

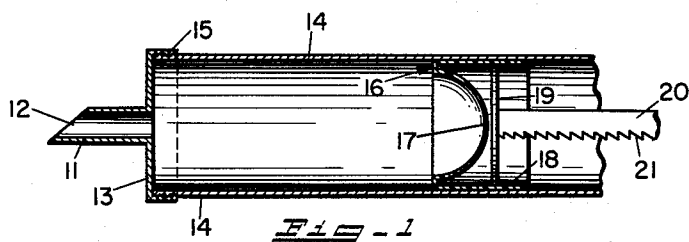
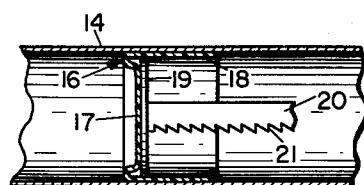
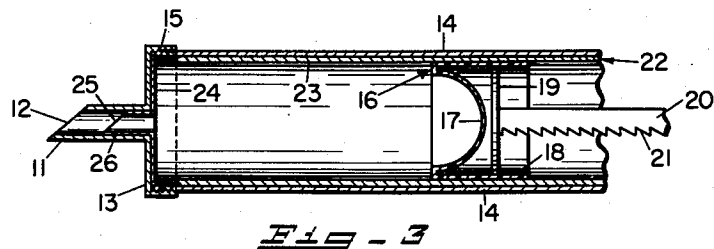
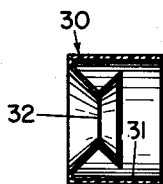
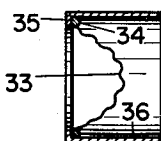
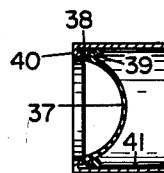
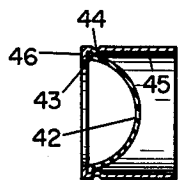
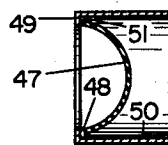
Feb. 2, 1960

H. S. MARAS

2,923,442

PRESSURE-RELIEF MEMBER FOR DISPENSER FOR VISCOUS MATERIAL

Filed Feb. 9, 1956



INVENTOR.

Henry S. Maras

BY *Gray, Mose and Dunson*

ATTORNEYS.

1

2,923,442

PRESSURE-RELIEF MEMBER FOR DISPENSER FOR VISCOUS MATERIAL

Henry S. Maras, Hamburg, N.Y.

Application February 9, 1956, Serial No. 564,557

7 Claims. (Cl. 222—327)

This invention relates to an improved cartridge container refill and an improved dispenser for viscous material, or the like, having a new and novel pressure-relief member. More particularly, the pressure-relief member of this invention comprises a deformable member which may be a resilient diaphragm, or a thin membrane, or combinations thereof, for the controlling, minimizing and/or preventing of unwanted and excessive discharge of viscous material after cessation of the application of a discharge force.

In the dispensing of viscous material, or the like, such as calking materials, putty, paste, greases, jellies, creams, and other products of paste, cream or doughlike consistency, numerous prior art dispensers comprise a material container and a means for applying pressure or movement to the material contents to propel and discharge the material through an orifice in the dispensing device. Frequently, this pressure or movement means comprises a piston-type arrangement of a plunger or shaft with an affixed plate which contacts a viscous material and which upon suitable plunger or shaft movement propels the material causing the material to discharge through an orifice of the dispenser.

For example, in the dispensing of calking materials in the calking material application art, a calking gun comprising a hand grip, a discharge nozzle having an orifice, a tubular material container, and a movement means such as a trigger-operated ratchet plunger with an affixed plate, is frequently used. In operation of the calking gun, after the tubular container has been filled with calking materials, or after a cartridge-container refill of calking material has been placed in the gun, a trigger is operated to advance the plunger forward. Upon plunger forward movement the plate attached to the plunger contacts and propels the material contents, or propels a cup contacting the material contents of the cartridge-container refill, thus propelling the material forward, so that the material discharges through the orifice. Cessation of the forward movement of the plunger does not cause an immediate cessation of the discharge of the calking material through the orifice as material continues to extrude, drip, or flow from the orifice for some time after cessation of the plunger forward movement. The continuation of material discharge through the orifice of the gun after cessation of the plunger forward movement not only creates an excessive and unwanted material discharge but gives a messy operation that permits material loss and waste. Very probably the excessive and unwanted discharge of material is caused by failure to dissipate the forces causing material movement in a short enough interval of time to prevent further forward movement of material and discharge. If the calking gun plunger and attached plate quickly are withdrawn rearward after the desired forward movement, the excessive and unwanted discharge may still continue for some time as the cup pressing against the material does not, of its own accord, move rearwardly appreciably

2

to relieve suddenly all the remaining applied forces on the material.

