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Marand

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[54] **COUPLER-ASPIRATOR-VALVE ASSEMBLY**

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[73] Assignee: **Ciba-Geigy Corporation**

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[52] **U.S. Cl.** **222/82,** 222/193, 239/308, 239/309, 239/328

[51] **Int. Cl.**.....**B67b 7/24,** B67d 5/54

[58] **Field of Search**.....222/80–83.5, 86, 88, 89, 130, 135, 136, 145, 193, 94, 106, 541, 80; 239/271, 272, 308, 307, 309, 415, 427, 434, 328, 337, 345, 318, 306; 215/37 R, 47; 220/63

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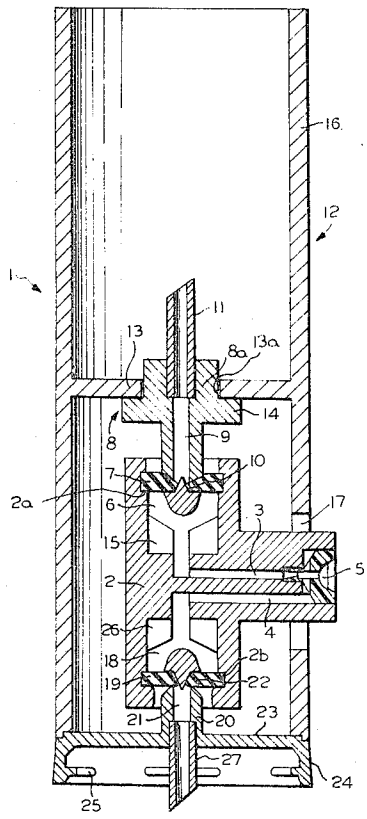
[57] **ABSTRACT**

A coupler-aspirator-valve assembly includes a coupler-aspirator having two flow passages joining in a nozzle. Each flow passage communicates with a chamber. One of the chambers houses a valve stem which couples to a valveless propellant cartridge. The other of the chambers houses a product container valve stem which couples to a valveless product container assembly.

