Sept. 22, 1970 M. E. NYQUIST 3,529,752

PLASTIC CONTAINER TOP WITH COMBINATION CLOSURE AND SPRINKLER

Filed Nov. 25, 1968

Fig. 1.

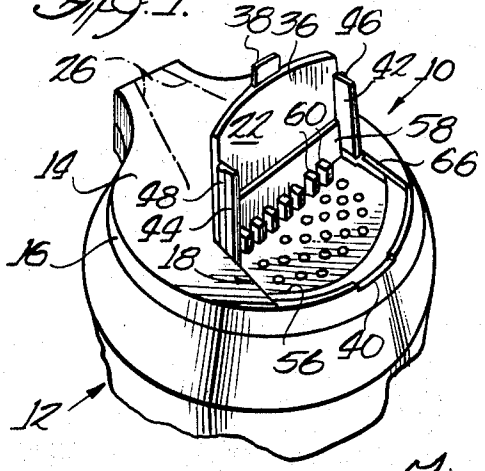



Fig. 2.

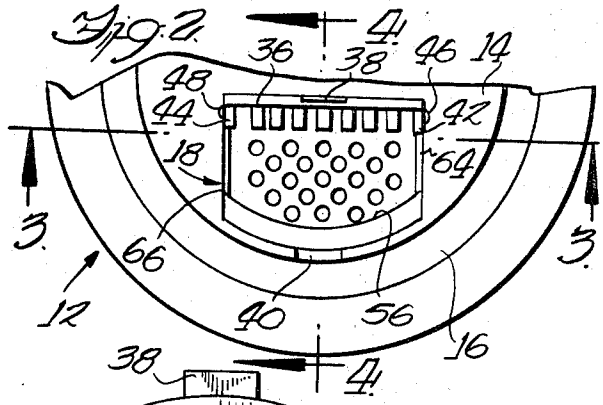



Fig. 3.

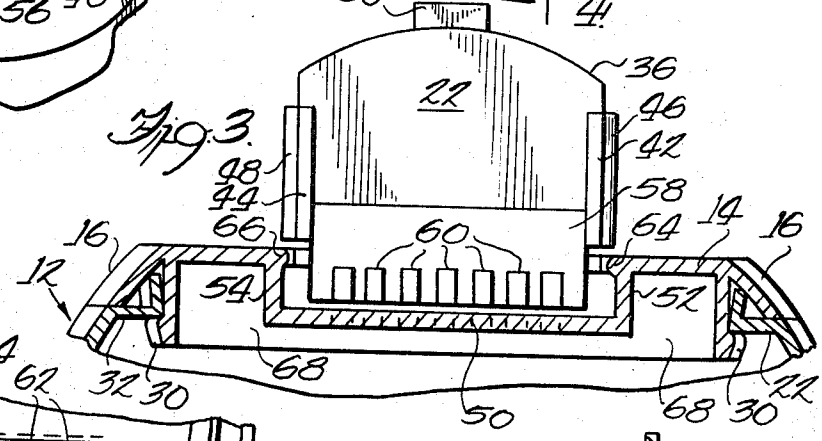



Fig. 6.

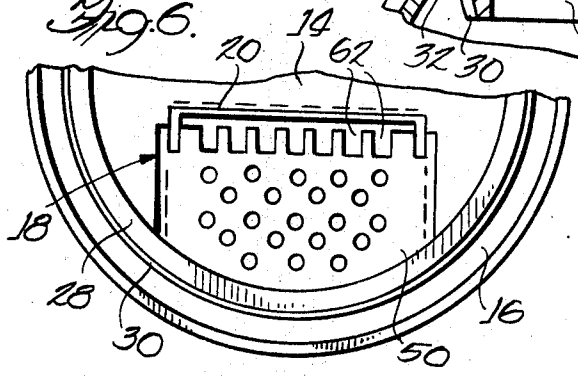



Fig. 4.

