Oct. 8, 1968 R. L. BEERS 3,404,810

POWDER DISPENSER

Filed Dec. 30, 1966

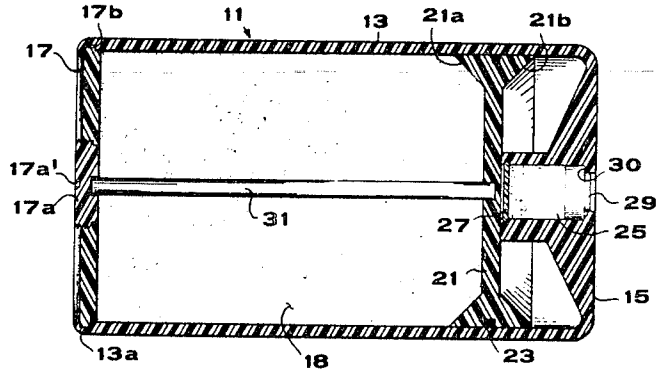


Fig. 1

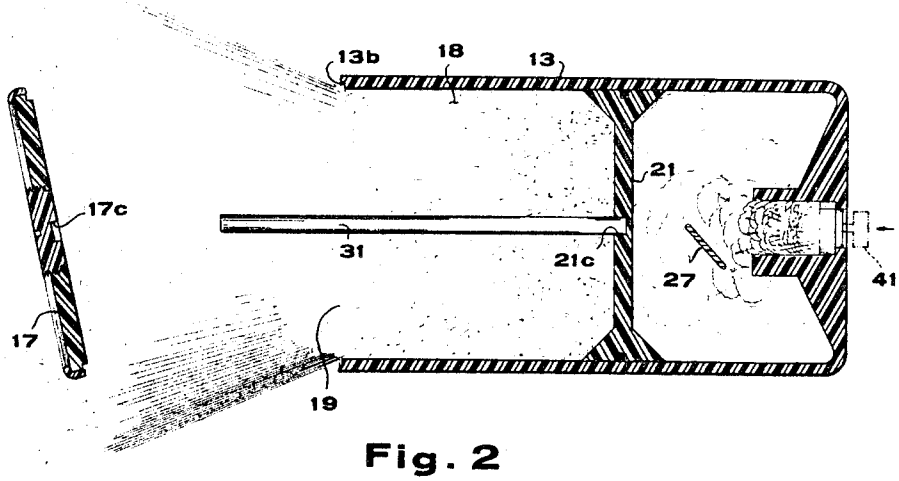


Fig. 2

RAYMOND L. BEERS
INVENTOR

ATTORNEY

United States Patent Office 3,404,810
Patented Oct. 8, 1968

3,404,810

POWDER DISPENSER

Raymond L. Beers, Baltimore, Md., assignor to AAI Corporation, Cockeysville, Md., a corporation of Maryland

Filed Dec. 30, 1966, Ser. No. 606,072
3 Claims. (Cl. 222—82)

ABSTRACT OF THE DISCLOSURE

A dispenser is disclosed in the form of a canister having a piston propelled by propellant gases to eject a powder charge through a discharge opening formed by removal of a wide-mouth initial cover through application of force directly to the cover by force transmitted from the piston to a central push rod which is in pushing contact with the cover. The forcibly removable cover has a threaded central closure through which a charge of material may be inserted into the canister, and this threaded central closure has a loose fitting lateral guide recess formed therein for laterally restrictedly restraining the push rod prior to and during expulsion of the cover, while enabling the cover to be expelled free of the main cannister body for pull expulsion of the charge of material therefrom.

This invention relates to powder or liquid dispensing devices, and particularly to an arrangement which enables the facile ejection and dissemination of particle or liquid material from within an initially closed canister or container.

It is often desirable to employ a device which will enable the substantially full and quick ejection of a charge of particulate or liquid material into the atmosphere. Such an ejection can be obtained with a container or canister dispenser employing an explosive charge for expelling the particles or liquid, but when such is attempted with an initially closed or sealed container a difficult problem is encountered in the conflicting requirements of providing a strong enough seal to prevent undesired inadvertent preopening, with a low cost lightweight canister or other container, while providing sufficient initial pressure to cause opening of the cover at the discharge opening to enable ejection of the particulate or liquid material. Thus, if one employs a heavy walled canister it is quite possible to have a strongly sealed cover at the discharge opening and effect adequate breakage of this strong seal with a sufficiently adequate explosive charge; however, it is desirable on the other hand to employ a lightweight canister in most instances while still having a sufficiently strongly sealed cover over the discharge opening, and this presents a problem in the accomplishment of rupturing, removing or otherwise opening of the seal or cover with the requisite lesser explosive charge that can be tolerated by the lighter weight canister. It has also been found that in the case of ejecting particulate materials from a canister through the use of an explosive charge a difficult problem is often encountered with compacting of particles along the side wall area of the canister when particulate material is employed as the dispensed charge, with consequent prevention or difficulty of ejection of these particles, particularly when the discharge or ejection opening is substantially smaller than the cross-sectional area of the chamber formed by the canister side wall.

