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(54) **DISPOSABLE REFILL AMPULE**

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(57) **ABSTRACT**

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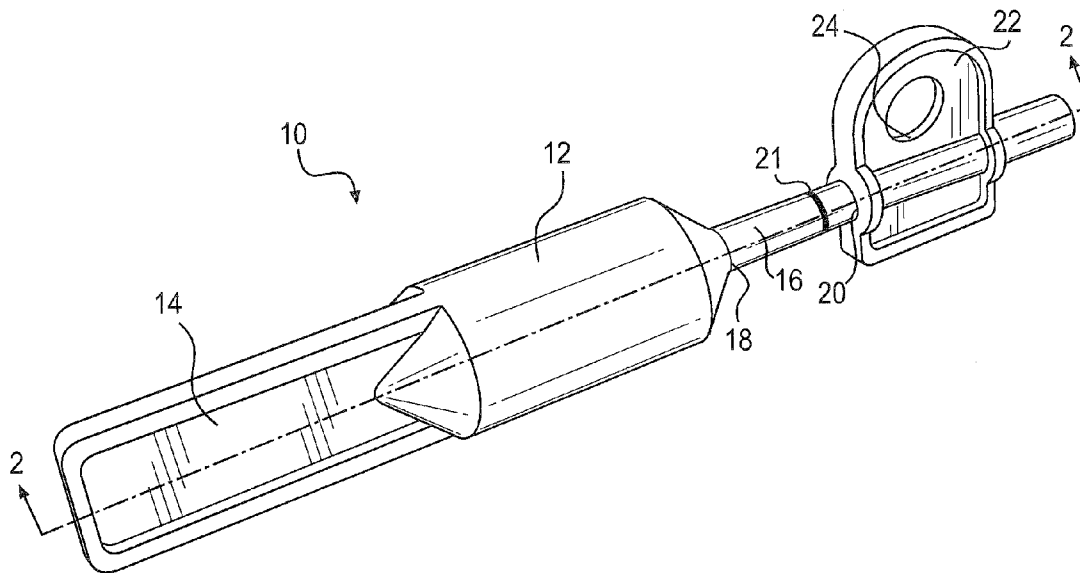
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A disposable refill ampule includes a hollow plastic body containing a liquid-filled reservoir sealed therein. The plastic body has a needle-nose projection extending outwardly from the plastic body. The projection is sealed on a distal end of the projection so that liquid is sealed inside the body and the projection. A connector is fixed to the projection near the distal end of the projection where it is adapted to be snapped off between the distal end and the connector to make the liquid available.



