configurations, the sealing members are protected by adjacent pairs of flat surfaces 166, 170. View (h) shows a similar arrangement of flat surface pairs 166, 168, 169, 170 on opposite sides
of sealing members 120, 122. This differs from the prior views in that the members 120, 122 are formed between flat surfaces 168, 169 which are maintained at an angle relative to the horizontal flat surfaces 166 and the vertical flat surfaces 170.

View (i) is similar to the double seal configuration of view (f), except that the sealing members 120, 122 are placed at the intersection between horizontal flat surfaces 166 and slanted flat surfaces 168. This enhances the effectiveness of the reentrant portions formed by surfaces 168, 169 between the two sets of seals 120, 122 and 120', 122'.

View (j) shows a labyrinth configuration comprising three sets of sealing members 120, 122, 120', 122' and 120", 122" mounted along slanted flat surfaces 168 which extend between horizontal flat surfaces 166 and vertical flat surfaces 170. The effectiveness of this sealing configuration is improved by virtue of the multiple sets of sealing members which develop the labyrinth path in addition to the effectiveness of the flat surfaces 166, 170 in preventing liquid from reaching the sealing members.

View (k) shows two sets of sealing members 120, 122 and 121, 123 which are immediately adjacent each other, situated between horizontal flat surfaces 166 and slanted flat surfaces 169. In this arrangement, the members 121, 123 are arranged inversely to the way in which the sealing members are shown in the previous views; that is, the peripheral ring is located on the cup lip 131 and the peripheral recess is on the periphery of the lid 142. This develops somewhat of a labyrinth effect in addition to the dual sealing feature which is afforded by the two sets of sealing members.

View (l) of Figure 16 shows a first pair of sealing members 120, 122, cupped in a first direction and situated adjacent the peripheral flat surfaces 166, and a second pair of sealing members 121, 123 cupped in the opposite
direction and displaced from the sealing members 120, 122 by a pair of flat surfaces 168. An additional pair of flat surfaces 170 is situated between the sealing members 121, 123 and the interior of the cup 131.

It will be appreciated that the various arrangements in accordance with the present invention provide improved sealable containers which may find a variety of uses. They may be manufactured very readily and at very low cost, thus facilitating their use as disposable containers. They can be marketed in various configurations, either sterilized or un-sterilized, as may be desired. In a sterile configuration, one particular arrangement in accordance with the present invention may be used in combination with a pair of towelettes to constitute a complete urinary specimen collection kit which is much less expensive than those presently on the market and at least as effective as many which are in customary use.
Claims

1. A nestable container having a base, an open top, and side walls extending from the open top to the base in an inwardly tapered fashion, characterized by a hinged lid which is integrally formed with the top, is shaped to conform to the open top of the cup and tapers inwardly from the hinge to the terminal portion of the lid so that, when folded open against the rear wall, it co-extends with the rear wall in order that like containers can be nested one within the other with the lid extending into the receiving cup.

2. The container of claim 1 further characterized by the rear wall of the cup and the lid being shaped to releasably hold the lid against the rear wall.

3. The container of claim 1 wherein the open top has a peripheral lip extending about the opening, further characterized by the opening being narrower at the lip portion remote from the hinge than it is adjacent the hinge.

4. The container of claim 3 further characterized by the cup having an expanded portion joined to the side walls and extending from the open top toward the base, the expanded portion forming at least part of the rear wall and including a distention in each side wall, the width of the cup between the distentions being the maximum width of the cup.

5. The container of any of claims 2-4 further characterized by the rear wall including a transverse recess adjacent the base and the lid including a
protruding border portion in registration with and engageable within the recess when the lid is opened co-extensive with the rear wall.

6. The container of claim 3 further characterized by the cup being generally triangular in horizontal cross section and by the lid being generally triangular in outline form, corresponding to the shape of the cup opening.

7. A container according to any of claims 3-6 further characterized by mating portions extending about the lid and about the cup adjacent the lip, respectively, for sealing the lid to the cup when the lid is closed over the open top.

8. The container of claim 7 wherein the mating portions are characterized by an inner peripheral groove in the cup adjacent the open top and a corresponding bead formed on the outer periphery of the lid.

9. The container of claim 8 further characterized by a peripheral shoulder in the cup adjacent to and beneath the groove to support the lid when closed.

10. The container of claim 3 further characterized by a neck in the cup adjacent the open top which is angled inwardly toward the opening and a peripheral border corresponding to the neck formed on the lid, the border being shaped to engage the neck in a snap lock fashion.
11. The container of claim 3 further characterized by an outwardly extending flange about the periphery of the cup adjacent the lip and a corresponding flange on the lid for maintaining flat surface contact between the flanges when the lid is closed over the open top.

12. The container of claim 7 wherein the mating portions of the lid and cup lip are characterized by a pair of mating sealing members and by corresponding pairs of flat surfaces on opposite sides of the sealing members.

13. The container of claim 12 wherein the periphery of the lid and upper portion adjacent the cup lip are characterized by a pair of mating labyrinth members to effectuate a liquid seal.

14. The container of claim 12 wherein the periphery of the lid and upper portion adjacent the cup lip are characterized by mating re-entrant portions to squeeze the opposed surfaces together.

15. A specimen collection kit including the container of any of claims 1-14 wherein the lid is characterized by a central recessed portion and further including a pair of packaged towelettes positioned within the recessed portion as the lid is folded downwardly against the rear wall of the cup, and further characterized by a protective plastic bag encasing the lid and by a double pocket sealed plastic enclosure for maintaining the contents thereof in sterile condition while permitting the nesting of each kit container within an adjacent kit container.