17 Claims, 6 Drawing Figures



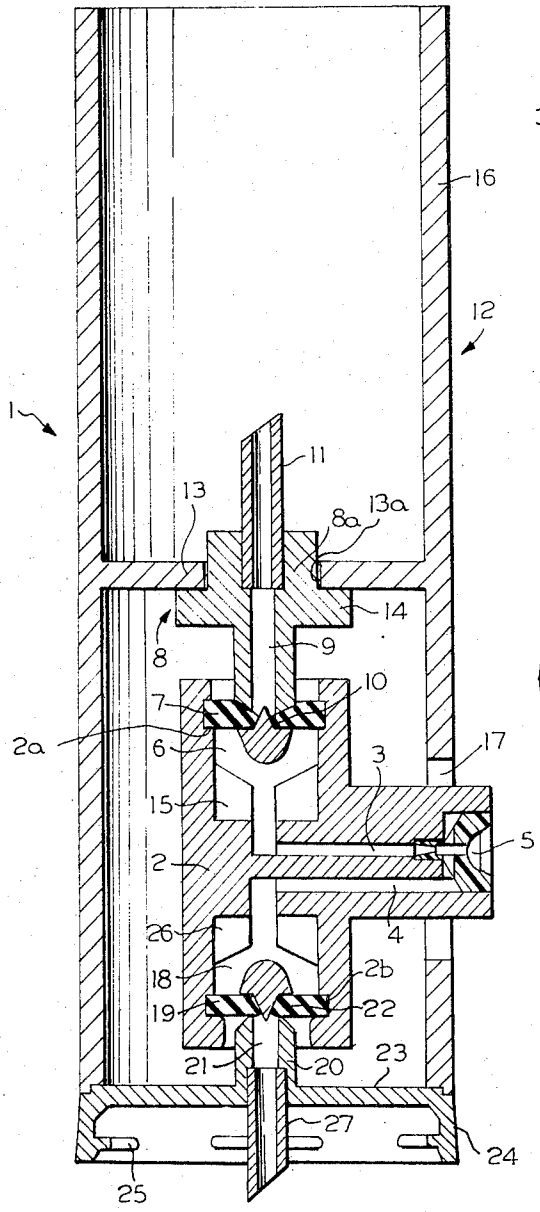


FIG. 1

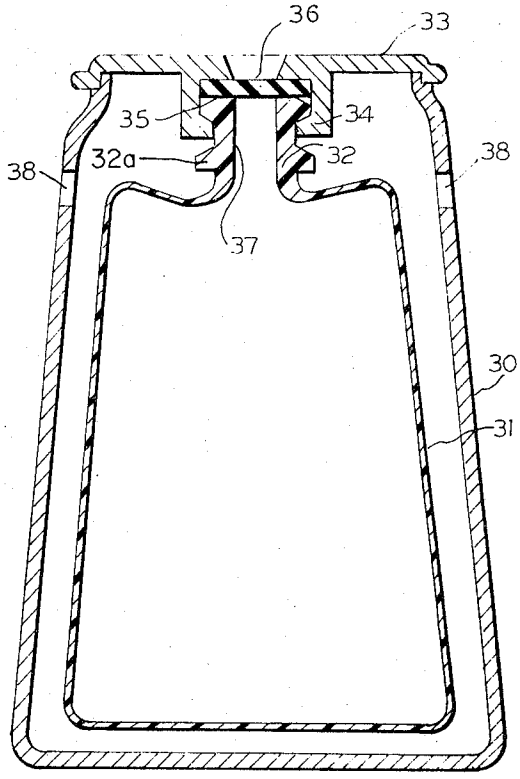


FIG. 2

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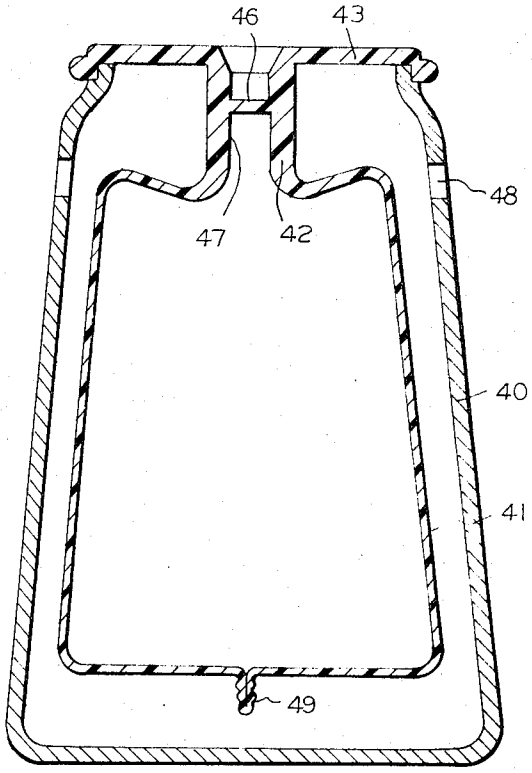
FIG. 3