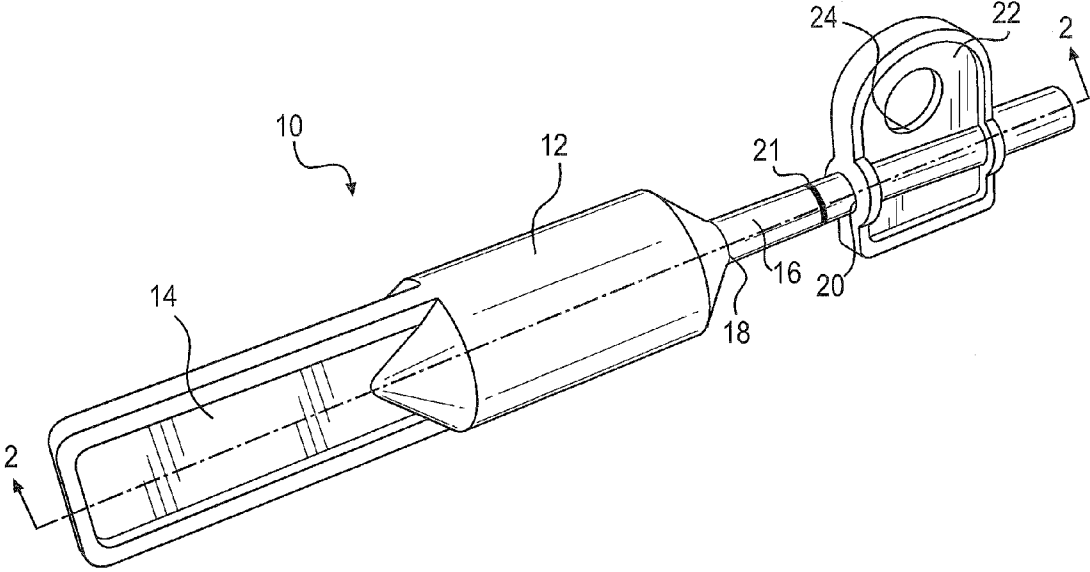


FIG. 1

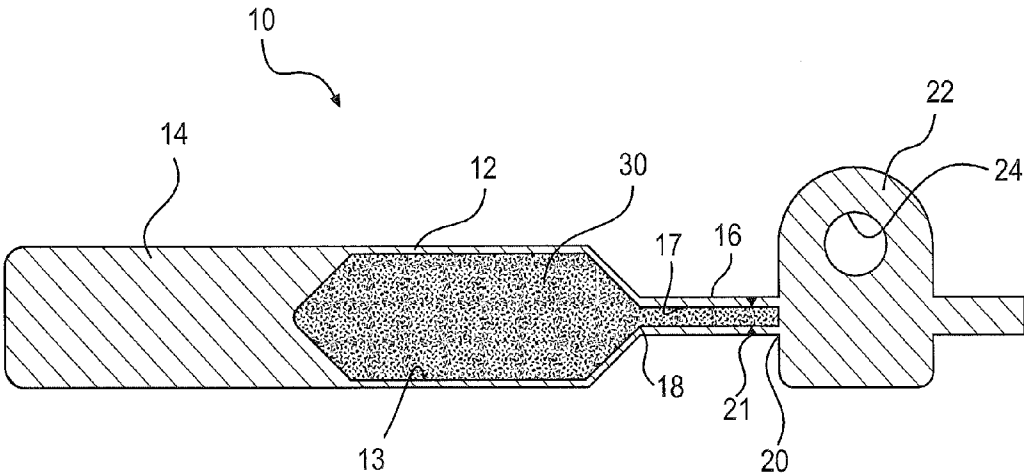


FIG. 2

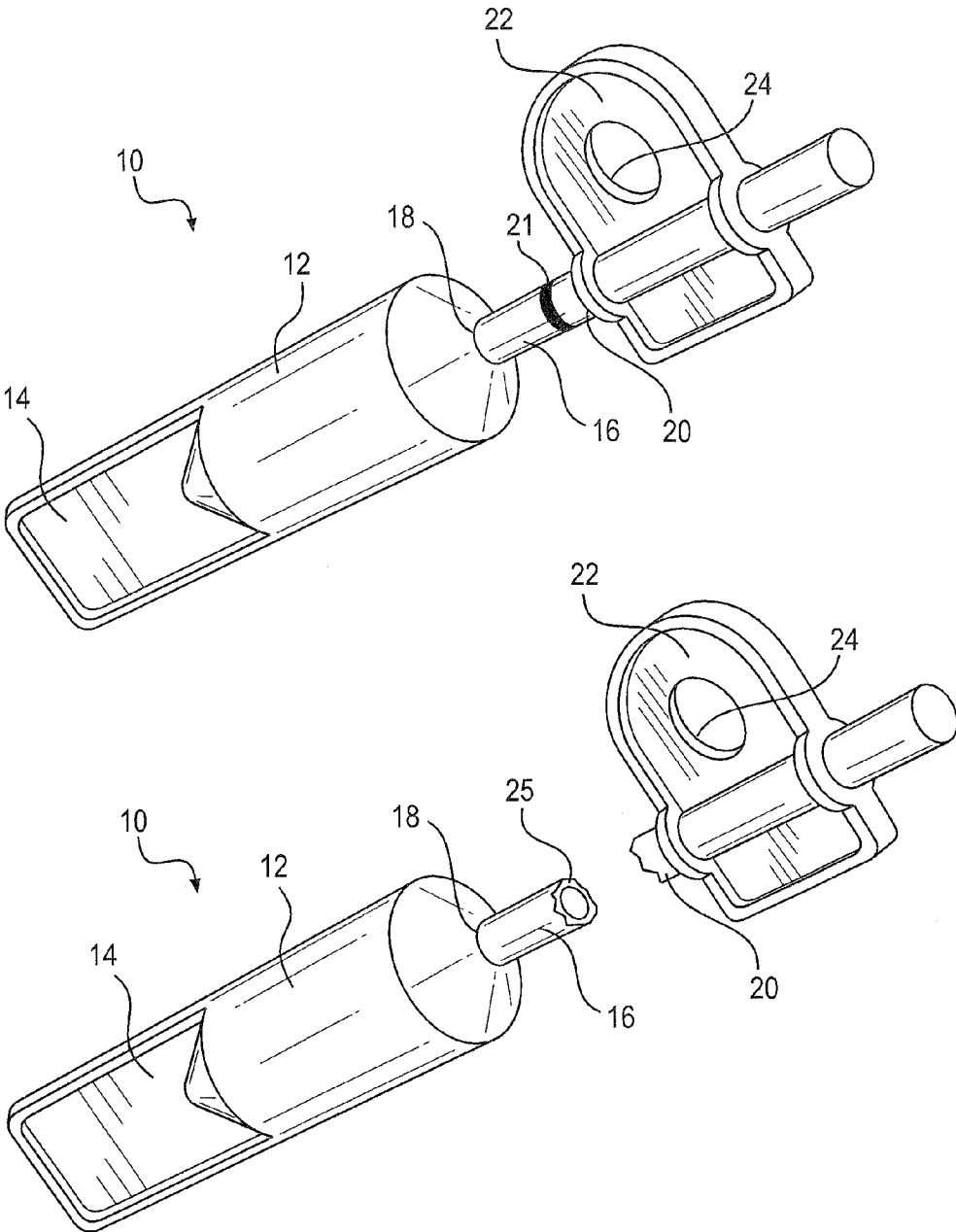


FIG. 3

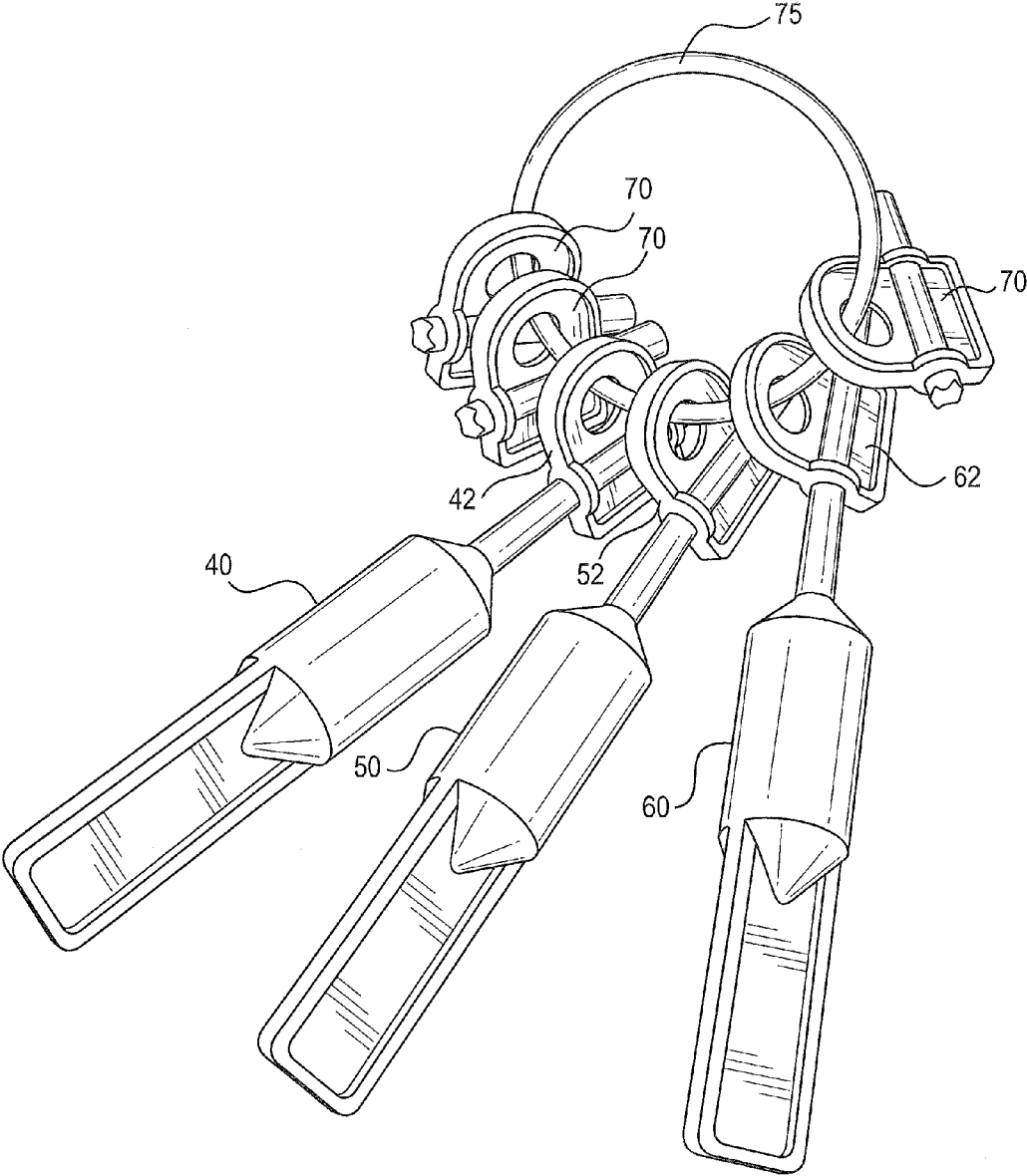


FIG. 4

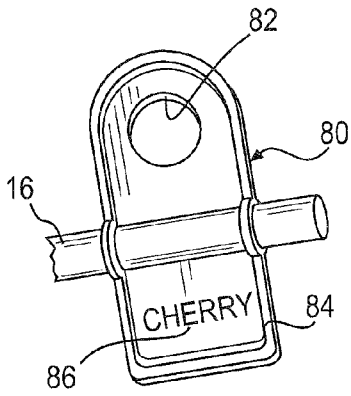


