ABSTRACT: In order to provide ventless fluid spray apparatus with a substantially instantaneous, and hence dripless, cutoff characteristic, a pliable container of normally circular cross section, which may be distorted to force fluid contained therein through a nozzle, is encompasses by a resilient band which constrains the container to quickly reassume its normal shape after the distorting pressure is released.
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DRIPLESS FLUID SPRAY APPARATUS

This invention relates to fluid dispensing and, more particularly, to spray apparatus adapted to force a fluid through one or more apertures in response to distortion of the fluid's container.

Relatively small refillable containers, such as those utilized for dispensing herbicides, insecticides, fungicides, and other liquid materials, are typically provided with a dispenser of the plunger type which may be removed in order to refill the container. Removable dispensers of this and comparable types are subject to several objections; viz.: they must be sold to the consumer separated from the fluid container and thus are subject to breakage and loss, they require a vent and consequent escape of fluid from the container such as might be desirable and, the force with which the fluid can be dispensed is decidedly limited.

It is known in the art to utilize a pliable container in combination with a ventless dispenser which may comprise simply one or more suitably shaped apertures. The fluid may be dispensed by tilting the container until the liquid level is above the apertures and distorting the container such that the consequent decrease in volume forcibly expels the fluid through the apertures. Prior art spray apparatus of this type provide acceptable control over direction and force of the expelled fluid, but they have uniformly suffered from a serious drawback. This drawback may best be illustrated by a brief example.

Assuming that spray apparatus of this type is being utilized to dispense a herbicide through selective spot spraying, with the intent that undesirable plants in close proximity to desirable plants are to be treated, the user will quickly discover that he is unable to change his target from one undesirable plant to another without subjecting adjacent desirable plants to a certain amount of the herbicide. The reason for this undesirable control of the liquid lies in the inability of the user to cut off the flow of the herbicide from the spray apparatus cleanly and quickly and without drip.

From the foregoing, it will be manifest that it would be highly desirable to provide spray apparatus combining the simplicity of simply distorting the container to provide the fluid impelling force with means for achieving substantially instantaneous cutoff with minimum dripping. It is, therefore, a broad object of this invention to provide improved spray apparatus.

It is more specific object of this invention to provide improved spray apparatus to the type in which the fluid-expelling force is achieved by distorting the container.

It is yet another object of this invention to provide a pliable container including means for forcibly returning the container to its normal shape when the distorting force is removed.

These and other objects of the invention are achieved by encompassing a pliable container with one or more resilient bands which function to constrain the pliable container toward its undistorted shape.

The subject matter of the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, may best be understood by reference to the following description taken in connection with the accompanying drawing of which:

FIG. 2 is a cross-sectional view of the container illustrating a single band embodiment of the invention;

FIG. 3 is a perspective view of a container illustrating a multiple band embodiment of the invention.

Referring now to FIG. 1, a container 1 is illustrated which includes a body 2 and a detachable dispenser 3. The detachable dispenser 3. The detachable dispenser 3 may be secured to the container body 2 by screw threads or any other convenient means. A cap member 4 for the detachable dispenser 3 is shown in FIG. 1 for illustrative purposes only. The construction of the detachable dispenser 3 is subject to many modifications within the contemplation of the invention insomuch as its principal office is merely to provide apertures through which fluid may be forced in the manner to be more fully described below.

The body 2 of the container 1 includes a pliable portion 5 adapted to manually distorted from its normally circular cross section. It has been found that a suitable material for the body 2 is polyethylene and that the pliable portion 5 may be attained by using a somewhat thinner wall than the adjacent, stiffer portions.

A resilient band 6, composed of a material such as spring steel, rubber, plastic, or the like tightly encompasses the pliable portion 5 of the body 2 as shown in the perspective view of FIG. 1 and the corresponding cross-sectional view of FIG. 2. The function of the resilient band 6 will be more readily understood from an appreciation of the manner in which the container is used to spray fluid in a controlled direction and with a controlled force. The container 1 is tilted until the apertures 7 of the detachable dispenser 3 are beneath the level of the fluid. The pliable portion 5 of the container is then manually distorted from its normally circular cross section. As is well known in the physical arts, a container of a predetermined height and a circular cross section will define a greater volume than a container of the same predetermined height exhibiting a cross section other than circular. Thus, although the cross-sectional perimeter may be the same in both instances, the circular cross section will define the greatest area. Thus, when the pliable portion 5 of the container 1 is distorted, the internal volume is decreased resulting in an expelling force which forces the fluid through the apertures 7 of the detachable dispenser 3.

Assuming, for purposes of illustration, that the container 1 was not fitted with the resilient band 6, the pliable portion 5 would slowly reassume its normal circular cross section at a rate in accordance with its elasticity. However, in order to insure that the pliable portion 5 may be easily distorted, its return to the normal circular cross section will be relatively slow such that fluid will continue to flow through the apertures 7 at a gradually decreasing rate until pressure equilibrium is reached between atmospheric and the interior of the container 1 after the distorting force is removed. The unavoidable result is to waste a certain amount of the fluid which may fall into areas in which it may bring about a decidedly undesirable effect.

The use of the resilient band 6 overcomes this inherent defect by urging the pliable portion 5 toward its normally circular cross section at a greatly increased rate once the distorting pressure has been relieved. The result is a sudden increase in volume within the container 1 with a commensurate decrease in pressure which may fall below atmospheric. The pressure differential existing across the apertures 7 forcibly interrupts the flow of the fluid through the apertures and thereby causes the desired cleanly controlled cutoff.

The characteristics and number of resilient bands required to achieve the necessary control will vary somewhat in accordance with the characteristics of the container and its contemplated use. Thus, by way of example, the container 8 of FIG. 3 utilizes a plurality of resilient bands 6 because the pliable portion 5 comprises practically the whole of the container's height. For certain conditions, a single resilient band, wider than those illustrated in FIGS. 1 and 3, may be utilized to secure the desired cutoff function when the height of the pliable portion 5 is relatively extensive such as it is with the container 8 of FIG. 3. Additionally, it has been found that the resilient bands may be integral with the container when a material is utilized which exhibits elastic characteristics sufficient to provide the restorative force capable of achieving the substantially instantaneous cutoff required.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adaptable to specific environments and operating requirements without departing from those principles.
We claim:

1. A container for directionally dispensing fluid comprising:
   a. a body, said body including a pliable portion of sufficient
      rigidity to assume a normally circular cross section;
   b. a dispenser, said dispenser having at least one aperture
      such that fluid in said container and in direct communica-
      tion with said aperture is forced through said aperture
      when said pliable portion is distorted from its normal cir-
      cular cross section; and
   c. a resilient band having a normally circular periphery
      tightly encompassing said body about said pliable portion.

2. The container of claim 1 which includes at least one addi-
   tional resilient band having a normally circular periphery
   tightly encompassing said body about said pliable portion.

3. The container of claim 1 in which said resilient band is
   composed of steel.

4. The container of claim 3 in which said resilient band en-
   compasses substantially the whole of said pliable portion of
   said body.

5. The container of claim 1 in which said dispenser is
   detachably secured to said body.