A portable receptacle has first and second body portions which are actuable between open and closed conditions about a first axis. The body portions are shaped such that the receptacle has a generally hollow interior when closed. The body portions are joined at a hinge having a hinge axis, the hinge axis being obliquely angled relative to the first axis in the closed receptacle condition such that the hinge deflects relative to the first axis during opening. The receptacle may advantageously be opened by applying a deflection force to the hinge which results in the movement of an edge of the first body portion away from the second body portion. A pair of hinges may be provided. The receptacle may take the form of a case for spectacles.
PORTABLE HINGED RECEPITACLE

CROSS REFERENCE TO RELATED APPLICATION


TECHNICAL FIELD

[0002] The present invention relates to portable receptacles of the type which open about a hinge, and more particularly to cases having a generally rigid wall construction for the protection of articles therein.

BACKGROUND

[0003] There are numerous examples of generally rigid cases having a so-called ‘clamshell’ design in the prior art. Such cases generally comprise of a pair of opposing concave case members, which are connected together by a conventional hinge arrangement such that the case can open and close to allow articles to be stored and retrieved from the interior of the case. Spectacles cases are one example of such receptacles.

[0004] The hinge arrangement for such cases comprises a pair of hinges which are spaced along the opposing edges of the case members. This configuration generally provides the case with a degree of rigidity. Also the hinges may be biased towards a closed condition by a resilient member in the, or each, hinge assembly. Such an arrangement helps to prevent a case opening by accident and thereby allowing articles to be spilled out of the case.

[0005] However the inventor has determined that there are a number of problems with such cases. In particular, the opening of the case is a two-handed operation, whereby the adjoining edges of the case halves are required to be pulled diametrically apart. Thus, the method of opening the case can cause significant problems for certain users who are physically impaired or for whom the degree of articulation of at least one hand is limited.

[0006] Furthermore, the hinges of such cases are typically biased towards open or closed conditions to such an extent that the case snaps open or closed when actuated by a user. This causes a problem in its own right, but when considered in light of the problem described above, it will be appreciated that when a user with reduced manual dexterity attempts to open the case, the force with which the case opens can cause the contents to be propelled from the case. This is a particular problem for receptacles since the lens surface can be scratched or otherwise degraded by unwanted impact with hard surfaces or objects.

[0007] Solutions to such problems have been addressed in the past by the provision of a case that is hinged about its shorter edge or depth and which has a releasable latching mechanism that can be actuated by a user to open the case. Whilst this type of case does provide one solution to the above problems, the provision of a spring-loaded latching mechanism adds significant complexity and cost to the manufacture of such cases. Furthermore, the access to the case interior is restricted by the cross-sectional area of the opening which is far smaller than that of a case which hinges about its length.

BRIEF SUMMARY

[0008] It is an aim of the present invention to provide a receptacle which opens and/or closes in an improved manner. It may be considered an additional or alternative aim of the invention to provide a receptacle with is simple and/or cost effective to manufacture.

[0009] According to a first aspect of the invention, there is provided a portable receptacle having first and second body portions which are actuable between open and closed conditions about a first axis, the body portions being shaped such that the receptacle has a generally hollow interior when closed, wherein the body portions are joined at a hinge having a hinge axis, the hinge axis being obliquely angled relative to the first axis in the closed receptacle condition such that the hinge deflects relative to the first axis during opening.

[0010] The receptacle may advantageously be opened by applying a deflection force to the hinge which results in the movement of an edge of the first body portion away from the second body portion. In this manner the receptacle may advantageously be opened using one hand only. Such a receptacle may provide a more ergonomic design.

[0011] The hinge axis may be obliquely angled relative to the first axis in the open condition.

[0012] In one embodiment, the first and second body portions are joined at both first and second hinges, which are spaced apart in the direction of the first axis. Either or both of the hinge axes may be angularly offset from the first axis in the open and/or closed condition. The hinge axes may both be obliquely angled relative to the first axis by an approximately equal angle. The angle formed between one hinge axis and the first axis in either condition may be substantially equal to the corresponding angle formed between the axis of the other hinge and the first axis in that condition. The first and second hinge axes may be angled in opposing senses relative to the first axis.

