It is an object of this invention to provide an improved dispensing device for bottles, tubes and other containers which is simple and inexpensive to manufacture and assemble and which complies with all the fundamental requirements set forth above while avoiding the disadvantages of the above mentioned prior proposals.

According to the invention there is provided a dispensing device for a container, comprising a dispensing head including a body portion having intermediate its end an integral and flexible inwardly directed pleat or fold, a valve member, an apertured dispensing member at one end of said body and a cap engageable with the said dispensing member, said pleat or fold serving when the cap is moved towards the other end of said body to cause relative movement between the valve member and dispensing member to prevent flow therethrough, while movement of the cap in the opposite direction releases the dispensing member for movement in a flow permitting direction in response to the flexibility of the said pleat or fold.

Where a dispensing head according to the invention is to be used with a container which is itself flexible e.g. a bottle or tube of thermoplastic the said body portion may be made of a material which is merely flexible and has little or no resilience since a squeeze applied to the container after releasing the cap will serve to move the dispensing member in a flow permitting direction. Where however the head is to be used with a rigid, e.g. glass, container the body portion of the head will be made of a material which is both flexible and resilient, e.g. polyethylene, so that on release of the cap the resilience of the pleat or fold will cause the dispensing member and valve member to separate to permit flow through the apertured dispensing member.

The said dispensing head according to the invention may be attached to the discharge end of a container e.g. a bottle, tube or jar in any convenient manner. Thus it may engage either internally or externally of the neck of such container. If desired it may be made to make a tight fit with the neck, or it may make threaded engagement with the container.

Preferably means such as screw threads, lugs or projections, engageable with corresponding threads, lugs or projections on the interior of the cap, are provided adjacent the said other end of the dispensing head to assist in the engagement of the cap with the said body portion.

Where the dispensing head is mounted over the neck of an associated container such means will preferably be formed on the exterior of the body portion and will be nearer said other end thereof than said pleat or fold. Where however the dispensing head is fitted within the neck of the container such means e.g. threads, lugs or projections will be provided on the exterior of the neck of the container.

According to another feature of the invention there is provided a container formed at least partly of a flexible material having a dispensing head as above set forth integral therewith.

Where the dispensing head is to be separately attached to the container the apertured dispensing member may if desired be made integrally with the body portion. Where however as is preferred the dispensing head is integral with the container the apertured dispensing member will be made separately from the body portion and can be attached thereto in any convenient manner. Thus the dispensing member can be engaged either internally or externally of the said one end of the body portion.

Various forms of apertured dispensing member may be provided depending on the particular dispensing head. Thus the said member may have a single discharge aperture therethrough or several such apertures.
In one embodiment of the invention the dispensing member is of tapered elongate form and constitutes a discharge nozzle.

If desired, however, the dispensing member may have on its outer surface a sealing for an absorbent pad, sponge or wad which upon receiving liquid through an aperture in the member serves to distribute the liquid over a surface to which it is to be applied. Where the aperture 
dispensing member is intended to receive a sponge or like absorbent pad it will preferably also have a flange or similar projection disposed outwardly of the sealing which serves to make engagement with the cap thereby to avoid direct engagement of the cap with the absorbent pad or sponge upon closing.

Where it is desired to close the dispensing head when it is not in use, e.g. where an absorbent pad or sponge is included in the head, the cap will cover the whole of the upper surface of the head. Where however the said ap 
{
ertured dispensing member merely has a sprinkler hole or holes therethrough, the cap may be of annular form so that the sprinkler holes are always exposed, opening or closing of the flow passage to the hole or holes being effected by moving the annular cap radially or away from the said other end of the body portion.

Preferably the said valve member is of the kind having a tapered sealing portion, which is engageable in sealing fashion in the or each discharge aperture in the said dispensing member.

The shape of said valve member will, of course, depend upon the size and number of the apertures in the dispensing member or on the shape and size of the flow passage leading to such aperture or apertures. In some arrange 
ments the said pleat or fold may carry the valve member of the dispensing head. However so as to ensure that the valve member is held stationary during movement of the dispensing member and pleat or fold in operation it is preferred to mount the valve member on a part, e.g. an inwardly projecting shoulder, of the head nearer to the said other end thereof than is said pleat or fold. Such an effect may, alternatively, be achieved by arranging for a part of or associated with the valve member to engage with a part of the interior of a container when the head is placed on the latter; for example, where the container is not very deep, the valve member could have an ex 
tension adapted to engage the base of the container upon application of the head thereto so as to hold the valve member against movement towards such base.

In general said valve member will comprise a sealing portion and a mounting portion which will permit a flow of liquid from a container past the valve when the device is in use.