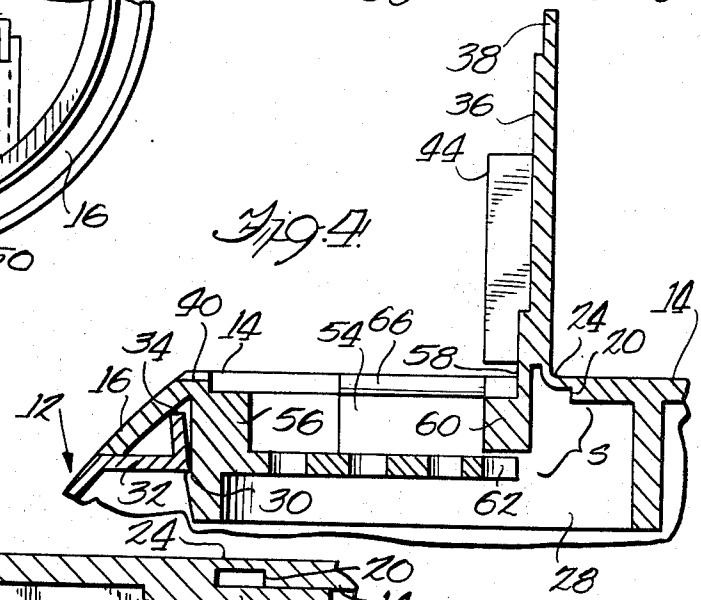
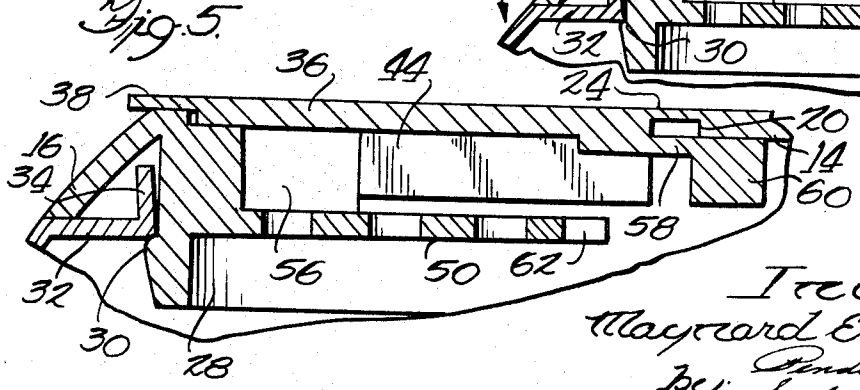



Fig. 5.




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# PLASTIC CONTAINER TOP WITH COMBINATION CLOSURE AND SPRINKLER

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U.S. Cl. 222—480 8 Claims

## ABSTRACT OF THE DISCLOSURE

This low-cost, one-piece integrally molded plastic container top for containers of particulate substances such as salt features a wall member having an opening with a hingedly-attached cover and a recessed perforated sprinkler plate across the opening. Access opening for mold parts adjacent the sprinkler plate are effectively sealed against undesired leakage by a series of spaced projections on the cover adjacent the hinge portion, which projections register with a series of edgewise slots in the sprinkler plate.

## BACKGROUND OF THE INVENTION

### Field of the invention

The present invention relates to a plastic closure and sprinkler device for particulate materials and more specifically to a low-cost, one-piece, integrally molded closure and sprinkler which lends itself to production by conventional techniques, preferably injection molding with simple two-section opposed dies.

For convenience herein, the invention will be described with particular reference to salt (sodium chloride) sprinkler and closure devices. It should be understood, however, that the invention is not limited thereto and can be embodied in the form of a sprinkler (or shaker) device to a wide variety of materials, but, most advantageously, for particulate solids, e.g., various condiments in granular form, granular sugar, granular foodstuffs and other edible and non-edible granular substances.