[0013] The angle formed between the, or each, hinge axis and the first axis in either the open or closed condition may be an acute angle. The angle may be less than 30° and typically less than 20°. The angle may be between 2° and 10°.

[0014] The first and second hinges may be spaced by an aperture or opening, which may be provided, for example, in a rear body portion of the receptacle. The opening may be curved or arcuate in shape. The opening may be circular or elliptical in shape.

[0015] The opening allows the hinges to be spaced in a manner which advantageously reduces the forces which needs to be applied in order to deflect the hinges and thereby open or close the receptacle.

[0016] The material properties, for example stiffness or bending resistance, may be tailored to ensure a relatively gentle biasing of the receptacle body portions between open and closed conditions. This feature may advantageously be coupled with the deflection angle of the hinge(s) to allow a relatively smooth opening action which is biased towards the open condition once the hinge(s) are deflected beyond the first axis.

[0017] The first and second body portions may be formed of a single piece of material. The first and second body portions may be integrally formed. The material of the first and second body portions may be a plastic.

[0018] In one embodiment the, or each, hinge comprises a crease, which is typically provided in a single piece of material, which is common to the first and second body portions, for example at an interface between the first and second body
portions. Either or both of the first or second body portions may comprise a fold in the vicinity of the, or each, hinge.

[0019] The first and/or second body portions may be generally concave in shape. The first and/or second body portion may comprise first and second angled walls. The first wall may comprise or adjoin the hinge. The first wall of the first body portion may adjoin the first wall of the second body portion at the hinge. The first wall may comprise a spine of the receptacle. The first and second wall may meet along an edge or vertex which extends generally along the length of the receptacle.

[0020] The first and/or second body portions may comprise a thin-walled construction and may, for example, be formed of sheet material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Practicable embodiments of the invention are described in further detail below with reference to the accompanying drawings, of which:

[0022] FIG. 1 shows a three dimensional view of a receptacle according to one embodiment of the invention in a closed condition;

[0023] FIG. 2 shows an end view of the receptacle of FIG. 1 in the closed condition;

[0024] FIG. 3 shows an end view of the receptacle of FIG. 1 in an open condition;

[0025] FIG. 4 shows a three dimensional view of the receptacle of FIG. 1 from behind;

[0026] FIG. 5 shows a three dimensional view of the receptacle of FIG. 1 from the front;

[0027] FIG. 6 shows a schematic longitudinal section through a receptacle according to one embodiment of the present invention in a closed condition; and

[0028] FIG. 7 shows a schematic longitudinal section through the receptacle of FIG. 6 in an open condition.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0029] The present invention provides a receptacle which is more ergonomic than conventional hinged receptacles. In particular, the present invention provides for a receptacle with a novel construction such that it can be opened by depressing a rear wall of the receptacle. This mode of opening allows the receptacle to be opened and closed for example with a single hand of a user.

[0030] The invention is applicable to portable receptacles which may be carried by hand, typically in one hand. The invention is particularly suited to generally pocket-sized receptacles, such as for example spectacle cases. However, the invention is not so limited and may be applied to other portable receptacles such as stationery or pencil cases, cases for make-up or medical cases, which may be used for example to carry medicines or medical devices, such as syringes, inhalers, wound dressings or other sterile equipment. It will be appreciated that the receptacle of the present invention may be applicable in general to any portable cases for which a generally rigid or solid wall construction is of benefit, which may be of generally clamshell design.

[0031] Turning now to FIGS. 1 to 3, there is shown a receptacle 10 having opposing body portions 12 and 14. Each body portion 12, 14 defines substantially one half of the receptacle 10 and is generally concave in shape. Each body portion is generally shaped like a hollow wedge of a sphere and has a curved front wall 12A, 14A and a rear wall 12B, 14B. The rear walls are generally planar in form whilst the front walls are curved. The front walls have curved edges 16, 18 which are joined at opposing vertices 20, 22 at each end of the receptacle.

[0032] The receptacle 10 is opened and closed about an axis extending substantially between the opposing ends or vertices 20 and 22 of the case.

[0033] The body portions are joined at their rear walls at a hinge to be described below. The opposing body portions 12 and 14 meet in the closed condition at their edges 16A, 16B which are correspondingly shaped. Those edges are similarly curved and in this embodiment have a generally hemi-elliptical shape.