The said valve member may be a separate member mountable within the head or where a separate dispensing member is provided may be formed integrally with a part of said body portion which will not, in operation, move when said pleat is opened or closed. Where a sep 
{
arate valve member is provided and is to be carried on the opposite side of said pleat from the apertured dispensing member, the valve member is preferably formed of resilient material so as to enable it to be deformed for insertion into the body past the pleat or fold, whereafter it will resume its original shape to make engagement with the body portion on said opposite side of the pleat.

In order that the invention may be well understood, cer 
tain embodiments thereof will now be described by way of example only and with reference to the accompanying drawings, in which:

FIGURE 1 shows in half section a first embodiment of a container and integral dispensing device according to the invention with the valve open but without its cap;

FIGURE 2 shows a view in section of half of the dis 
{
pensing device of FIGURE 1 but with the cap in position 
and the valve closed;

FIGURE 3 shows a cross section on line III—III of 
FIGURE 1;

FIGURE 4 is a side elevation of the valve member of the dispensing head;

FIGURE 5 is a top plan view of the valve member of 
FIGURE 4;

FIGURE 6 shows the valve member of FIGURES 4 and 5 in its compressed condition ready for insertion in the dispensing head;

FIGURE 7 is a side elevation of an alternative form of valve member showing, in dashed lines, the position it assumes during insertion into the head;

FIGURE 8 is an underneath plan view of such valve member;

FIGURE 9 shows, in vertical medial cross-section, the top of a container having an integral dispensing device in accordance with a second embodiment of the invention, the device being in its closed condition;

FIGURE 10 is a side elevation of a container having a nozzle and an integral dispensing device in accordance with a third embodiment of the invention;

FIGURE 11 is a cross-section on the line XI—XI of 
FIGURE 10; and

FIGURE 12 is a vertical medial cross-section of the top of a container carrying an integral dispensing device according to a fourth embodiment of the invention; the dispensing devices being in their open condition in the embodiments of FIGURES 10 to 12.

Referring first to FIGS. 1 to 6 of the drawings, 1 in 
dicates a blown thermoplastic bottle intended to carry a liquid soap cleaning preparation and incorporating an in 
{
tegral dispensing head 2.

At one end 4 the body portion of the head 2 has an apertured dispensing member 5 engaged thereon in a liquid tight manner. This member 5 has a sealing 6 on its upper 
surface in which an absorbent pad 7 is mounted. Seat 
ing 6 is inset from the edge of member 5 to leave a shoulder 8 against which a shoulder 9 on the interior of a cap 3 (FIG. 2) engages as will be explained here 

After member 5 has an aperture 10 extending cen 
trally therethrough. The underside of the walls of aperture 10 are tapered at 11 to mate with the tapered end 12 of a valve member 13.

An annular shoulder 23 is formed on the underside of member 5 and serves to prevent any displacement of valve member 13 during use of the container. The other end 15 of the body portion of the dispensing head has an external multi-start screw thread 16 en 
gageable with an internal thread 17 on cap 3; in this em 
{
bodiment a four-start thread is provided.

The valve member 13 (see FIGS. 4 to 6) has a cross 
{
piece 14 past the sides of which liquid may flow to the end 4 of the body. Two oppositely facing legs 19 and 20 depend from the cross-piece 14, each leg being formed with an arcuate rebate 21. The space between the legs 19 and 20 extends up beneath the tapered end 12 of the valve member, to form a V-shaped groove 22 extending somewhat into the underside of the cross-piece 14.

Between the ends 4 and 15 of the body portion an in 
{
rtegral resilient inwardly directed bellows fold or pleat 18 is formed. This fold or pleat 18 extends inwardly towards the valve member 13 in the space between the cross-piece 14 and the legs 19 and 20 depending there 

Below the pleat or fold 18 the body portion of the dispensing head has an inwardly directed annular shoulder 26 which engages in the rebates 21 of the legs 19 and 20 of the valve member 13 and thus holds the valve member against movement when the pleat or fold is caused to close.

The tapered end 12, cross-piece 14 and legs 19 and 20 of the valve member are formed integrally from a resil 
{
ent material such as polyethylene or polypropylene and it will be understood that the provision of the groove 22 under the cross-piece 14 enables the whole member to be
distorted into the position which is shown in FIG. 6 so that, to insert the valve member in the dispensing head, it may be pressed into the same from the top whereupon engagement of the legs 19 and 20 with the plate causes them to be urged inwardly to such distorted condition in which they can pass by the plate, whereafter the spring again for the rebates 21 thereof to engage with the shoulder 26 as shown in FIG. 1. Return of the valve member to its undistorted shape is assisted when the cross-piece 14 is pressed down on to the top of the plate 18 upon insertion so that the cross-piece is flattened out and the legs 19 and 20 swing outwardly.