An object of this invention is to provide a suitable means comprising a suitable pressure-relief member for the control, minimization, and/or prevention of discharge of viscous materials from a cartridge refill or a dispenser after cessation of an applied discharge means.

An additional object is to provide a pressure-relief member adapted for placement in present art calking dispensers.

A further object of this invention is to provide a pressure-relief member for a dispenser of viscous materials, or the like, that provides a sudden cessation of a material discharge upon a cessation and withdrawal of an application of a means for propelling the material contents.

A further object is to provide a combined end-cap pressure-relief member for pressing art cartridge-container refills of calking materials.

Still a further object is to provide a pressure-relief member for a dispenser of viscous materials, or the like, comprising a resilient diaphragm and/or a thin membrane.

Further objects and advantages of the present invention will be apparent in view of the following detailed disclosure and description thereof.

This invention is a pressure-relief member for a cartridge-container refill and for a dispenser of viscous materials comprising a deformable member which may be a resilient diaphragm, or a thin membrane, or combinations thereof, whereby unwanted and excessive discharge of material controlled, minimized, and/or prevented. The preferred pressure-relief member of this invention comprises a diaphragm having sufficient resiliency to recover to its approximately undeformed position, or a thin collapsible membrane capable of inflation by slight force, or combinations thereof. Upon cessation and removal of an applied discharge force the forces remaining on the viscous material cause material to flow into the volume encompassed by the diaphragm upon recovery or encompassed by the thin membrane upon inflation rather than in an unwanted and excessive discharge through the orifice of the dispenser.

In the drawings:

Fig. 1 is a longitudinal section of a portion of a dispenser showing the pressure-relief member of this invention having a pressure-relief diaphragm in an undeformed position;

Fig. 2 is a longitudinal section of a portion of the same dispenser as shown in Fig. 1 showing the pressure-relief diaphragm in a deformed position;

Fig. 3 is a longitudinal section of a portion of a dispenser having a cartridge-container refill showing a combined end-cap pressure-relief member for a cartridge refill with a diaphragm in an undeformed position; and

Figs. 4 to 8 show longitudinal sections of various embodiments of the pressure-relief member of this invention with a diaphragm or a membrane in an undeformed position.

A portion of a material dispenser is illustrated in Figs. 1, 2, and 3. A nozzle 11 having an orifice 12 is an integral part of end cap 13 or is affixed by any suitable means such as welding to end cap 13. End cap 13 is affixed to tubular container 14 by a suitable means such as a threaded engagement designated 15. Within tubular container 14 is a cuplike pressure-relief member generally designated 16. Pressure-relief member 16, as illustrated in Figs. 1, 2, and 3, has a dome-shaped resilient diaphragm 17 and a directly and integrally connected guiding means comprising side wall 18 extending rearwardly from said diaphragm and having an outer surface in slidable engagement with an inner surface of the tubular container 14. Directly rearward of cuplike pressure-relief

member 16 is a plunger plate 19 in slidable engagement with the inner surface of side wall 18 and capable of passing interiorly of tubular container 14 and pressure-relief member 16 to contact the dome-shaped diaphragm 17 of the pressure-relief member 16. In Figs. 1 and 3 plunger plate 19 is not in contact with the diaphragm 17 and the diaphragm 17 is shown in an undeformed or dome-shaped position. In Fig. 2 plunger plate 19 has moved forward and is in contact with diaphragm 17 with the diaphragm 17 shown in a deformed position. Plunger plate 19 is affixed by a suitable means such as welding to one end of plunger 20. Plunger 20 has teeth 21 for engaging a conventional trigger-operated ratchet mechanism not illustrated. In the portion of the dispenser not illustrated there are found a conventional trigger-operated ratchet mechanism and a hand grip for controlling the movement of the plunger and for the easy handling of the dispenser device. Numerous hand grips and trigger-operated ratchet mechanisms known in the art may be used in combination with the dispenser with typical examples being those known in the calking gun art.