[0034] Each edge 16A and 16B has a lip formation 24A, 24B along at least part of its length which overlaps with the corresponding lip formation on the opposing edge when the case is closed. Such lip formations thus serve to form a tight closure which prevents the ingress of unwanted material into the case when closed.

[0035] In FIGS. 4 and 5, further details of the case of FIGS. 1 to 3 are shown as will be described below. Each of the body portions 12 and 14 comprise a relatively thin wall structure, such that the material thickness is at least an order of magnitude less than the width or depth dimensions of the body. The body portions are formed of a plastic material which is of thickness and stiffness sufficient to provide a generally rigid case. Such body portions may be considered to provide a shell of the case. However the body portions, particularly at the rear wall, are sufficiently to allow a degree of flexing in response to a manually applied force. In this context, a manually applied force may be considered to relate to a force applied for example between a thumb and finger(s), such as a pinching force and may comprise a few Newtons, such as for example fewer than 10 N.

[0036] The body portions may be formed by a moulding process such as injection moulding. In particular the body portions may be co-formed as a single, unitary piece.

[0037] In order to show the details of the body portions, the polymer material is shown as being exposed. This may represent one embodiment of the invention. However, the plastic body portions will typically be covered or coated with a further material layer. Such a layer may comprise a fabric, leather, faux-leather or another natural or manmade textile layer or another conventional lining or cover material. Such materials may be adhered or otherwise bonded to the body members in order to provide the desired finish or surface properties for the case. In different embodiments, a lining may be provided only on an interior surface of the body portions; a cover material may be provided only on an outside, convex surface of the body portions; or else suitable cover material, or else a combination of different materials, may be provided to both the inner and outer surfaces of the body portions.

[0038] In FIGS. 4 and 5, further details of the rear walls 123 and 143 are shown. Each rear wall 123 and 143 is curved in the form of an arc such that the combined rear walls in plan take the general form of an oval. However the opposing arcuate shapes of the rear walls 123 and 143 form a discontinuity or opening 26 in the rear of the case. The opening is curved in the form of ellipse. In an embodiment in which a flexible lining or cover material is provided, such material may span and/or cover the opening such that the interior of the
receptacle is protected from the exterior when in the closed condition. However the opening may be exposed in alternative embodiments.

[0039] The rear walls 12B and 14B are joined by a pair of spaced hinge formations 28 and 30 located on either side of the rear opening 26. The hinge formations provide a spine of the receptacle 10. The hinge formations in plan are generally aligned with a longitudinal axis of the receptacle 10 such that the receptacle is formed of a pair of body portions, each of which is substantially a reflection of the other. However the hinges are substantially misaligned or angularly offset when viewed from another direction as will be described below.

[0040] The hinge formations in this embodiment comprise folds or creases in the rear wall of the receptacle. The wall thickness may be reduced along the length of the hinges in order to promote bending along the hinge. Additionally or alternatively one or more discontinuities, such as a series of perforations, may be provided along the length of the hinges in order to provide the desired bending properties.

[0041] The hinges extend from the outer edges 20, 22 of the receptacle inwards and are each of length between approximately a quarter and a third of the length of the receptacle. Accordingly the opening in this embodiment is of length between a third and a half of the receptacle length.

[0042] Also visible in FIG. 8 are a plurality of strengthening ribs 32 provided at spaced locations along the interior side of edge 18. The ribs span the front and rear walls of the respective body portion and thereby hold the front and rear walls at a desired orientation in the vicinity of edge 18.

[0043] Each body portion may have an engagement formation 34 located at the edge 16. The engagement formations on each of edges 16A, 16B is arranged to releasably engage with the opposing engagement formation on the corresponding edge of the other body portion when the case is closed. In this embodiment one engagement formation comprises a projection and the other comprises a recess which is arranged to receive the projection therein in the manner of an interference or friction fit. Thus the engagement formations may serve to hold the opposing body portions in the correct closed alignment but may yield upon application of an opening torque thereto.

[0044] Turning now to FIGS. 6 and 7 there is shown longitudinal sections of the receptacle 10 in closed (FIG. 6) and opened (FIG. 7) conditions. The edge 26 defining the opening 26 is shown in phantom, as is the edge 18, whereas the edge 16 and hinges 28, 30 are shown as solid lines.

