

DISPENSING CLOSURE

Field of the Invention

This invention relates to a dispensing closure for containers and relates particularly to a dispensing closure which is adapted to engage a container and facilitate dispensing of a material, such as a liquid, solid, powder or granular material, into the container.

Background of the invention

The invention will be described with particular reference to a cap for a liquid container, such as a beverage container. However, it will be appreciated that the principals of the invention can be applied to containers and closures of many different types to enable two or more materials to be kept separated up to the moment of use, and to then dispense, discharge or mix at least one of the materials into another. Thus, the invention is applicable to, for example, dispensing pharmaceuticals in liquid, powder, tablet or granule form into an appropriate medium for ingestion of the pharmaceutical; dispensing colour pigments, in liquid or powder form or in capsules, into base paint carriers; mixing cosmetic colouring material into a carrier; mixing chemicals, including catalysts and hardeners, and particularly those that may be toxic or dangerous to touch, into an active ingredient; discharging food flavouring, colouring, sweeteners or other food product into an appropriate beverage medium or the like. The invention is therefore useful for combining materials of many types where it is necessary or desirable to selectively dispense or mix one material or substance into another.

Discussion of prior art

A number of proposals have previously been made for containers to be constructed in a way that two products are maintained separated until the moment of use at which time one product is admixed with the other in the container. Containers of this type have been proposed with closures which are used to effect the product separation and facilitate the introduction of one product into the other. However, the containers and closures previously proposed are relatively complicated. For example, in one proposal, a closure is formed of three parts, a first part including a compartment to hold one product, the compartment being adapted to engage in the neck of a container, a second part which moves relative to the first part and has a means for opening a bottom wall of the compartment to release the first product into the container, and a sealing cap which engages over the compartment and second part to seal the closure on the container.

Such a structure is relatively complicated and expensive to manufacture, requires the assembly of three separate parts as well as introduction of a product into the compartment during assembly, and necessarily involves a number of separate actions in order to release the product in the compartment into the container.

ANCESTRY EX. 1021

In another proposal as outlined in Patent GB2012714, a container is disclosed having an inner wall which divides the container into two compartments. An upper compartment contains a piercing device that is moveable by pressure applied to a top wall to cause a tip of the piercing device to pierce a hole in the dividing wall.

5 However, this structure requires a moveable top wall and is, therefore, susceptible to accidental actuation.

It is therefore desirable to provide an improved dispensing closure for containers which obviates at least some of the disadvantages of previously proposed dispensing closures.

10 It is also desirable to provide a dispensing closure for containers whereby a material or substance in liquid, powder, solid, granular or other form is able to be quickly and easily dispensed into the product in the container on which the closure is attached.

It is also desirable to provide a dispensing closure for containers which is relatively easy to produce, assemble and use.

15 It is also desirable to provide a dispensing closure for a variety of container types, including beverage containers, paint containers, cosmetic containers and others.

It is also desirable to provide a dispensing closure which may be adapted for a variety of different products to be dispensed into the container on which the closure is mounted.

20 **Summary of the Invention**

According to one aspect of the invention there is provided a dispensing closure to dispense at least one product into a container, the closure including a container closure body adapted to sealingly engage with a neck of the container, the body having securing means to secure the closure to the container neck, a compartment to contain

25 the at least one product to be dispensed, the compartment being adapted to fit within the container neck and being defined by a side wall, a top wall and a frangible bottom wall, and cutting means moveable relative to the side wall and the bottom wall to break open the frangible bottom wall of the compartment to selectively dispense contents of the compartment into the container.

30 In one form of the invention, the closure body includes an outer, cylindrical wall and a coaxial inner wall. The outer wall is provided with internal threads adapted to threadingly engage the threaded neck of a container to which the closure is to be fitted. The inner wall engages within the container neck, and the compartment fits within the inner wall. The upper end of the compartment is formed with a radially outwardly

35 extending flange having reversely formed shoulders to engage corresponding shoulders on the closure body. In this way, the two parts of the closure are able to be snap-fitted together so that the compartment is able to rotate about its axis relative to the body. In this embodiment, the inner wall of the body carries a cutting knife edge which is inwardly and upwardly turned towards the frangible bottom wall of the compartment.

The bottom wall of the compartment extends at an angle to a plane perpendicular to the axis such that, in first assembled position, the bottom wall does not contact the knife. On relative rotation of the compartment, however, the frangible bottom wall is brought into contact with the knife which cuts and breaks the wall from the compartment
5 permitting contents thereof to be dispensed into the container to which the closure is fitted.

In another embodiment of the invention, the compartment and closure body are integral and are engaged with a cylindrical band which fits over the wall of the compartment. The band carries the cutting knife which operates in the manner
10 described above.

Preferably, the container closure body includes, on the lower end of the outer wall, a tamper proof evidence release band to provide any indication of tampering with the closure prior to its use.

According to another aspect of the invention there is provided a dispensing
15 device for dispensing product into a container, the device having a sealed compartment containing the product, the compartment having a substantially cylindrical side wall, a frangible bottom wall and a top wall, the compartment being adapted to fit within a neck of the container, the device further having an outer wall to engage an outer surface of the container neck and including securing means to secure the device to the
20 container, and cutting means adapted to be rotated relative to the frangible bottom wall, the cutting means and/or the frangible bottom wall being arranged such that the relative movement causes the cutting means to break open the frangible bottom wall of the compartment to selectively dispense contents of the compartment into the container.