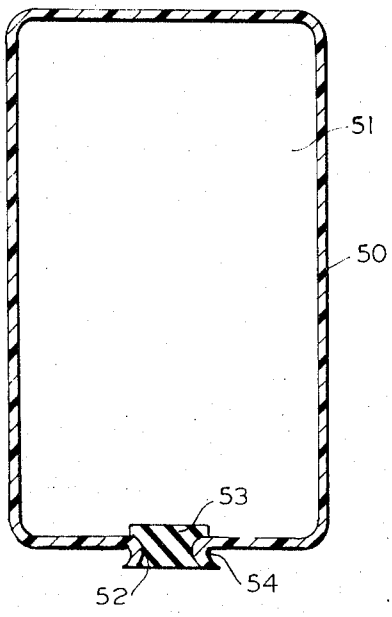


FIG. 4

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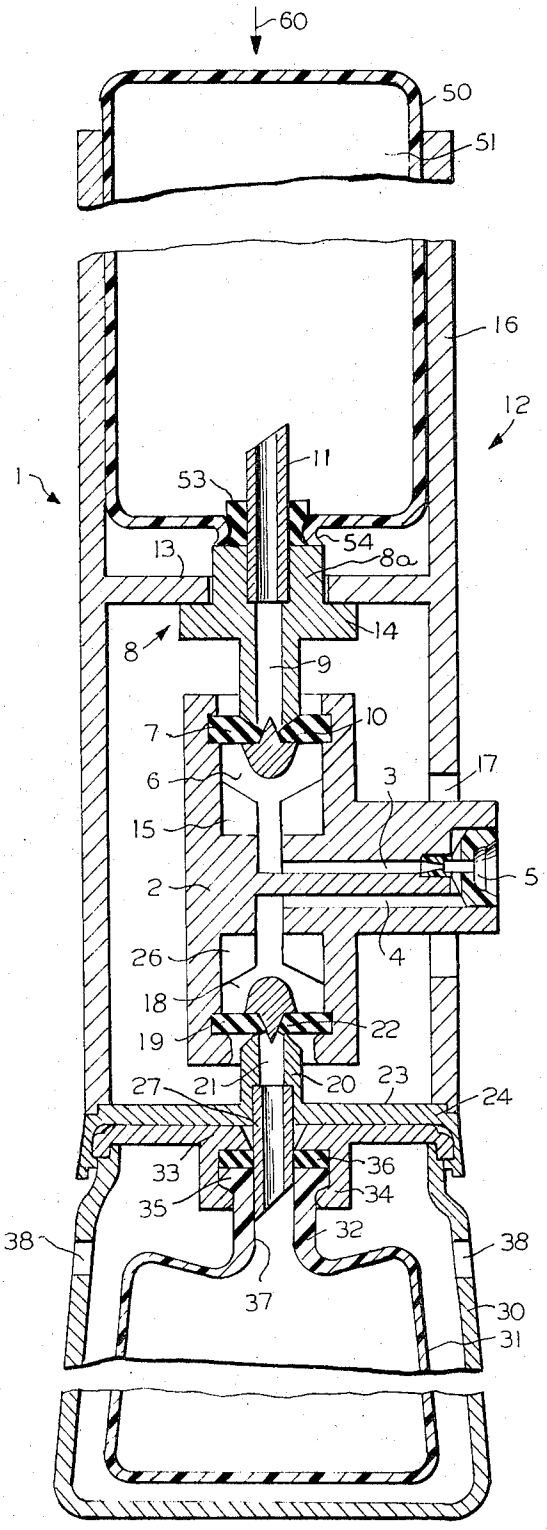

FIG. 5

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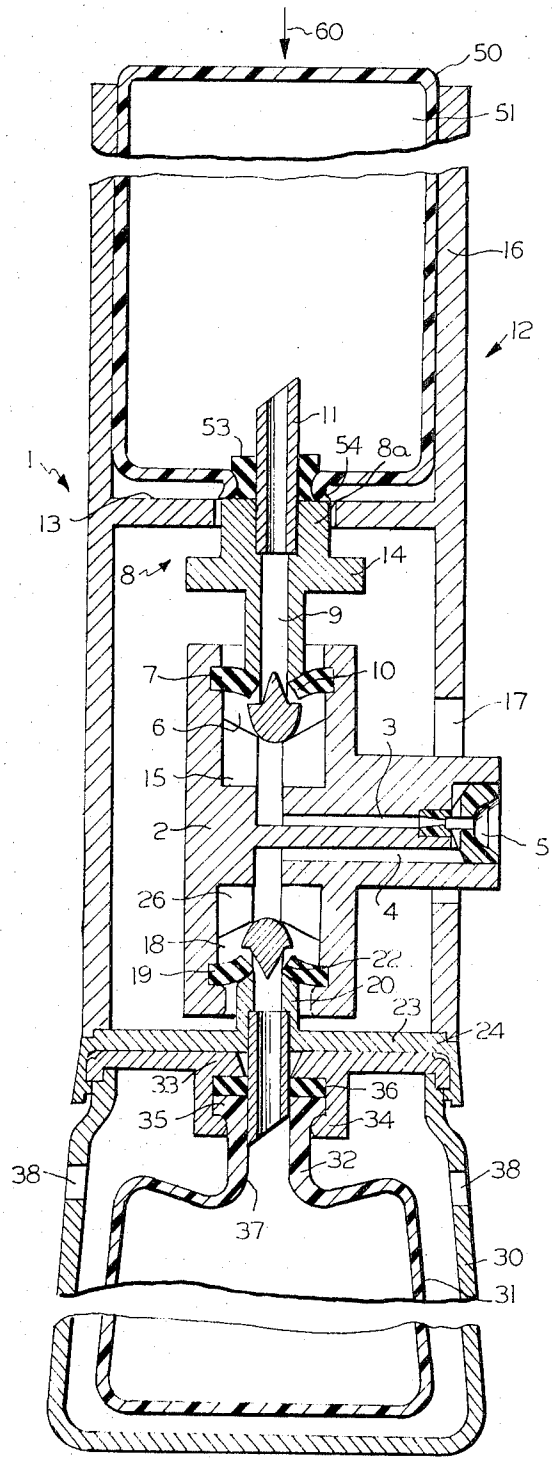