### Description of the prior art

The dispensing of particulate material, such as salt, presents a number of problems. Among these problems is the requirement of providing at extremely low cost a convenient, sanitary, stackable, attractive and structurally-sound package from which the salt can be dispensed selectively by pouring or sprinkling but which can be resealed after each use. The stringent cost limitation has led to efforts to mold one-piece snap-on container tops including resealable pouring spouts and sprinkler devices.

Such efforts have met with only limited success. For example, in one case, the resulting combination top did not present a substantially planar surface in the closed position for convenience of stacking, but instead employed upstanding nibs or projecting buttons for securing the closure. Another disadvantage arose from the fact that undesired spaces had to be included in the sprinkler plate for mold parts, thus presenting excessive sifting or bypass leakage problems and defeating the function of the foraminous sprinkler plate, e.g., fine sifting and the retention of undesired large particles. This shortcoming is particularly apparent when using small-diameter spaced perforations for extra-fine distribution of particles.

It is therefore an object of the present invention to provide a low-cost resealable sprinkler which is integrally molded as part of a container top and copes with these problems. It is a more specific object of the present invention to provide a low-cost, integrally molded closure and sprinkler which can be molded by simple two-section injection molding techniques. It is another object of the present invention to provide a low-cost closure and sprinkler combination which is free from projecting nibs and presents a planar top surface in the closed position for ease of stacking. It is still another object of the present invention to provide a closure and sprinkler combination which is free from undesired open areas on or adjacent the recessed sprinkler plate or grate, at least when the closure is in the open position. These and other objects of the present invention will become apparent as a detailed description proceeds.



## SUMMARY OF THE INVENTION

In brief, these objects are achieved in a particular embodiment by a one-piece molded plastic closure and sprinkler which comprises a preferably-flat wall member having an opening preferably with at least one straight side and securing means adjacent peripheral portions for attachment to a vessel such as a salt container. The securing means is preferably in the form of a snap fitting, e.g., depending flanges on the wall member with enlarged engageable surfaces adjacent the lower extremity which engage depending flanges on the open end of the container. The wall member is preferably reinforced for structural strength by transverse flanges or the like, e.g., depending transverse webs.

A cover for, and substantially registering with, the opening is integrally molded in an upstanding position (i.e., vertical with respect to the flat wall member), usually along the straight side, by means of a thinned section whereby the cover can be hingedly flexed from the upstanding molded position to a preferably-coplanar closed position. The cover has means for releasably securing the cover in a closed position, e.g., depending side rails and outwardly-extending detents, for engaging recesses or registering detents on edge portions of the opening, or equivalents. A tab portion on the cover preferably overhangs the wall member in the closed position so as to facilitate digital opening of said cover.

A perforated sprinkler plate or sifter grate is integrally molded to the undersurface of the flat wall member and extends substantially across the opening, but terminates spacedly from the inner, straight side so as to provide an access space for mold parts associated with the lower extremity of the cover and the inner surfaces of the thinned hinge section.

The resulting access space, which is essential so that all surfaces are engageable by dual mold cavities and has heretofore resulted in undesired leakage, is sealed against excessive granular flow by an integrally molded series or plurality of spaced projections adjacent the lower extremity of the cover, which projections cooperate with a series of registering slots on the adjacent edge of the sprinkler plate. The relationship of the projections and slots is such as to maintain a minimum gap when the cover is in the vertical or sprinkling position and preferably during at least a portion of the arc of travel of the cover from the upstanding molded position to the coplanar closed position. Thus the flow of particulate materials is substantially limited to the apertures or perforations in the sprinkler grate, at least when the cover is in the open sprinkling position.

The apertures in the sprinkler plate may have various configurations, including cylindrical, frustoconical (funnel shaped), rectilinear, combination curved and straight sided polygonal orifices and the like. The sprinkler plate itself may be substantially flush with the underside of the flat wall member or substantially recessed below said wall member.

Because of recognized advantages, the structure of the present invention is molded as a unitary structure in plas-

tic. The selected plastic should be readily moldable by conventional low cost techniques and should preferably have high strength, reasonable resilience and sufficient body to maintain shape under normal usage. It should also be inert, free from objectionable odors, and should otherwise meet structural, sanitary and aesthetic requirements.