FIG. 5A

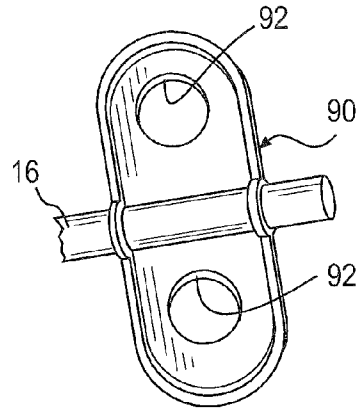


FIG. 5B

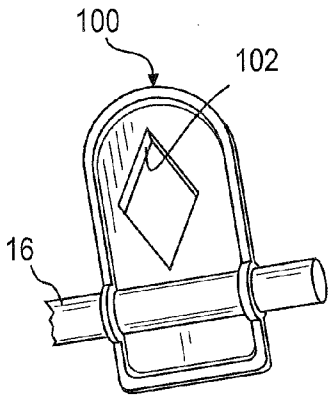


FIG. 5C

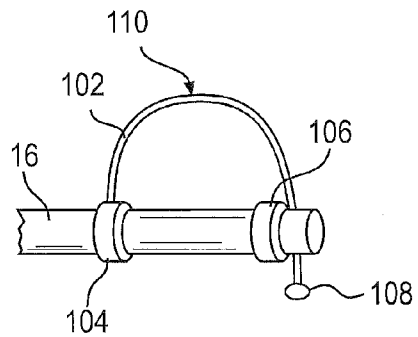


FIG. 5D

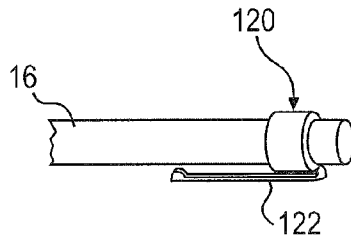


FIG. 5E

DISPOSABLE REFILL AMPULE

[0001] The field of the invention is liquid-filled ampules, and specifically disposable refill ampules that may be used in connection with storing and refilling liquid in electronic cigarettes and similar vaporizer devices.

