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FLOW CONTROL NECK OR HEAD

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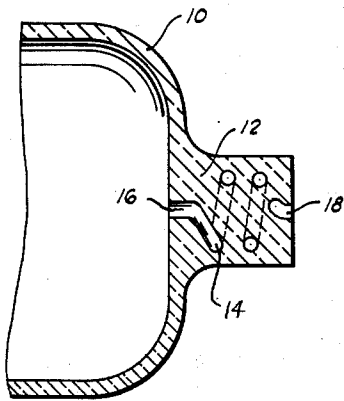


FIG. 1

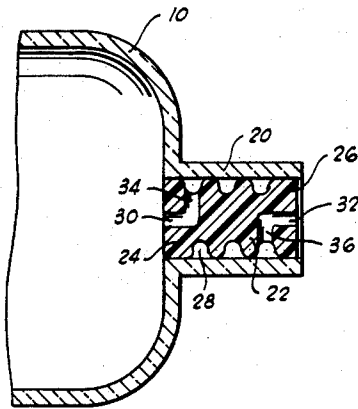


FIG. 2

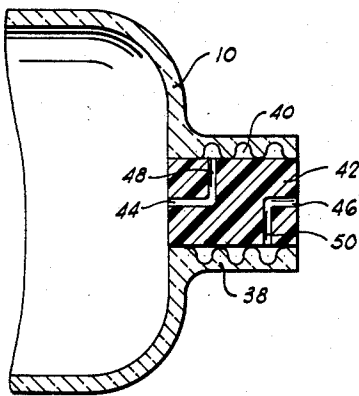


FIG. 3

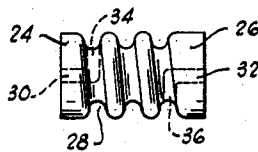


FIG. 2A

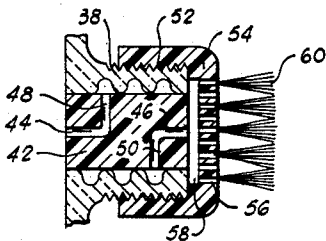


FIG. 4

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FLOW CONTROL NECK OR HEAD

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This invention relates to a device for providing a controlled dispensation of the contents of a container. More particularly, but not by way of limitation, the present invention relates to a container neck or head having incorporated therein a valve device which permits the controlled dispensation of the contents of the container while preventing leakage or dripping from the container during non-use.

A number of valve devices have previously been contrived for the purpose of preventing undesirable leakage or dripping from the mouth or nozzle of a container when the container is not in use, but which readily permit the substance contained in the container to be freely ejected through the valve when desired. Such valve devices have generally been characterized by one or more disadvantages which preclude their usage under circumstances where the fluid or substance to be ejected through the valve is subject to rapid dehydration and setting-up to a solid state upon exposure to air. These disadvantages usually result from the multiplicity and complexity of parts in the valve structure which permit the valve to become fouled or clogged when the substance ejected through the valve sets-up or hardens following use and upon exposure to air.

Moreover, it is frequently necessary to manipulate the valve structure per se prior to the dispensation of the contents therethrough in order to provide the necessary opening or passage. Such manipulation is, of course, a time-consuming and troublesome operation which materially decreases the attractiveness of the packaged product to the consumer. Valves which have functioned in the manner described, and which have been located in the neck or head of containers according to previous designs, have also generally been characterized by a relatively expensive construction which is difficult to justify in the light of the frequently short operating life of such valves, and their tendency to function defectively after short periods of usage.

The present invention contemplates a device which permits the controlled dispensation of the contents of a container at any instant when such dispensation is desired, without the necessity of manipulating or adjusting the device in any manner. Moreover, the flow control device of the present invention effectively prevents any seepage or leakage of the contents of the container therefrom during the times when the contents are not being dispensed. The flow control device of the invention generally comprises a narrow or restricted neck portion affixed to the container with which it is to be used, and having the neck portion blocked or obstructed by a solid portion through which extends a sinuous or serpentine groove establishing communication between the inside of the container and the surrounding atmosphere.

In a preferred embodiment of the invention, the solid obstruction in the neck portion of the container consists of a solid plug which carries at its periphery a spiral or helical groove extending from closely adjacent one end of the plug to a point closely adjacent the opposite end thereof. The peripheral helical groove, however, does not extend to or through the ends of the solid plug, but instead is in communication with a pair of radial bores which extend inwardly to the longitudinal axis of the plug, and are there in communication with a pair of axial bores which are formed in each end of the plug. By virtue of this arrangement, the contents of the container are prevented from leaking or seeping from the inside

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of the container through the plug to the outside thereof when the container is resting on its side or is in an inverted position. On the other hand, the contents may be easily ejected from the container through the plug by simply shaking the container or, in the case of a plastic container, by squeezing the sides thereof to produce excessive pneumatic pressure inside the container.