Suitable plastics may include, but are not limited to, polyethylenes, polypropylenes, polyamides, acetate-butyrate copolymers, polyvinyl chloride polymers and copolymers, polystyrene, and compatible combinations thereof, preferably polyethylenes and/or polypropylenes, which have what the art refers to as excellent "living hinge" properties. The plastic, particularly those with little tolerance to repeated flexure, may also contain necessary or desirable additives, such as dyes, plasticizers, extenders, and the like, as those skilled in the plastic molding art will recognize. In the specific embodiment hereinafter set forth, the container top is injection-molded from injection-molding grade, high-density polyethylene having a density of about .95, and the salt container on which it is snap fitted is blow-molded from blow-molding grade high-density polyethylene having a density of about .96.

A particular feature of the apparatus is the fact that when the cover is disposed at right angles to the flat wall member, the apparatus can be molded in one piece by conventional dual mold techniques. Yet, the structure is free of undesired mold-access spaces which cause leakage and defeat the purpose of the perforated sprinkler. Thus, a relatively inexpensive, simplified, high-speed two-section injection mold, one section approaching in a direction substantially perpendicular to the wall member and the other section approaching from the opposite direction, can be employed.

## BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more clearly understood from the following detailed description of a specific embodiment, read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a preferred embodiment of the present invention in place on a fragmentally-illustrated salt container, the combination closure and sprinkler being shown in the open or sprinkler position;

FIG. 2 is a fragmentary overhead plan view of the embodiment of FIG. 1, the combination closure and sprinkler again being shown in the open or sprinkling position;

FIG. 3 is an enlarged section view along the line 3—3 of FIG. 2;

FIG. 4 is a still further enlarged section view along the line 4—4 of FIG. 2;

FIG. 5 is similar to FIG. 4 on a larger scale but with the cover in the closed position; and

FIG. 6 is a fragmentary bottom plan view of the embodiment of FIGS. 1–5, certain details being omitted in the interest of clarity and drawing economy.

## DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the drawings, a preferred embodiment of the plastic container top of the present invention is indicated generally as top member **10** and is mounted, preferably by an internal snap fitting, on vessel **12**, such as a cylindrical salt container having a narrowed intermediate waist. While vessel **12** is not, per se, part of the present invention, there are manifestly cooperating and interacting structures between top **10** and vessel **12**, as will become apparent hereinafter. For example, as discussed in connection with FIGS. 3–5, top **10** may have a depending flange which engages an internal flange on container or vessel **12** to form a snap fitting. While top member **10** is depicted as the whole top for an open-ended container, it may also constitute a plug-type insert or the like with peripheral recesses, grooves or equivalents, which insert is snap fitted into an aperture in the top wall of a container.

The container top **10** comprises wall member **14**, which in the illustrated embodiment is substantially flat, except for outwardly and downwardly extending peripheral edge flange **16**. Wall member **14** has at least one opening therethrough generally indicated at **18**, said opening preferably having at least one straight side **20** (FIGS. 4–6) to which cover **22** is integrally molded along a thinned section **24**. Straight side **20** would not be apparent in an overhead plan view when the cover is in the closed position as shown in FIG. 5 because thinned section **24** is integrally molded therewith, presenting an unbroken exterior surface to the viewer.

In a preferred embodiment, wall member **14** may also have a second opening, preferably opposite opening **16**, as indicated in dashed lines at **26** (FIG. 1). In this opening is mounted an integrally formed dispensing spout, the specific structure of which not being, per se, part of the present invention. A preferred form of dispensing spout is disclosed, for example, in a copending application of Albert Yochim, Ser. No. 766,720, filed Oct. 11, 1968, and entitled "Dispensing Apparatus."