FIG. 6

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COUPLER-ASPIRATOR-VALVE ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates to an integral coupler-aspirator-valve assembly for use in a dispensing system of the type wherein the product is aspirated through the coupler-aspirator by a propellant which is housed in a propellant cartridge separate from the product container.

More particularly, the present invention relates to such an assembly which comprises the coupler-aspirator and both the product container valve and the propellant valve.

Even more particularly, the present invention relates to such an assembly wherein the aerosol valve and the product container valves include piercing means adapted to pierce a respective aerosol propellant cartridge and a product container assembly when assembled to the coupler-aspirator-valve assembly.

The present invention is related to the dispensing system disclosed in applicant's application Ser. No. 43,417, filed June 4, 1970 In the said copending application is disclosed a dispensing system of the type wherein a product is housed in a product container separate from the propellant. The product container has a valve therein which is coupled to a coupler-aspirator. The coupler-aspirator is also coupled to the stem of the valve of an aerosol propellant cartridge which is positioned above the coupler-aspirator and the product container. When the top of the propellant cartridge is depressed, both the valve thereof and the product container valve are opened, and the product is aspirated through the coupler-aspirator by the propellant. This system, however, requires that both the product container and the propellant cartridge have valves therein. Particularly with respect to product manufacturers. Such arrangement presents certain problems. Many manufacturers of various products adapted to be dispensed by an aerosol dispenser lack the expertise and facilities for manufacturing a product container assembly having an aerosol type valve therein.

It is therefore a primary object of the present invention to provide an integral coupler-aspirator-valve assembly for use in the type of dispensing system disclosed in the said copending application.

It is a further object of the present invention to provide such an integral coupler-aspirator-valve assembly which may be easily coupled to product containers and to propellant cartridges which do not have aerosol valves therein.

It is an even further object of the present invention to provide such an integral coupler-aspirator-valve assembly which may be inexpensively manufactured by routine molding techniques.

These objects are achieved in accordance with the present invention by the provision of an integral coupler-aspirator-valve assembly including a guide and a coupler-aspirator having first and second flow passages therein. The two flow passages in the coupler-aspirator join at a Venturi nozzle therein for spraying the product. The first flow passage also communicates with a first chamber in the coupler-aspirator. A first annular gasket is supported within this chamber and operates as a high pressure obturator, obturating radial openings in a hollow propellant valve stem which is movable within the chamber. The propellant valve stem is laterally supported by an inwardly extending annular flange of the guide.

The second flow passage of the coupler-aspirator communicates with a second chamber. A second annular gasket is supported within the second chamber and operates as a low pressure obturator to obturate the radial openings of a product container valve stem. The product container valve stem is integral with a product container valve plate which is adapted to be fastened in a suitable manner over the collar of a product container. The product container valve plate is also suitably attached to the bottom of the guide.

The top of the guide is adapted to laterally support an aerosol propellant cartridge. The guide additionally has a hole therein through which the coupler-aspirator is adapted to extend and spray. Both the propellant valve stem and the product container valve stem have hollow piercing means therein. Thus, as the coupler-aspirator valve assembly is assembled to the product container, the piercing means within the product container valve stem will pierce the product container in a suitable manner to provide communication of the product with the product container valve stem. Similarly, when a propellant cartridge is assembled within the guide, the piercing member of the propellant valve stem will pierce the propellant cartridge in a suitable manner to provide communication of the propellant with the aerosol valve stem.