BACKGROUND

[0002] The use of electronic cigarettes and similar vaporizer products is becoming more common. As users are puffing more and more flavored liquid, the devices that vaporize the flavored liquid have diversified and include multiple types of refillable devices. In other words, a single vaporizer device may be used to puff more flavored liquid than is contained and carried in the vaporizer device. Accordingly, users typically carry small bottles of the flavored liquid that they then use to refill liquid in their vaporizer device. Depending on the flavored liquid bottle size, it is not always convenient to carry an extra bottle of flavored liquid. Additionally, these bottles of flavored liquid may be carried in a pocket or purse and, if not tightened after each use, or as a result of pressure or temperature change, may leak and cause a mess.

SUMMARY

[0003] Accordingly, it is an object of the present invention to overcome the foregoing drawbacks with respect to conventional liquid refill bottles and ampules.

[0004] In one example, a disposable refill ampule includes a hollow plastic body containing a liquid-filled reservoir sealed therein. The plastic body has a needle-nose projection extending outwardly from the plastic body. The projection includes a hollow center bore and a proximate end in fluid connection with the liquid in the plastic body. The projection is sealed on a distal end of the projection whereby the liquid is sealed inside the projection. A connector is fixed to the needle-nose projection near the distal end of the projection. The needle-nose projection is adapted to be snapped off along the projection between the distal end and the connector to make the liquid available. The connector may include a ring fixed to the needle-nose projection. The liquid sealed in the body may comprise a flavored vaporizing liquid. The length of the needle-nose projection between the plastic body and the connector is about one-quarter to ten inches, or alternatively one-half to two inches or about one inch. The needle-nose projection may comprise a preweakened breakpoint therein so that the projection is adapted to be snapped in two at the breakpoint. The breakpoint may be near the connector. The connector may comprise indicia that indicates a property of the liquid contained inside the ampule.

[0005] In another example, an electronic vaporizer refill set comprises a plurality of the disposable refill ampules described above. Further, a loop is placed in the plurality of ampule connectors and holds the ampules together. The loop may be a rigid key chain. The refill set may comprise at least six refill ampules connected by the loop.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective view of an ampule as described herein.

[0007] FIG. 2 is a side cross-sectional view of the ampule shown in FIG. 1.

[0008] FIG. 3 is a perspective view of an ampule shown in the unitary and broken apart pieces.

[0009] FIG. 4 is a perspective view of a ring having three ampules and three solitary connectors mounted thereon.

[0010] FIGS. 5A-5E are perspective views of alternative examples of ampule connectors.

DETAILED DESCRIPTION

[0011] The disposable refill ampule disclosed herein is engineered to be sold in a set or bundle of ampules. The plastic ampule has a connector integral or connected to the distal end of the needle-nose portion of the ampule. The ampule may be deployed for any use including, but not limited to, eye drops or breath fresheners. Another application is for dispensing liquid for refilling electronic cigarettes or other vaporizer devices. The connector is positioned at the end of the needle-nose projection so that multiple ampules may be strung or clipped together for easy storage, use and retail sale.

[0012] Turning now to FIGS. 1-3, there is shown one example of an ampule described herein. Of course, other shapes of ampules that include a body and a needle-nose projection may be deployed. Moreover, the ampule may have different proportionate sizes or shapes depending on the specific application or use of the ampule. As shown in FIGS. 1-3, there is an ampule 10 that is made up of a hollow plastic body portion 12, a solid plastic handle 14 and a needle-nose projection 16. The hollow plastic body 12 includes a reservoir 13 inside it that holds a liquid 30 sealed therein. A hard plastic handle 14 is integrally connected on one end of the hollow plastic body 12. The handle 14 has a primary purpose of allowing a user to easily hold and use the ampule 10. The handle 14 also provides an area where labeling may be displayed that shows the brand and/or the contents of the ampule 10.

[0013] The hollow plastic body portion 12 is engineered to store a predetermined volume or aliquot of liquid 30 therein. As shown in the Figures, the ampule 10 is an integral single piece of plastic that includes the handle 14 on one end of the plastic body 12 and the needle-nose projection 16 on the other end of the plastic body 12 from the handle 14. The needle-nose projection 16 includes a proximal end 18 adjacent the plastic body 12. A distal end 20 of the projection 16 is at the end of the projection farthest away from the body 12. The projection 16 includes a hollow bore 17 open to the reservoir 13 so that the liquid 30 is allowed to flow freely between the body 12 and the bore of the projection 16.