While it is appreciated that valve structures having helical or spiral grooves therein have been utilized in various dispensing or flow control devices of the prior art, it is believed that the present invention presents for the first time the concept of leading the fluid into and out of such helical or spiral groove by way of axial and radial bores formed in the end portions of the body of the solid plug. I have found that the utilization of such axial and radial bores permits the contents to be more accurately directed as they leave the neck or head of the container, and that the particular construction described is also effective to avoid the clogging of the valve passages due to the setting-up or hardening upon its exposure to air of the material dispensed. The latter result is achieved by virtue of the fact that upon the termination of the ejection of such material from the container, the material in the helical passageway tends to return to the inside of the container and is thus not detrimentally exposed to air.

It is accordingly an object of the present invention to provide a flow control neck or head for use on a container, which flow control neck will prevent the undesirable leakage of the container contents when the container is not in use, but which will permit the dispensation of the contents with a minimum of effort on the part of the user at any time desired.

Another object of the present invention is to provide a simple valve through which liquid or semi-liquid substances having a tendency to set-up or harden upon exposure to air may be dispensed without serious apprehension of the valve becoming clogged or stopped up by such substances due to their accumulation in the valve and subsequent exposure to air.

Another object of the present invention is to provide a flow control device for use in the neck or restricted opening in a container, which device permits the contents of the container to be accurately directed upon dispensation.

A further object of the present invention is to provide a flow control device for use in the neck or restricted opening of a container, which device permits the contents of the container to be confined to a small and concentrated stream upon dispensation.

A further object of the present invention is to provide a flow control neck or head for use upon a container from which the contents are to be dispensed, which flow control neck or head is inexpensive to manufacture, and yet is of rugged construction and therefore characterized by a long and trouble-free operating life.

Other objects and advantages of the invention will be evident from the following detailed description, when read in conjunction with the accompanying drawings which illustrate my invention.

In the drawings:

FIGURE 1 is a view in section taken through the center of a container having a flow control neck portion constructed in accordance with a non-elected embodiment of the present invention.

FIGURE 2 is a view in section taken through the center of a container fitted with a modified embodiment of the flow control device of the present invention.

FIGURE 2a is an elevational view of the plug used in the embodiment of the invention illustrated in FIG. 2, with the axial and radial bores therein indicated by dashed lines.

FIGURE 3 is a view in section taken through the center

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of a container and illustrating a further modification of the present invention.

FIGURE 4 illustrates the manner in which one of the flow control necks of the present invention may be utilized in combination with a cap having bristles protruding therefrom.

Referring now to the drawings in detail, and particularly to FIG. 1, reference character 10 designates a bottle or container used for the purpose of storing fluids and the like which are periodically to be dispensed therefrom in small quantities. The bottle 10 has a solid neck portion 12 which may be integrally formed with the container or formed separately and secured thereto. The neck portion 12 has formed therein a sinuous passageway 14 which originates at a point 16 which is substantially coincident with the geometric center of the inner end of said neck portion and terminates at a point 18 which is substantially coincident with the geometric center of the outer end of the neck portion. The passageway 14 sinuates in a lateral direction or from side to side in the neck portion 12 and may conveniently assume the form of a helix or spiral extending around a medial portion of the neck portion 12.

In the modified embodiment of the present invention which is illustrated in FIG. 2, the container 10 is characterized by the usual hollow, constricted neck 20 of the type frequently encountered. An insert or plug 22 having shoulders 24 and 26 at each of its ends is pressed into the hollow neck 20 in frictional engagement therewith. To permit the plug 22 to be tightly pressed into the hollow neck 20, I prefer to construct the plug of plastic although other suitable materials may be utilized. The plug 22 is characterized by a tortuous peripheral groove 28 which extends around a medial portion of the plug and terminates adjacent the shoulders 24 and 26. In some instances, it may be desirable to form the shoulders 24 and 26 separately from the plug 22 and secure them to each end thereof in a manner to block or close the tortuous groove 28. The shoulders 24 and 26 have axial bores 30 and 32 therethrough which communicate with radial bores 34 and 36, respectively. The radial bores 34 and 36 thus effectively connect the axial bores 30 and 32 to opposite ends of the tortuous groove 28.

It will be observed, in referring to FIGS. 2 and 2a, that the axial bores 32 and 30 are of smaller diameter than the diameter of the tortuous groove 28. It has been found in practice that such construction affords finer and more accurate control of the contents of the container during dispensation than can be accomplished when the axial and radial bores are of enlarged diameter. This construction also permits the surface tension of the liquid to play a more important role in controlling the rate of dispensation. However, it is contemplated that some advantage will accrue from the use of enlarged axial and radial bores when it is desired to dispense relatively viscous or heavy substances, and the present invention should therefore not be considered as limited in scope to the precise constructional dimensions illustrated.