During use, the propellant cartridge is depressed, and force is applied downwardly to the coupler-aspirator. As this occurs, the propellant valve stem is moved downwardly with respect to the coupler-aspirator and the coupler-aspirator is moved downwardly with respect to the product container valve stem. This action causes both the high and low pressure obturating means to be moved away from their respective radial openings. This allows communication of the product through the product container valve stem and into the second flow passage within the coupler-aspirator. Likewise, communication is open for the propellant through the propellant valve stem and the first flow passage of the coupler-aspirator. Thus, the propellant is caused to aspirate the product through the coupler-aspirator.

Other objects and features of the invention will be made clear with the following description taken together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of the novel integral coupler-aspirator-valve assembly of the present invention;

FIG. 2 is a cross-sectional view of the product container assembly adapted to be used with the coupler-aspirator-valve assembly of FIG. 1;

FIG. 3 is a cross-sectional view of a modified illustration of a product container assembly for use in accordance with the present invention;

FIG. 4 is a cross-sectional view of an aerosol propellant cartridge adapted to be used with the coupler-aspirator-valve assembly of FIG. 1;

FIG. 5 is a cross-sectional view of the coupler-aspirator-valve assembly of FIG. 1 assembled with a product container assembly of FIG. 2 and the propellant cartridge of FIG. 4; and

FIG. 6 is a cross-sectional view of the assembly of FIG. 5 shown in the actuated or dispensing position.

With reference now to FIG. 1 of the drawings, the coupler-aspirator-valve assembly of the present invention will be described in detail. The assembly 1 includes a coupler-aspirator 2 having first and second flow passages 3 and 4, respectively, therein. Flow passages 3 and 4 join at Venturi nozzle 5 inserted within the coupler-aspirator 2. First flow passage 3 also communicates with a first chamber 6 within the coupler-aspirator. A first annular gasket 7 has its outer edge held in place by recessed portion 2*a* of coupler-aspirator 2 to be positioned within chamber 6. A propellant valve stem 8 is positioned for movement within chamber 6. Longitudinal channel 9 extends through stem 8 and terminates at one end thereof in radial openings 10. The inner periphery of gasket 7 obturates radial openings 10 and thus serves as a high pressure obturator. Positioned within the other end of stem 8 and communicating with channel 9 is a hollow piercing member 11.

Coupler-aspirator 2 is positioned within a guide 12. An inwardly extending annular flange 13 of guide 12 has a hole 13*a* therein through which extends a first outwardly extending flange 8*a* of stem 8. A second outwardly extending flange 14 of stem 8 has the upper surface thereof abutting the bottom surface of flange 13 to limit movement of and act as a stop for stem 8 in the upward direction as viewed in FIG. 1. Chamber 6 has fins 15 therein for limiting the downward movement of stem 8 in relation to coupler-aspirator 2. The upper length 16 of guide 12 is adapted to laterally support a propellant cartridge which may be inserted therein. When such propellant cartridge is inserted within upper length 16 of guide 12, the piercing member 11 is adapted to suitably pierce the cartridge. An opening 17 is provided in the guide 12 through which the coupler-aspirator 2 extends and sprays.

Second flow passage 4 in coupler-aspirator 2 communicates with a second chamber 18. A second annular gasket 19 has its outer edge held in place by recessed portion 2*b* of coupler-aspirator 2 to be positioned within chamber 18. A product container valve stem 20 is positioned for movement within chamber 18. Longitudinal channel 21 extends through product container valve stem 20 and terminates at one end thereof in radial openings 22. The inner periphery of annular gasket 19 closes radial openings 22 and thus serves as a low pressure obturator. Integral with the other end of product container valve stem 20 is product container valve plate 23. The plate 23 is attached in any suitable manner to the bottom of guide 12. Plate 23 has a depending flange 24 thereon which is adapted to be coupled to the top or collar of a product container in any desirable manner such as by means of lock flanges 25. Chamber 18 has fins 26 therein which limit the extent of movement of coupler-aspirator 2 with respect to product container valve stem 20. A hollow piercing member 27 is positioned within the other end of stem 20 and container valve plate 23 and is in communication with channel 21. Hollow piercing member 27 is thus adapted to pierce a product container when the assembly 1 is coupled thereto.