As shown in FIGS. 3–5, wall member **14** may be snap fitted to vessel **12** by means of a depending flange **28** which has at its lower extremity an enlarged area or rim **30**. During assembly, flange **28** is flexed inwardly slightly as top member **10** is moved coaxially onto vessel **12** until rim **30** resiliently engages the corner of container **12** formed by horizontal internal flange **32** and upstanding internal flange **34**, which are shown only fragmentarily. Since the particular form of snap fitting is not, per se, the invention, no further description thereof is necessary. Manifestly, wall member **14** could have elongated depending sides which could constitute the walls of the vessel, thus requiring only a bottom fitting or closure. The depending sides could take the form of elongated downward extensions of either edge flange **16** (in which case depending flange **28** could be eliminated) or depending flange **28** (in which case edge flange **16** could be eliminated).

Cover **22** comprises a substantially flat web **36** which is molded in the vertical position shown in FIGS. 1–4. Because of thinned section **24**, it can be flexed to the closed position shown in FIG. 5 so as to register with opening **18**, whereby its upper surface is disposed in coplanar relationship with the upper surface of wall member **14**. This facilitates stacking during storage, shipping, and display. Tab **38**, adjacent the center of cover **22**, registers with recess **40** and projects outwardly beyond wall member **14**, whereby tab **38** can be digitally engaged so as to open cover **22**, as is best depicted in FIG. 5. Alternatively, wall member **14** and flange **16** can be indented inwardly to permit insertion of a fingernail or tip of a finger beneath cover **22** for opening the same.

Cover **22** features depending side rails **42** and **44** with elongated detents **46** and **48**, respectively. As will become apparent hereinafter, these rails and detents provide means for releasably securing cover **22** in the closed position. Otherwise the stresses in thinned section **24**, which constitutes what those skilled in the art sometimes refer to as a "living" or "memory" hinge, would tend to return cover **22** to the upright, molded position.

Perforated sprinkler plate **50** is integrally molded by means of side walls **52** and **54** and outer wall **56** to the undersurface of wall member **14** and extends substantially across opening **18**. It terminates in spaced relation, horizontally and vertically, from side **20**, whereby an access space "S" (FIG. 4) is provided for mold parts which form the lower extremity of cover **22**, including thinned section **24**, as those skilled in the molding arts will appreciate. Mold access space "S" causes gross leakage problems, which could be coped with heretofore only by configurations requiring multi-section molds having more than opposed dual cavities.

In the present invention this problem is solved by adding to the lower extremity of cover **22** by means of ex-

tension flange **58** a series of spaced projections **60**. These projections mesh or register with spaced slots **62** at the inner edge of perforated plate **50** so that the projections can interdigitate through the registering slots as cover **22** is moved between the open and closed positions. Extension flange **58** and spaced projections **60** can disadvantageously be molded by the same mold sections which also form cover **22**, including thinned section **24**, as those skilled in the art will recognize in the light of the present disclosure. Thus for example, mold portions which form the lower surfaces of projections **60** pass through slots **62** in plate **50**.

The capability of molding container top **10** in a simple two section injection mold is a particularly advantageous aspect of the present invention. Thus, when cover **22** is in a fully upright position, that is, web **36** is perpendicular to wall member **14**, the structure can be molded in its entirety using an injection-type mold, the two sections of which move in opposite or opposed vertical directions as viewed in FIGS. 3 and 4. The two mold sections are brought together, the plastic injected, the two mold sections are separated and the resulting container top is readily removed. This avoids the high cost of, and lower production rates associated with, complex multi-section molds. This simplicity of molding is vitally important in meeting the critical low cost requirement.

Conventional molding techniques are employed. For example, one-half degree tapers are provided on vertical surfaces to facilitate removal of the molded structure from the mold. Recesses and the like are sized and configured, e.g., rounded or the like, so that they can be readily flexed or otherwise snapped from the mold. High-speed, multi-cavity molds are used. These and other techniques are well known to those skilled in the molding arts.