[0014] Attached to, and as shown integral with, a connector 22 is positioned at the distal end 20 of the projection 16. In this example, the connector 22 includes a circular aperture 24 therein. This aperture 24 is adapted to be used with a loop or chain or ring. The connector 22 is shown as integral with the projection 16, but it could equally be adhered or clipped or otherwise bonded to the projection as well. Additionally, the connector 22 has enough surface area to enable some visual indicia on it including, for instance, a label or other information tag.

[0015] In use, the body 12, handle 14 and projection 16 sections of the ampule 10 are snapped off of and separated from the connector 22. The projection 16 as shown includes a preweakened notch 21 around the projection 16. This enables a clean break of the body 12 including the liquid 30 from the connector 22. A break at the notch 21, as shown in FIG. 3, creates the open end 25 which is on or adjacent the distal end 20 of the projection 16. Once the ampule is separated from the connector 22, the user may dispense the liquid into an electronic cigarette or vaporizer. In other examples, if the liquid is

used as eye drops, then the liquid may be dispensed into an eye. In any event, the separation or snapping open of the projection 16 gives access to and allows the dispensing of all or a portion of the liquid 30 previously sealed therein.

[0016] Turning now to FIG. 4, there is shown a plurality of ampules 40, 50 and 60. These ampules 40, 50 and 60 include connectors 42, 52 and 62 respectively. These ampules are connected by a key ring 75. Also shown are connectors 70 that were previously connected to other ampules (not shown). These additional connectors 70 reflect that three ampules have already been used and disposed of in this set of six ampules. The key ring 75 as shown is a solid, rigid ring. The ring 75 may comprise any type of loop including a string or chain.

[0017] The material that forms the ampule may be essentially any type of material. The body portion of an ampule needs to be flexible so that it may be squeezed to force the liquid out of the ampule. The projection may be relatively stiffer than the body of the ampule. Similarly, the handle can be any material as that material is preferably only a stiff material able to be held by a user. The projection portion of an ampule needs to be stiff enough to break cleanly when the projection is broken apart to give access to the liquid. Additionally, the material that forms the ampule should be impermeable to prevent the loss of liquid from inside of the ampule and to also prevent the ingress of air from outside the ampule. Suitable polymers that the ampule may be formed from include polyethylene, polypropylene, polyester, polyvinylchloride, copolymers thereof, laminates or coextrusions thereof, or other composite materials. In one example, the ampule is LDPE.

[0018] The size of the ampule is variable. The body of the ampule needs to be large enough to handle but small enough to be easily stored and carried. A size of ampule may hold enough liquid to recharge an electronic cigarette or vaporizer reservoir volume, for example, 0.5 ml for an electronic cigarette up to 5 ml for a large vaporizer. The ampule reservoir can be larger or smaller as needed, for instance 0.25 ml to 20 ml, or alternatively, 0.5 ml to 5 ml. The ampule is a single use and disposable item, so the size of the ampule needs to be engineered accordingly. There is no need for any extra volume other than the single use that is intended.

[0019] The size and length of the projection will vary depending on the application and use of the ampule. The projection must be small enough in diameter cross-section that a relatively small stream will flow from the ampule, in other words that it does not come out too quickly. The projection must be long enough that the liquid can be applied and dispensed in a narrow, tight spot, for instance, for electronic cigarettes. The projection may be about one-quarter to ten inches in length, or alternatively, about one-half to two inches. One example of a projection size includes a hollow bore diameter cross-section of about 1 to 6 mm, or alternatively about 1.5 to 3 mm, or about 2 mm. The connector portion of the ampule has an opening of any relevant size or shape. The connector is positioned on the distal end of the projection so that no extra liquid from the body of the ampule is retained on the key ring or loop that carries multiple ampules. As indicated earlier, the connector itself may have labeling thereon. The connector can show some indicia of the ampule that is attached or was previously attached to the key ring or loop.