The cutting means may extend from a separate cylindrical band coaxial with the
25 side wall of the compartment but rotatable relative thereto. Alternatively, the compartment and outer wall may be separate integers with the cutting means extending from an intermediate wall located between the compartment and the inner surface of the neck of the container.

According to a further aspect of the invention there is provided a method of
30 dispensing at least one product into a container, the method including the steps of assembling a compartment containing a product to be dispensed with a closure body, engaging the assembled closure with a neck portion of a container into which the contents are to be dispensed, providing a cutting knife adjacent to a bottom wall of the assembled closure, and rotating the knife relative to the bottom wall to cause the knife
35 to cut into the bottom wall to thereby release the contents of the compartment into the container.

According to a further aspect of the present invention there is provided a cutting knife for use with a dispensing closure, the knife being integrally moulded with a wall

of the closure, the knife having at least two cutting edges extending at an acute angle to each other.

In order that the invention is more readily understood, embodiments thereof will now be described with reference to the accompanying drawings wherein:

5 Figure 1 is a cross sectional, elevational view of a first embodiment of the invention;

Figure 2 is a cross sectional, elevational view of the first embodiment of the invention taken at 900 to that of Fig. 1;

10 Figure 3 is a cross sectional, elevational view of a second embodiment of the invention;

Figure 4 is a cross sectional, elevational view of the second embodiment of the invention taken at 900 to that of Fig. 3;

Figure 5 is a cross sectional, elevational view of a third embodiment of the invention;

15 Figure 6 is a cross sectional, elevational view of the third embodiment of the invention taken at 900 to that of Fig. 5;

Figure 7 is a cross sectional, elevational view of a fourth embodiment of the invention;

20 Figure 8 is a cross sectional, elevational view of the fourth embodiment of the invention taken at 900 to that of Fig. 7;

Figure 9 is a cross sectional, elevational view of a fifth embodiment of the invention;

Figure 10 is a cross sectional, elevational view of the fifth embodiment of the invention taken at 900 to that of Fig. 9;

25 Figure 11 is a cross sectional, elevational view of a sixth embodiment of the invention;

Figure 12 is a cross sectional, elevational view of the sixth embodiment of the invention taken at 900 to that of Fig. 11;

30 Figure 13 is a cross sectional, elevational view of a seventh embodiment of the invention;

Figure 14 is a cross sectional, elevational view of the seventh embodiment of the invention taken at 900 to that of Fig. 13;

Figure 15 is a cross sectional, elevational view of the seventh embodiment of the invention similar to Fig 14 showing the closure after an initial actuation;

35 Figure 16 is a cross sectional, elevational view of an eighth embodiment of the invention;

Figure 17 is a cross sectional, elevational view of the eighth embodiment of the invention taken at 900 to that of Fig. 16;

Figure 18 is a cross sectional, elevational view of a ninth embodiment of the invention;

Figure 19 is a cross sectional, elevational view of the ninth embodiment of the invention taken at 900 to that of Fig. 18;

Figure 20 is a cross sectional, elevational view of a tenth embodiment of the invention;

5 Figure 21 is a cross sectional, elevational view of the tenth embodiment of the invention taken at 900 to that of Fig., and showing an initial actuation of the closure;

Figure 22 is a cross sectional, elevational view of an eleventh embodiment of the invention;

10 Figure 23 is a cross sectional, elevational view of the eleventh embodiment of the invention taken at 900 to that of Fig. 1, and showing an initial actuation of the closure;

Figure 24 is a cross sectional, elevational view of a twelfth embodiment of the invention;

15 Figure 25 is a cross sectional, elevational view of the twelfth embodiment of the invention taken at 900 to that of Fig. 24, and showing an initial actuation of the closure

Figure 26 is a perspective view of a form of closure in accordance with embodiments of the invention;

Figure 27 is a perspective view of a compartment for a closure, shown upside down, in accordance with embodiments of the invention;

20 Figure 28 is a perspective view of another compartment for a closure, shown upside down, in accordance with embodiments of the invention;

Figure 29 is a perspective view of a further form of compartment for a closure, shown upside down, in accordance with other embodiments of the invention;

25 Figure 30 is an enlarged elevational view of one embodiment of cutting knife in accordance with the invention; and

Figure 31 is a perspective view of a further form of cutting knife in accordance with some embodiments of the present invention.

Referring to the drawings, Figures 1 and 2 illustrates a first embodiment of the invention in which a dispensing closure 15 has a compartment 16 defined by a
30 cylindrical side wall 17, a top wall 18 and a frangible bottom wall 19.

The height of the side wall 17 varies around the perimeter of the compartment 16 so that the bottom wall 19 extends at an angle to a plane perpendicular to the axis of the cylindrical side wall 17.

35 The closure of this embodiment includes a closure body 21 which comprises an outer side wall 22 and an intermediate wall 23. The outer side wall 22 is provided with internal threads 24 that engage with corresponding threads on the neck of a container 20 to which the closure is fitted. When fitted to the neck of a container 20 as shown, the intermediate wall 23 closely engages the internal surface of the container 20 neck.

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