With reference now to FIG. 2 of the drawings, a product container assembly adapted to be used with the coupler-aspirator-valve assembly of FIG. 1 will be described in detail. A container 30 has a collar 33 attached thereto in any conventional manner. The seal between collar 33 and container 30 need not be a pressure seal since the container 30 does not house a propellant. Also, since the product is not enclosed in container 30, the seal between container 30 and collar 33 need not be leak proof. A flexible product sac 31 containing the product to be dispensed is positioned within product container 30. Sac 31 may be blow-molded to have a suitable thickened neck portion 32. Flange 35 of neck portion 32 is adapted to be supported by downwardly extending flange 34 of collar 33. Integral with neck portion 32 is flange 32*a* which may be contacted by a tool to facilitate assembly of sac 31 to collar 33. Positioned between collar 33 and flange 35 is a gasket 36 which closes passage 37 through neck portion 32 of product sac 31. Gasket 36 is adapted to be pierced when the product container assembly is assembled to the coupler-aspirator-valve assembly shown in FIG. 1. Container 30 is provided with holes 38 in any suitable location for the purpose of providing air vents in the container. Holes 38 allow equalization of atmospheric pressure within the container 30 and around product sac 31. Thus, as product is dispensed from sac 31, the pressure is equalized therearound to insure complete and continued dispensing.

With reference now to FIG. 3 of the drawings, a modified embodiment of a product container assembly adapted for use with the coupler-aspirator-valve assembly of FIG. 1 will be described in detail. A flexible product sac 41 containing a suitable product to be dispensed is housed in container 40. Product sac 41 is suitably manufactured to have a thickened neck portion 42. However, product sac 41 has additionally been suitably manufactured to provide an integral membrance 46 which closes passage 47 through neck portion 42. In addition, product sac 41 has been manufactured such that collar portion 43 is integral therewith. As was the case in the product container assembly of FIG. 2, the seal between collar 43 and product container 40 need not be a pressure seal since the product container 40 does not house a propellant. Likewise, the seal need not be leakproof since the product is housed within the sac 41. Container 40 is provided with holes 48 in a manner similar to the embodiment shown in FIG. 2. It will be apparent that membrane 46 is adapted to be pierced when the product container assembly is assembled to the coupler-aspirator-valve assembly shown in FIG. 1. The bottom of product sac 41 is sealed in any suitable manner such as heat sealing as shown at 49 after the sac has bean filled with a suitable product.

With reference now to FIG. 4 of the drawings, a propellant cartridge adapted to be used with the coupler-aspirator-valve assembly shown in FIG. 1 will be described in detail. The cartridge 50 houses a suitable propellant 51. Cartridge 50 has an annular opening 52 therein. A suitable stopper 52 is tightly held in place in opening 52 by crimp 54. Since the cartridge is under high pressure, it is necessary that crimp 54 provide a pressure seal with stopper 53. It will be apparent that when the propellant cartridge 50 is assembled with the coupler-aspirator-valve assembly 1, the stopper 53 will be pierced by piercing member 11.

With reference now to FIG. 5 of the drawings, the coupler-aspirator-valve assembly of FIG. 1 will be

described assembled with the product container assembly of FIG. 2 and the propellant cartridge of FIG. 4. The assembly 1 may be assembled first with either the product container assembly or the propellant cartridge. Assuming that the propellant cartridge is to be assembled first, the cartridge 50 is placed within the upper length 16 of guide 12. When stopper 53 contacts piercing member 11, force is applied to the top of cartridge 50 as illustrated by arrow 60. This force causes stopper 53 to be pierced by piercing member 11. Communication of the propellant 51 is thus open from the interior of cartridge 50 through the hollow piercing member 11 and into channel 9 within valve stem 8. to the product container assembly by pressing guide 12 downwardly to thereby force flange 24 of product container valve plate 23 into engagement with collar 33 of the product container 30. As this happens, piercing member 27 is caused to pierce gasket 36. Thus, communication of the product within product sac 31 is open through passage 37, the interior of piercing member 27 and into channel 21 within the product container valve stem 20.