Because thinned section **24** is, as aforementioned, a "memory" hinge, the stresses therein tend to hold the cover **22** in the open position. When cover **22** is flexed to a closed position, it is releasably secured in such position by means of elongated detents **46** and **48** on rails **42** and **44**, which frictionally overlap or snap past registering protrusions **64** and **66** in opening **18** of wall member **14** adjacent the upper portion of side walls **52** and **54**. Various equivalent combinations of detents and recesses and equivalents thereof may be substituted as those skilled in the art will recognize in the light of the present disclosure.

FIG. 4 best illustrates how projections **60** effectively seal access space "S". The projections cooperate with peripheral edges of slots **62** so as to effectively block the flow of particulate substances. The gap between projections **60** and slots **62** can be adjusted so as to effectively seal and yet not cause binding, as is readily apparent in the light of the present disclosure.

Additional structural strength and rigidity can be provided to top **10** by depending transverse flanges such as flange **68**, and equivalents. Such transverse flanges in conjunction with depending flange **28** and peripheral edge flange **16** provide substantial rigidity to the container top, particularly when it is snap fitted to vessel **12**. In fact, the combination of dispensing top **10** and container **12** interact to provide a substantially rigid unitary structure even when molded with relatively thin plastic walls, e.g., 25 to 50 mils.

In the design of the structure the natural shrinkage of the plastic upon cooling is relied upon in part to assure that projections **60** clear slots **62** upon opening or closing cover **22**. While plastics having excellent "living hinge" properties are employed, the life of the hinge can be adjusted, if desired, by proper selection and formulation of the plastic composition, as those skilled in the art will recognize. Thus, while the plastic may be formulated to outlive the normal span of usage of the salt container, it may be adjusted for sanitary reasons to prevent repeated reusage thereof.

From the above description its is apparent that the objects of the present invention have been achieved. While only certain embodiments have been illustrated, many alternative modifications will be apparent from the above description to those skilled in the art. These and other alternatives are considered within the spirit and scope of the present invention, and coverage thereof is intended by this application.

Having described the invention, what is claimed is:

**1.** A one-piece molded plastic closure and sprinkler device for particulate materials comprising:

(a) a wall member having an opening therethrough and securing means adjacent peripheral portions thereof for attachment to another wall portion of a vessel;

(b) a cover for said opening integrally molded in an upstanding position to said wall member along one side of said opening by means of a thinned section, whereby said cover can be hingedly flexed along said thinned section from said upstanding molded position to a closed position;

(c) a perforated plate integrally molded to inner surfaces of said wall member and extending substantially across said opening and terminating in spaced relation from said one side, whereby an access space is provided for mold portions associated with the lower extremity of said cover and the inner surfaces of said thinned section, said perforated plate having a plurality of edgewise slots adjacent said access space; and

(d) a plurality of spaced projections integrally molded to said cover adjacent the lower extremity thereof and registering with said slots so as to substantially seal said access space against granular flow therethrough at least when said cover is in the upstanding molded position, whereby the flow of particulate materials through said opening is substantially limited to the perforations in said perforated plate.

**2.** The device of claim **1** including depending side rails on the underside of said cover with detents to releasably secure said cover in the closed position.

**3.** The device of claim **1** including projecting tab means on said cover whereby said cover can be digitally engaged for opening.

**4.** The device of claim **1** including a depending transverse web on the lower surface of said wall member to add structural strength thereto.

**5.** The device of claim **1** wherein said securing means comprises a depending flange with enlarged engageable surfaces adjacent the lower extremity thereof for snap fitting said device to the open end of a vessel.

**6.** The device of claim **1** molded from high density polyethylene.

**7.** The device of claim **1** wherein substantially all surfaces are engageable by dual mold cavities approaching from two opposite directions when said cover is disposed substantially normally to said wall member.

**8.** The device of claim **1** wherein said wall member is substantially flat and said cover is substantially coplanar therewith when said cover is in the closed position.

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SAMUEL F. COLEMAN, Primary Examiner

U.S. Cl. X.R.

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