[0045] The axis of rotation of the body portions during opening and closing is shown at 38, which defines a longitudinal axis of the receptacle 10.

[0046] As can be seen in the closed condition the hinges 28 and 30 are deflected outwardly. That is to say the hinges are angled with respect to the axis 38 such that the rear walls slope slightly outward of the interior of the receptacle. The hinges thus depend outwardly in a direction which is transverse to the longitudinal axis of the receptacle. The angle formed between the hinges 28 and 30 and the axis 38 is a few degrees, typically between 1 and 10°. It is also notable that the hinges are angled by the same degree but in an opposing sense or direction of rotation. In this embodiment the spaced hinges are angled towards each other.

[0047] During opening of the receptacle, a user can grip the front wall 12A, 14A of each body portion, for example between a thumb and one or more fingers of one hand, about the edges 18. The user can then apply an opening force to one or more rear walls 12B, 14B, typically in the region of one of the hinges. This can be achieved for example by gripping the receptacle between the thumb and middle finger of one hand and applying a deflection force to the rear wall using the index finger. Additionally the receptacle could be gripped using the thumb and the ring finger, leaving the index and/or middle finger free to apply the deflection force.

[0048] During opening, the user can also apply an opening force to the opposing edges 18 by pinching the edges 18 in a rearward direction using their thumb and the opposing gripping digit. Such a pinching force opposes the deflection force applied to the rear wall of the receptacle. Thus the spaced points of application of the pinching forces and deflecting force apply an opening torque to each body portion.

[0049] By gripping the receptacle in this manner and applying one or more opening forces described above, the body portions start to pivot about the axis 38 and, once the body portions have opened beyond a predefined angle, the hinges are deflected towards the axis 38. This deflection in the rear walls causes a biasing force which urges the receptacle into the fully open condition as shown in FIGS. 3 and 7. The biasing force is generated by the resilience of the rear walls deflecting and thereby being under compression such that they apply a torque about the hinges toward an open receptacle condition. This biasing force is caused by the material properties of the rear walls and beneficially does not require an additional spring or biasing element to be provided.

[0050] It has been found that the biasing force applied by the rear walls when deflected upon opening is relatively weaker than the spring opening mechanisms applied to a number of prior art receptacles of this kind. Accordingly the receptacle 10 opens relatively gently in a controlled manner and does not tend to eject the contents from the interior of the receptacle.

[0051] The manner in which the receptacle 10 opens is advantageous in general but is particularly beneficial for those with a physical impairment that reduces their manual dexterity. Also the receptacle is particularly useful for a user who is attempting to open a receptacle with one hand whilst their other hand is occupied with a different task.

[0052] As shown in FIG. 7, when the receptacle is open, the hinges are each deflected by a substantially equal angle relative to their orientation in the closed condition. Thus the hinges typically pivot during opening about the ends 20, 22 of the receptacle. In order to achieve the biasing force described above, the hinges are preferably deflected such that they pass through the axis 38 during opening. Thus in the open condition the hinges achieve an orientation wherein they are angled in an opposing sense relative to the axis 38. The hinges may be considered to be angled inwardly relative to the interior of the receptacle when opened. The angle formed between each of the hinges and the axis 38 remains substantially equal during the opening action and also when the receptacle is at rest in the open condition.

[0053] Whilst it is preferable that the hinges are angled inwardly in the open condition, for example by an angle between 1 and 10°, it will be appreciated that it is possible in an alternative embodiment that this angle could be negligible such that the hinges are approximately aligned with the axis 38 when open. The deflection angles of the hinges as well as the material properties of the body portions may be tailored to suit a desired opening/closing force of the receptacle.
Each body portion typically pivots by an angle of approximately 45° or more between the closed and open conditions such that the opposing edges 16A and 16B move through a total relative opening angle of 90° or more. The receptacle may offer the further advantage that it could open by a greater angle if desired.

When closing the device, a user may simply apply a closing force to the front walls 12A, 14A of the opposing body portions, for example by pinching the body portions together between a thumb and a finger of a single hand. During closing, the hinges and rear walls will deflect back to their closed orientations in response to the closing force.