[0020] FIGS. 5A-5E illustrate alternative types of connectors that may be incorporated on the ampule. In each alterna-

tive, the needle-nose projection 16 is generally the same. In FIG. 5A, the connector 80 includes the round aperture 24 similar to that shown in FIGS. 1-4. However, the rectangular portion 84 of the connector 80 is relatively larger to allow for and facilitate written indicia 86 for labeling. In FIG. 5B, the alternative connector 90 includes apertures 92 on both sides of the projection 16. In FIG. 5C, the connector 100 includes a diamond shaped aperture 102 that is found to be a low-friction shape for use on, for instance, a key ring. In FIG. 5D, the connector 110 is a silicone loop 102 that is connected on one end 104 by a loop around the projection 16. The loop 102 is connected on its opposite end to the projection 16 by a second loop 106 having a slit therein that a round ball 108 at the end of the loop can be inserted through. FIG. 5E illustrates a connector 120 that is generally similar in appearance to a pen or pencil clip. This clip 122 may be clipped onto a key ring or, alternatively, may be clipped onto a shirt pocket or other clothing item of a user.

[0021] A label or indicia can appear on the connector or on the handle portions of the ampule, or both. The written brand may be displayed. Contents information may be provided, for instance the flavor and amount of nicotine in a liquid that may be used for electronic cigarettes and vaporizers. The ampule may be comprised of a particular color or visual pattern or shape that is distinctive to a brand or an attribute of the contents. Alternatively, a separate label or product information surface can be connected to the loop or ring that describes what is contained in each of the plurality of ampules that is likewise connected to the ring or loop.

[0022] The set or plurality of ampules may be engineered for a particular purpose. There are multiple disposable ampules, because there is no reuse after the single use. The set of ampules may be sized and/or numbered to last a predetermined amount of time. The set of ampules may likewise be sized to correspond to a traditional amount of puffing, like a pack of cigarettes. The set of ampules may comprise two to ten ampules, or alternatively, four to six ampules.

[0023] Other embodiments of the present invention will be apparent to those skilled in the art from consideration of the specification. It is intended that the specification and Figures be considered as exemplary only, with a true scope and spirit of the invention being indicated by the following claims.

That which is claimed is:

1. A disposable refill ampule comprising:

a hollow plastic body containing a liquid-filled reservoir sealed therein;

wherein the plastic body has a needle-nose projection extending outwardly from the plastic body and a hollow center bore and a proximate end of the needle-nose projection in fluid connection with the liquid in the plastic body;

wherein the needle-nose projection is sealed on a distal end of the projection whereby liquid is sealed inside the projection; and

a connector fixed to the needle-nose projection near the distal end of the projection, wherein the needle-nose projection is adapted to be snapped off along the projection between the distal end and the connector to make the liquid available.

2. A disposable refill ampule as described in claim 1,

wherein the connector comprises a ring fixed to the needle-nose projection.

3. A disposable refill ampule as described in claim 1, wherein the liquid sealed in the body comprises a flavored vaporizing liquid.
4. A disposable refill ampule as described in claim 1, wherein the length of the needle-nose projection between the plastic body and the connector is about one-quarter to two inches.
5. A disposable refill ampule as described in claim 1, wherein the needle-nose projection comprises a preweakened breakpoint therein so that the projection is adapted to be snapped in two at the breakpoint.
6. A disposable refill ampule as described in claim 5, wherein the preweakened breakpoint is near the connector.
7. A disposable refill ampule as described in claim 1, wherein the ampule is comprised of high density polyethylene.
8. A disposable refill ampule as described in claim 1, wherein the connector comprises indicia that indicates a property of the liquid inside the ampule.
9. A disposable refill ampule as described in claim 8, wherein the liquid comprises flavoring and nicotine; and wherein the indicia identifies the type of favoring and amount of nicotine.
10. An electronic vaporizer refill set comprising: a plurality of disposable refill ampules as described in claim 1, and a loop that is placed in the plurality of ampule connectors and holds the ampules together.
11. An electronic vaporizer refill set as described in claim 10, wherein the loop is a rigid keychain.
12. An electronic vaporizer refill set as described in claim 10, wherein the refill set comprises at least six refill ampules connected by the loop.

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