It is accordingly a major feature of this invention to provide a canister dispenser which is useful in the dispensing of particulate material, and which is particularly adapted to quick expulsion of particle type material, while enabling employment of a relatively lightweight canister with a relatively small propellant charge, while also permitting the employment of a realtively rugged discharge cover seal arrangement if desired.

Still a further feature of the invention is the provision of an ejection arrangement in which a discharge opening cover is employed, and in which pressure generated within the device for ejection of the material is transmitted to the discharge opening cover by movement of a cover knockout rod to facilitate rupture of the cover holding seal and removal of the cover and consequent ease of discharge of the material.

Still other objects, features and attendant advantages will become apparent to those skilled in the art from a reading of the following detailed description of one physical embodiment constructed in accordance with the invention, taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a longitudinal section view of a dispenser constructed according to the invention, the dispenser being shown in its condition prior to ejection; and

FIGURE 2 is a longitudinal section view similar to that of FIGURE 1, illustrating the dispenser action during ejection.

Referring now in detail to the figures of the drawings, the illustrated dispenser **11** takes the form of a container or canister **13** which is preferably formed of lightweight material such as nylon, Delrin acetal resin, aluminum, or other suitable relatively lightweight material of good strength.

In the illustrated embodiment, one end **15** of the canister **13** is closed as initially molded or otherwise formed, and over the mouth of discharge opening **19** of the other end of the cylindrical canister **13** is suitably secured a discharge opening cover **17** which may be of similar material. In this embodiment the cover **17** fits along its annular periphery **17***b* against an annular shoulder **13***b* and within an annular lip **13***a* formed at the adjacent end of the main canister body **13**. The annular lip **13***a* may be suitably deformed radially inwardly over the peripheral edge and adjacent end surface of the cover **17** as by heating and deforming with a die in the case of thermoplastic materials, or by swaging in the case of aluminum or other malleable metallic materials. Also, in the case of a thermoplastic body for the canister **13**, as illustrated, the annular lip **13***a* may be heated to a tacky condition and pressure welded to the front face surface of the cover along the junction zone in order to provide better moisture sealing characteristics.

The discharge opening cover **17** includes a central closure plug **17***a* which may be removed for insertion of a powder charge into the chamber **18** formed within the canister **13**. Closure plug **17***a* may be suitably removably secured in seated relation in the main body of the cover **17** as by a threaded connection, as shown, and a key or slotted recess **17***a*[1] may be formed in its outer surface for ease of removal or securing of the plug. The chamber **18** is formed by the cover **17***a*, the annular side wall of the canister **13**, and the forward surface of a piston **21** which is slidably disposed within the annular inner wall of the canister.

The piston **21** has a front obturating surface **21***a* and a rear obturating surface **21***b*, and additionally may employ an O-ring seal to aid in gas-pressure-sealing between the opposite faces of the piston.

Formed in the rear end wall **15** of the canister is a propellant charge chamber **25** in which a suitable ignitable gas-generating propellant charge is disposed, the chamber being closed at the forward end by a blowout cover disc **27**. At the rear of the chamber **25** a conventional percussion primer **29** is mounted in a complementary recess in the rear end wall, the primer being secured against rearward blowout by an annular shoulder **30** in the rear end wall which encompasses an opening providing access for a firing pin to strike the percussion primer in the operation of firing the dispenser.

In order to facilitate the quick release and removal of he discharge opening cover **17** from the canister **13** and hereby enable full and quick discharge of the particuate material from the canister by the longitudinal movement of the piston **21** toward the discharge opening **19**, here is provided a rigid rod **31** which is preferably formed of metal of suitable strength, such as aluminum, steel, etc. Rod **31** is disposed and extends between the cover **17** and the piston **21**, being supported at its opposite ends in recesses **17***c* and **21***c* respectively. The recess **21***c* is preferably complementary to and forms a force fit receptacle for the rod **31**, whereas the recess **17***c* is preferably slightly oversized and forms a loose fit receptacle for the opposite end of the rod **31**, thereby enabling retention of the rod in the piston, while facilitating the full release and expulsion of the cover **17** after effecting breakage or rupture of the retaining seal at the peripheral edge of the cover as formed by the annular lip **13***a*.