As described above, the receptacle may be actuated between open and closed conditions using a relatively small actuating force typically of the order of one or two Newtons or less.

The supporting ribs 32 serve to maintain the structural rigidity of the receptacle and ensure that the maximum deflection of the rear walls occurs correctly about the hinges (i.e. at a location spaced from the reinforced edges 18). This helps to promote correct operation of the receptacle with repeated use such that the receptacle does not otherwise deform in an unwanted manner. The wall thicknesses of the body portions may also be tailored to provide greater stiffness in the vicinity of the front walls and edges 18 and a reduced stiffness in the vicinity of the hinges.

Whilst the embodiments described above make use of a curved opening 26, it will be appreciated that other shapes of opening may be provided. Furthermore the size of the opening may be reduced if desired to improve structural properties of the receptacle. It is to be noted that it is possible to achieve the above described opening action without providing an opening in the rear wall. However it has been found that the opening significantly improves the deflecting action of the hinges during opening and closing. In an alternative embodiment it may be possible to achieve a similar opening operation without an opening by reducing the wall thickness of the rear walls toward their central region (i.e. in the vicinity of the opening 26 shown in FIG. 4).

As a further development of the embodiments described above, it is also possible to provide an embodiment which is intended for single use, such that it may be disposable after opening. Such an embodiment may have, for example a fastening arrangement between the body portions 12 and 14, which is capable of opening, such that the case does not correctly close after first opening. Additionally or alternatively, the hinge arrangement can be angled such that, once opened the hinge is deflected in such a way that it does not readily return to the closed condition. Such single-use embodiments may, for example, be useful in a medical context or for other applications in which it is desirable to provide anti-tampering or tamper-evident features.

A portable receptacle having first and second body portions, at least one of said body portions being actuable relative to the other about a first axis between open and closed conditions, the body portions being shaped such that the receptacle has a generally hollow interior when closed wherein the body portions are joined at a hinge having a hinge axis, the hinge axis being obliquely angled relative to the first axis in the closed condition such that the hinge deflects relative to the first axis during opening.

2. The receptacle according to claim 1 wherein the hinge is angled outwardly of the interior of the receptacle in the closed condition.

3. The receptacle according to claim 1 wherein the hinge has a first end located towards an outer edge of the receptacle and extends part way along a length of the receptacle towards a second end of the hinge.

4. The receptacle according to claim 1, comprising a pair of hinges, the hinges being substantially equally but opposingly angled relative to the first axis.

5. The receptacle according to claim 1 wherein the first and second body portions are joined at both first and second hinges, said hinges being spaced apart in the direction of the first axis.

6. The receptacle according to claim 5 wherein the first and second hinges are spaced by an aperture.

7. The receptacle according to claim 6 wherein the aperture is elliptical.

8. The receptacle according to claim 1 wherein the angle of deflection of the hinge between the closed and open conditions is less than 10°.

9. The receptacle according to claim 1 wherein the hinge is arranged to deflect during opening of the receptacle such that the hinge passes through the first axis.

10. The receptacle according to claim 9 wherein the hinge is deflected during opening such that the hinge is obliquely angled relative to the first axis in the open condition.

11. The receptacle according to claim 1 wherein the deflection of the hinge causes a resultant force in the body portions during opening, which resultant force biases the body portions towards the open condition.

12. The receptacle according to claim 1 wherein the first and second body portions are integrally formed as a single receptacle body.

13. The receptacle according to claim 12 wherein the hinge comprises a crease or other line of weakness adjoining the first and second body portions.

14. The receptacle according to claim 1 wherein the first and/or second body portion comprise first and second angled walls, which meet along an edge which is spaced from the hinge.

15. The receptacle according to claim 14 wherein the edge is provided with one or more reinforcing formations.

16. The receptacle according to claim 14 wherein the first wall of each body portion is arched, such that the edge is curved and the first walls of each body portion meet at the hinge which runs substantially equidistantly between the opposing curved edges of the body portions.

17. The receptacle according to claim 16 wherein the opposing curved edges of the body portions terminate at a vertex at each end of the receptacle.

18. The receptacle according to claim 1 comprising a non-return member arranged to deform upon first opening of the first and second body portions in a manner such that the non-return member does not return to its pre-deformed condition upon subsequent closing of the body portions.