When the cap 3 is placed upon the dispensing head 2 (see FIG. 2) it will be seen that shoulder 9 abuts on shoulder 8 of the aperture dispensing member 5 and threads 16 and 17 interengage. Upon tightening the cap onto the head by means of the threads, member 5 is moved towards end 15 of the body portion and the angle embraced by the plate or fold 18 is reduced thus causing tapered end 12 of valve member 13 to close aperture 10. In this position flow through the aperture 10 is completely prevented even though the bottle may be inverted.

Downward displacement of the valve member 13 upon such closing is, of course, prevented by the engagement of its legs 19 and 20 with the shoulder 26 of the dispensing head. When the liquid is again to be used the cap is removed and the resilience of the plate or fold 18 causes dispensing member 5 to move upwardly away from valve member 13 so as to permit flow past the valve member 13 to the pad 7.

In an alternative arrangement the valve member 13 could be of hollow thin-walled construction and in this case need not be slotted at its base as the flexibility of its wall would then be sufficient to permit folding of the cross-piece 14.

FIGS. 7 and 8 show an alternative form of valve member, comprising a circular plate 27 formed with four symmetrically arranged apertures 28 to permit the flow of liquid to the end 4 of the body. Two oppositely facing pairs of legs 29 and 30 depend from the plate 27 and, as may be seen from FIG. 8, are offset from one another. Each leg is of substantially triangular shape and is formed with an acute rebate 31 at its outwardly facing apex. On its underside, between the pairs of legs, the plate 27 is formed with a transverse groove 24, while the valve member is slotted at 25 adjacent its connection to the plate 27. It will be seen that the valve member of FIGS. 7 and 8 is deformed as shown in dot-and-dash lines in FIG. 7, to enable it to be passed by the plate 18 of the dispensing head.

FIG. 9 illustrates a second dispensing device according to the invention, in which the body portion of the dispensing head 2 is of virtually the same form as in the embodiment of FIGS. 1 to 6, and is again integral with a bottle 1. Those parts which are of the same form as the corresponding parts in FIGS. 1 to 6 will not, therefore, be described again.

In the embodiment a lambs-wool bob or pad 32 is carried on a ring 33 formed at one end of a supporting wire member 34 embedded at its other end in the tapered part 12 of the valve member 13. A dispensing member 35 fits on the upper end 4 of the body portion of the dispensing head as in FIGS. 1 to 6, but is in this case formed with an upstanding annular bush 36 surrounding and supporting the wire member 34 and also defining a discharge aperture 37 of the dispensing member.

The cap 38 of this embodiment screw-threadedly engages the lower end 15 of the body portion of the dispensing head as in the previous embodiment, but is in this case of domed shape and is formed with an internal shoulder 39 for engagement with the perimeter of the dispensing member when the device is closed as illustrated. The valve member 13 used in the embodiment illustrated in FIG. 7 may, of course, be replaced if desired by one of the kind shown in FIGS. 7 and 8.

FIGS. 10 and 11 illustrate a third embodiment of the invention, in the form of a container 40 having a nozzle through which, by virtue of the invention, liquid may be supplied at a rate variable between a steady stream and a drop at a time.

Here again, the body portion of the dispensing head is integral with a container 40 and is of the same form as in FIGS. 1 to 6 and FIG. 9, and so will not be described in detail.

In this case, however, the dispensing member takes the form of a tapered tube 41 forming a nozzle and provided with a skirt portion 42 fitting over the upper end 4 of the dispensing head. The valve member is provided with a shaft 43 extending coaxially within the nozzle 41 and having a tapered end part 44 adapted to fit in the discharge aperture defined by the hollow conical end part 45 of the nozzle when the device is closed. As before, closure is achieved by movement of the dispensing member relatively to the valve member, in this case by tightening an annular cap 46 on the body portion of the dispensing head, the top of the cap having an inwardly projecting shoulder 47 engageable with the perimeter of the dispensing member 41. It will be understood that in this embodiment adjustment of the annular cap 46 enables the size of discharge aperture to be varied; thus the rate of liquid discharge may be adjusted as desired.

This arrangement has the advantage that it is not necessary completely to separate the cap from the dispensing device to permit the flow of liquid, so that any danger of the cap becoming mislaid is obviated. We may provide additional stop means which positively prevent complete removal of the cap while still, of course, permitting a full range of variation of the rate of liquid flow. A further advantage of this embodiment over other nozzled containers lies in the fact that the nozzle is closed off at its extreme tip so that the whole of the contents are completely cut off from the atmosphere when the device is closed.

This embodiment of the invention also has the advantage that due to the absence of cracks and crevices, threads and the like, which can come in contact with the contents, the container can be completely cleaned by simply wiping it over with a cloth. This, of course, makes it eminently suitable for use with food products and pharmaceuticals, i.e. mustard, sauces, salad dressings and the like, or drip feeders for eye drops or other medicaments.

The dispensing device illustrated in FIG. 12 differs from those previously described in that it is not integral with a container but is of such a form that it may be separately applied to containers C of many known kinds which have not been especially adapted to receive it.