In operation, the dispenser **11** may be held by hand and pointed with its cover **17** extended toward the target area. A firing pin **41** is then caused to strike the percussion primer **24** to thereby effect ignition of the propellant charge **25**. The arrangement of the firing pin for movement into percussive contact with the primer does not form a portion of this invention, and as such can be mounted or otherwise moved in any of a number of different ways, including spring biased pivotal mounting on the rear end wall **15** of the canister, such is not further shown or described in detail herein. Ignition of the propellant charge **25** effects blowout of the blowout cover **27**, and the ensuing gas pressure build-up effects axial movement of the piston toward the covered discharge end of the canister **13**. Upon movement of the piston **21**, the rod **31** effects removal of the discharge opening cover from the remainder of the canister **13**, whereupon the particulate material **18** will be discharged into the atmosphere through the discharge opening **19** by continued forward movement of the piston **21**. In the case of a swaged annular lip **13***a* of malleable material, the lip may be merely deformed radially outwardly to a straightened condition in the removal of the cover by the rod **31**, while in the case of a plastic annular lip **13***a* such may shear or otherwise rupture as shown in FIGURE 2, or bend radially outwardly, depending upon the nature of the particular plastic material. In any event, the holding zone of the annular lip about the annular periphery of the cover **17** will be disrupted, and the cover **17** will be discharged forwardly with the particulate material.

While the invention has been illustrated and described with respect to the single embodiment, it will be readily apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the illustrative embodiment, but only by the scope of the appended claims.

That which is claimed is:

1. A dispenser for particle or fluid material comprising a container having material-moving means for ejecting particle or fluid material from said container, and a chamber for containing particle or fluid material to be ejected,

said container including a discharge-opening cover spaced from said material-moving means,

and a rod disposed between said material-moving means and said discharge-opening cover for effecting removal or rupture of said cover as a function of axial motion of said material-moving means toward said cover,

said material-moving means comprising a piston axially slidable within said chamber, and gas-pressure-generating means for imparting axial motion to said piston toward said cover,

said cover extending substantially across one end of said container, and means securing said cover to the remainder of said container about its outer peripheral edge,

said container being cylindrical and said cover securing means comprising a radially inturned circumferential lip on said one end of said container,

said container being formed of malleable material and said lip being swaged about the circumferential periphery of said cover, said container having a shoulder adjoining said lip and against which said cover abuts,

said cover having a threaded central opening therein for loading a charge of material into said container and a closure for said opening,

said closure being threadedly removably disposed in said opening,

said rod being secured to said piston and removably loosely engaging said threaded cover closure and laterally restrictedly held by said threaded closure in the quiescent position of said piston.

2. A dispenser according to claim **1**, said rod engaging at one end thereof a complementary force fit recess in said piston, said rod engaging at its opposite end a loose fit recess in said threaded cover closure.

3. A dispenser for particle or fluid material comprising a container having material-moving means for ejecting particle or fluid material from said container, and a chamber for containing particle or fluid material to be ejected,

said container including a discharge-opening cover spaced from said material-moving means,

and a rod disposed between said material-moving means and said discharge-opening cover for effecting removal or rupture of said cover as a function of axial motion of said material-moving means toward said cover,

said material-moving means comprising a piston axially slidable within said chamber, and gas-pressure-generating means for imparting axial motion to said piston toward said cover,

said cover extending substantially across one end of said container, and means securing said cover to the remainder of said container about its outer peripheral edge,

said container being cylindrical and said cover securing means comprising a radially inturned circumferential lip on said one end of said container,

said container being formed of thermoplastic material, and said circumferential lip being bonded along the inturned face of said lip to said cover,

said cover having a threaded central opening therein for loading a charge of material into said container and a closure for said opening,

said closure being threadedly removably disposed in said opening,

said rod being secured to said piston and removably loosely engaging said threaded cover closure and laterally restrictedly held by said threaded closure in the quiescent position of said piston.

References Cited

UNITED STATES PATENTS

2,340,329	2/1944	King	102—65
2,947,315	8/1960	Connell	222—541 X
3,135,090	6/1964	Straight et al.	222—504 X

ROBERT B. REEVES, *Primary Examiner.*

HADD S. LANE, *Assistant Examiner.*