In the modified embodiment of the invention illustrated in FIG. 3, the container 10 has a hollow neck portion 38 which is characterized by a spiral or helical groove 40 formed in its internal wall. An insert or plug 42 having a smooth external surface is pressed into the neck portion 38 and is of sufficient length to extend past the ends of the groove 40. The plug 42 has a pair of axial bores 44 and 46 which extend from the inner and outer ends of the plug, respectively, for a short distance into the plug. Radial bores 48 and 50 connect the axial bores 44 and 46, respectively, to the spiral groove 40. In this manner, communication is established between the inside and outside of the container 10.

The principle of operation is substantially the same for each of the embodiments of the present invention illustrated in FIGS. 1, 2 and 3. When the container 10 is tilted upon its side or is inverted, the contents

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of the container will enter the axial bore or passageway in the internal end of the plug or solid neck portion, as the case may be, and will proceed for a short distance into the sinuous passageway formed by the groove in or around the medial portion of the plug or neck portion. The length of the passageway, however, is such that before it is completely filled with liquid, a vacuum is established in the container of sufficient magnitude to prevent the further ingress of liquid into the passageway. It is also believed that the liquid which enters the spiral passageway divides into plural portions separated by air spaces which act as air locks to arrest the further progress of liquid toward the outer end of the neck portion. Thus, no leakage or seepage of liquid through the neck portion can occur. When it is desired to dispense the contents of the container 10, it is only necessary to shake the container up and down to force the liquid through the sinuous passageway or, in the case of plastic containers in current widespread use, to press the sides of the container together in order to increase the pressure acting upon the contents of the container. Upon cessation of the shaking movement (or the squeezing, as the case may be), air rushes into the container via the spiral passageway, forcing the liquid before it and thus assuring that the liquid is not exposed to external atmospheric conditions.

The central location of the axial passageway at the outer end of the neck portion permits a simple, easily removed cap to be utilized if desired. The location of the origin and terminus of the passageway through the neck portion of the container at approximately the geometric center of the plug or solid neck portion also permits the contents of the container to be more accurately directed to a desired point of application. Moreover, by employing a single, relatively small opening at the outer end of the neck portion or plug, the discharge of the contents from the container is confined to a small concentrated stream.

A practical application of the flow control neck of the invention is depicted in FIG. 4. The embodiment of the invention there utilized is the one which is illustrated in FIG. 3, but it will be apparent that any of the forms shown and discussed above may be utilized. The neck portion 38 carries external threads 52 and a cap 54 is screwed on the neck portion. The cap 54 has a series of perforations 56 in its outer end which communicate with a cavity 58 formed between the cap and the neck portion. Bristles 60 protrude outwardly from the end of the cap 54 to form a brush. The assembly thus constructed using the novel flow control neck of the invention might conveniently be used as a shoe polish applicator, glue applicator, toothpaste applicator, etc.

Changes may be made in the combination and arrangement of parts or elements as heretofore set forth in the specification and shown in the drawings, it being understood that changes may be made in the precise embodiment disclosed without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. A valve device for controlling the dispensation of the contents from a container comprising a solid plug having a tortuous peripheral groove extending around a medial portion of said plug and terminating adjacent, but short of, each end of said plug, said plug further having a pair of axial bores each extending into said plug a short distance from opposite ends of the plug and having a radial bore extending from the inner end of each of said axial bores to the adjacent end of said tortuous groove whereby said axial bores are placed in communication with said tortuous groove.
2. A valve device as claimed in claim 1 in which said tortuous peripheral groove is of spiral configuration.
3. A valve device as claimed in claim 1 in which said tortuous peripheral groove is of helical configuration.
4. A valve device for controlling the dispensation of the

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contents from a container comprising a solid cylindrical plug having a helical groove in a medial portion of its outer periphery, and having a radial bore extending from each end of said helical groove to the center of said plug; and a pair of cylindrical shoulders formed integrally with each end of said plug adjacent the termini of said helical groove, said shoulders each having an axial bore there-through communicating with the respective adjacent radial bore, and said shoulders and plug having an outside diameter of a size to permit the plug and shoulders to be pressed tightly into the opening of the container in which the valve device is to be used.

5. A flow control neck for use upon a container to control the dispensation of the contents therefrom comprising a neck portion for said container having an internal tortuous groove extending over a medial portion of said neck portion and terminating adjacent, but short of, each end of said neck portion; and a plug of a size to tightly fit in said neck portion and having a length equal

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to the length of said neck portion, said plug having an axial bore at each of its ends extending a short distance into said plug, and further having a pair of radial bores extending from the inner end of each of said axial bores to the adjacent end of said tortuous groove whereby said axial bores are placed in communication with said tortuous groove.

6. A flow control neck as claimed in claim 5 wherein said internal tortuous groove is of helical configuration.

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