With reference to FIG. 6 of the drawings, the assembled dispensing system of FIG. 5 will be shown in its operative dispensing position. Cartridge 50 is depressed further in the general direction of arrow 60. This force is transferred to valve stem 8 and then to coupler-aspirator 2. Thus, coupler-aspirator 2 is moved downwardly with respect to product container valve stem 20, and valve stem 8 is moved downwardly with respect to the coupler-aspirator 2. As this occurs, gaskets 7 and 19 are flexed, thereby unblocking radial openings 10 and 22, respectively. Therefore, communication is open from channel 21, through radial openings 22, into chamber 18 and second flow passage 4. Likewise, communication is open between channel 9, through radial openings 10, and into chamber 6 and first flow passage 3. Thus, propellant from cartridge 50 flows through first passage 3 and Venturi 5 and aspirates product from product sac 31 and through second flow passage 4.

It is to be understood that all of the various parts of the various elements of the assemblies of the present invention as described above may be made of any desirable and suitable material. For instance, all of the above parts may be molded of plastic material by conventional molding techniques, thus making passible the provision of such dispensing system at a low cost. The flexible sac above described is preferably of the thin walled type and should have a high degree of flexibility. The sac may be made of any suitable material which is compatible with the product used therein.

It is to be understood that the propellant cartridge need not be specially designed with regard to the quantity of the product contained in the product container assembly. When the propellant is exhausted, it need merely be replaced by another propellant cartridge in the manner described above. Additionally, when the product is exhausted and some of the propellant remains, the propellant cartridge may be transferred along with the coupler-aspirator-valve assembly to a new product container assembly. Thus, it is apparent that the system in accordance with the present invention eliminates waste of both the product and the propellant.

It will be seen that there has been provided an integral coupler-aspirator-valve assembly which may readily be assembled with a propellant cartridge and a product container assembly, neither of which need have dispensing valves therein. Thus, the manufacture of product and aerosol assemblies for use in this type system has been greatly simplified.

Although a preferred embodiment of the present invention has been described in detail, such description is intended to be illustrative only and not restrictive, since many details of the construction of the invention may be altered or modified without departing from the spirit or scope thereof.

For instance, it is to be understood that the coupler-aspirator-valve assembly could be provided with only one of the product container valve or propellant valve, rather than with both as above described. Such a modification would merely require that the coupler-aspirator be adapted to couple to a conventional propellant cartridge valve or product container valve, as described.

What is claimed is:

1. A coupler-aspirator-valve assembly for use in an aerosol dispensing system of the type wherein the product to be dispensed is housed in a container separate from the propellant cartridge, said assembly comprising a coupler-aspirator having a Venturi nozzle and two flow passages joining at said nozzle, the first of said flow passages communicating with a first chamber in said coupler-aspirator and the second of said flow passages communicating with a second chamber in said coupler-aspirator, said first chamber positioned above and extending upwardly from said second chamber; a propellant valve stem movably mounted in said first chamber and having a first channel therethrough adapted to communicate with said first chamber; means mounted between said coupler-aspirator and said propellant valve stem for selectively blocking and unblocking said first channel; means for coupling said propellant valve stem with a valveless propellant cartridge to provide access of propellant into said first channel; a product container valve stem movably mounted in said second chamber and having a second channel therethrough adapted to communicate with said second chamber; means mounted between said coupler-aspirator and said product container valve stem for selectively blocking and unblocking said second channel; and means for coupling said product container valve stem with a valveless product container to allow communication of product into said second channel.

2. A coupler-aspirator-valve assembly as claimed in claim 1, wherein said first channel terminates in first radial openings communicating with said first chamber, and said means for blocking and unblocking said first channel comprises a first annular gasket having an outer edge and an inner periphery, said outer edge being held in place by a first recessed portion of said coupler-aspirator, and said inner periphery obturating said first radial openings.

3. A coupler-aspirator-valve assembly as claimed in claim 1, wherein said means for coupling said propellant valve stem comprises a first hollow piercing member positioned within said propellant valve stem and in communication with said first channel.

4. A coupler-aspirator-valve assembly as claimed in claim 1, further comprising a guide surrounding said coupler-aspirator and including an inwardly extending annular flange having a hole therein through which said propellant valve stem extends, an upper length for supporting said propellant cartridge, and an opening through which said coupler-aspirator extends and sprays.

5. A coupler-aspirator-valve assembly as claimed in claim 4, wherein said propellant valve stem further includes a first outwardly extending flange which extends through said hole and a second outwardly extending flange having an upper surface abutting a bottom surface of said inwardly extending annular flange.