Thus in this case, the body portion 48 of the dispensing head is formed integrally with the apertured dispensing member, which again comprises a nozzle 49. The body portion is again formed with a plate 18 and an inwardly extending shoulder 26, the latter supporting a valve member which is basically similar to that of FIGS. 10 and 11 with the exception that the crosspiece 14 thereof is omitted, the reason for this being that the valve member will in this case be inserted in the body portion of the dispensing head from its lower end before the device is engaged on a container with the result that the presence of a cross-piece is no longer necessary to prevent the valve member being pushed into the container, as was so in the previous embodiments.

The valve member has a shaft 50 extending coaxially within the nozzle 49 and formed with a tapered end part 51 adapted to fit, when the device is closed, in the discharge aperture 52 defined by the conical open end of the nozzle-shaped dispensing member 49.

The lower end of the body portion 48 of the dispensing head has an annular skirt 53 adapted to fit in the mouth of a container C, the external screw-thread 54 of
which will cooperate with an internal thread 55 of an annular cap 56 of the dispensing device. The cap 56 is formed with an integral shoulder 57 engagable with the perimeter of the lower part of the dispensing member 49 so that, as before, tightening of the cap causes movement of the dispensing member relative to the valve member to close the discharge aperture 52.

It will be clear that, in addition to its further advantageous features, the dispensing device of FIG. 12 has nearly the same advantages, when applied to a container, as has that of FIGS. 10 and 11. It may also, being detachable, be formed for fitting to each of a commercial range of containers having bodies of different shapes and sizes.

It will be seen that the invention provides a range of very simple dispensing devices which securely close their associated container, which can be opened and re-closed by a very simple operation, and which can be cheaply and easily mass produced.

It will also be understood that only one preferred embodiment by way of example of an integral container and dispenser head according to the invention has been described above and that variations and modifications may be made therein without departing from the scope of the invention.

I claim:

1. A dispensing device for a container, comprising: a tubular body portion; an apertured dispensing member at one end of said body portion and defining a valve seat; a valve member in said body portion and cooperative with said valve seat to control flow through said dispensing member; said tubular body portion having a permanent bellows fold therein between its ends providing for movement of said apertured dispensing member relative to said valve member; a cap threadedly mounted on said body portion at a part thereof separated from said dispensing member by said bellows fold and having interior shoulder means thereon abutting a shoulder on said dispensing member spaced from said valve seat; whereby said cap may be threadedly moved on said dispensing device relative to said valve member to compress said bellows fold and move said dispensing member toward said valve member to a closed position or in a direction to release said dispensing member for movement to an open position.

2. A dispensing device for a container, comprising: a tubular body portion; an apertured dispensing member at one end of said body portion and defining a valve seat; a valve member in said body portion and cooperative with said valve seat to control flow through said dispensing member by said bellows fold and having means thereon abutting said dispensing member; a cap mounted on said body portion at a part thereof separated from said dispensing member by said bellows fold and having means thereon abutting said dispensing member; and means for moving said cap axially of said body portion whereby said cap may be manipulated to move said dispensing member relative to said valve member to a closed position or to release said dispensing member for movement to an open position, said dispensing member being of tapered elongate form constituting a discharge nozzle.

3. A dispensing device for a container, comprising: a tubular body portion; an apertured dispensing member at one end of said body portion and defining a valve seat; a valve member in said body portion and cooperative with said valve seat to control flow through said dispensing member; said tubular body portion having a flexible bellows fold therein between its ends providing for movement of said apertured dispensing member relative to said valve member; a cap mounted on said body portion at a part thereof separated from said dispensing member by said bellows fold and having means thereon abutting said dispensing member; and means for moving said cap axially of said body portion whereby said cap may be manipulated to move said dispensing member relative to said valve member to a closed position or to release said dispensing member for movement to an open position, wherein the said valve member is fixedly mounted in said body portion on a part thereof separated from said dispensing member by said bellows fold.

4. A dispensing device according to claim 6, wherein said valve member is mounted on an inwardly projecting shoulder in said body portion.

5. A dispensing device according to claim 6 wherein the said valve member is removable from said body and having a mounting portion formed of resilient material so as to enable it to be deformed for insertion into or removed from the body past said bellows fold, whereby it will assume its original shape to make supporting engagement with the body portion.

References Cited by the Examiner

UNITED STATES PATENTS

2,858,558 11/1958 Sudbeaz -- 15--572 X
3,090,987 5/1963 Rueckberg -- 15--572
3,106,742 10/1963 Schultz et al. -- 15--565
3,128,016 4/1964 Ferri -- 222--212
3,193,154 7/1965 Bross -- 222--213

CHARLES A. WILLMUTH, Primary Examiner.

S. E. BECK, Assistant Examiner.