6. A coupler-aspirator-valve assembly as claimed in claim 4, wherein said means for coupling said product container valve stem comprises a product container valve plate integral with said product container valve stem, said product container valve plate being attached to the bottom of said guide and adapted to be attached to said product container, and a second hollow piercing member positioned within said product container valve stem and in communication with said second channel.

7. A coupler-aspirator-valve assembly as claimed in claim 1, wherein said second channel terminates in second radial openings communicating with said second chamber, and said means for blocking and unblocking said second channel comprises a second annular gasket having an outer edge and an inner periphery, said outer edge being held in place by a second recessed portion of said coupler-aspirator, and said inner periphery obturating said second radial openings.

8. An aerosol dispensing system comprising a valveless propellant cartridge; a valveless product container assembly; and a coupler-aspirator-valve assembly comprising a coupler-aspirator having a Venturi nozzle and two flow passages joining a said nozzle, the first of said flow passages communicating with a first chamber in said coupler-aspirator and the second of said flow passages communicating with a second chamber in said coupler-aspirator, said first chamber positioned above and extending upwardly from said second chamber, a propellant valve stem movably mounted in said first chamber and having a first channel therethrough adapted to communicate with said first chamber; means mounted between said coupler-aspirator and said propellant valve stem for selectively blocking and unblocking said first channel; means for coupling said propellant valve stem with said valveless propellant cartridge to provide access of propellant into said first channel, a product container valve stem movably mounted in said second chamber and having a second channel therethrough adapted to communicate with said second chamber; means mounted between said coupler-aspirator and said product container valve stem for selectively blocking and unblocking said second channel, and means for coupling said product container valve stem with said valveless product container assembly to allow communication of product into said second channel; said valveless propellant cartridge aligned vertically above said valveless product container assembly.

9. A dispensing system as claimed in claim 8, wherein said first channel terminates in first radial openings communicating with said first chamber, and said means for blocking and unblocking said first channel comprises a first annular gasket having an outer edge and an inner periphery, said outer edge being held in place by a first recessed portion of said coupler-aspirator, and said inner periphery obturating said first radial openings.

10. A dispensing system as claimed in claim 8, wherein said means for coupling said propellant valve stem comprises a first hollow piercing member positioned within said propellant valve stem and in communication with said first channel.

11. A dispensing system as claimed in claim 8, further comprising a guide surrounding said coupler-aspirator and including an inwardly extending annular flange having a hole therein through which said propellant valve stem extends, an upper length supporting said propellant cartridge, and an opening through which said coupler-aspirator extends and sprays.

12. A dispensing system as claimed in claim 11, wherein said propellant valve stem further includes a first outwardly extending flange which extends through said hole and a second outwardly extending flange having an upper surface abutting a bottom surface of said inwardly extending annular flange.

13. A dispensing system as claimed in claim 11, wherein said means for coupling said product container valve stem comprises a product container valve plate integral with said product container valve stem, said product container valve plate being attached to the bottom of said guide and attached to said product container, and a second hollow piercing member positioned within said product container valve stem and in communication with said second channel.

14. A dispensing system as claimed in claim 8, wherein said second channel terminates in second radial openings communicating with said second chamber, and said means for blocking and unblocking said second channel comprises a second annular gasket having an outer edge and an inner periphery, said outer edge being held in place by a second recessed portion of said coupler-aspirator, and said inner periphery obturating said second radial openings.

15. A dispensing system as claimed in claim 8, wherein said valveless propellant cartridge comprises a cartridge having an annular opening therein, and a stopper sealing said opening in pressure seal relationship, said stopper being pierced by said means for coupling said propellant cartridge.

16. A dispensing system as claimed in claim 8, wherein said valveless product container assembly comprises a product container, a collar attached to said product container and having a flange extending downwardly therefrom, a product sac positioned within said product container and having a thickened neck portion supported by said flange, and a gasket positioned between said collar and said neck portion and pierced by said means for coupling said product container valve stem.

17. A dispensing system as claimed in claim 8, wherein said valveless product container assembly comprises a product container, and a product sac assembly comprising a product sac positioned within said product container and having a neck portion, a collar integral with said neck portion and attached to said product container, and a membrane integral with and

closing said neck portion and pierced by said means for coupling said product container valve stem.

* * * * *