In Fig. 3 a tubular cartridge-container refill generally designated 22 has been inserted in tubular container 14 of the dispenser. Cartridge-container refill 22 has a side wall 23 and an affixed or integral end cap 24 at one end having an orifice 25 in a protruding nozzle 26. Not illustrated is a plug or frangible covering for the orifice 25 of the nozzle 26. Generally, a plug or frangible covering closes the orifice 25 in the nozzle 26 for shipment and merchandizing with this plug or frangible covering removed or ruptured prior to operation of the dispenser utilizing a cartridge-container refill 22. At the end of the cartridge-container refill 22 rearward of the end cap 24 is a combined end-cap pressure-relief member 16 serving as an end cap for the dispenser cartridge refill container 22 for shipment and merchandizing purposes. Combined end-cap pressure-relief member 16 has a dome-shaped diaphragm 17 and an integrally connected guiding means of side wall 18 in a slidable engagement with the inner surface of side wall 23 of container refill 22. Plunger plate 19 directly rearward of combined end-cap pressure-relief member 16 is in slidable engagement with the inner surface of side wall 18 and is capable of passing interiorly of cartridge-container refill 22 to contact diaphragm 17 of pressure-relief member 16.

Fig. 4 illustrates an embodiment of the pressure-relief member of this invention generally designated 30 comprising a bellows-type diaphragm 32 connected to an integral guiding means of a side wall 31.

Fig. 5 illustrates an embodiment of the pressure-relief member of this invention comprising a thin membrane 33 affixed by a suitable means, such as cements or adhesives 34, to an annular flange 35 of a guiding means of a side wall 36.

Fig. 6 illustrates an embodiment of the pressure-relief member of this invention wherein a modified dome-shaped diaphragm 37 having a peripheral ringlike protuberance 38 has been affixed by a suitable means, such as cements or adhesives 39, to an integral annular flange 40 attached to a side wall 41.

Fig. 7 illustrates an embodiment of the pressure-relief member of this invention wherein a modified dome-shaped diaphragm 42 having a peripheral ring 43 is held by means of an integral inwardly protruding ridge 44 of side wall 45 and an annular flange 46 of a guiding means of a side wall 45.

Fig. 8 illustrates an embodiment of the pressure-relief member of this invention wherein a modified dome-shaped diaphragm 47 having a peripheral ring 48 contacts an annular flange 49 of a guiding means of a side wall 50, and is held in that position by a ring 51 which is in force-fit with the inner surface of side wall 50.

In the operation of the pressure-relief member of this invention, as illustrated in the dispenser of Figs. 1 and 2, a conventional trigger-operated ratchet mechanism, not

illustrated, or other suitable movement means is used to advance the plunger 20 in a stepwise forward movement. The power for operation of the suitable movement means may be manual, mechanical, hydraulic or other suitable means. Forward movement of plunger 20 and affixed plunger plate 19 provides for contact of plate 19 with diaphragm 17 causing diaphragm 17 to deform from the position as illustrated in Fig. 1 to the deformed position as illustrated in Fig. 2. As plunger 20 and affixed plate 19 continue their forward movement, pressure-relief member 16 is propelled forward towards the nozzle 11 propelling the material contents within the cylindrical container 14 so that the material discharges through the orifice 12 of the nozzle 11. Side wall 18 of pressure-relief member 16 acts as a guide means by guiding on the inner surface of tubular container 14 with a slidable substantially material-tight engagement thereon. The clearance between the outer surface of side wall 18 and the inner surface of tubular container 14 is such as to prevent substantial material leakage between side wall 18 and the adjacent inner surface of the container 14. Upon cessation of the movement means causing plunger 20 to move forward and upon disengagement of the ratchet retaining means so that plunger 20 and affixed plate 19 are free to retract rearwardly, or are withdrawn rearwardly a short distance by suitable part of the movement means, such as a spring, diaphragm 17 snaps or returns from the deformed position as illustrated in Fig. 2 to the undeformed position as illustrated in Fig. 1. Material within tubular container 14 flows into the volume encompassed by the position of the undeformed diaphragm 17, thus equalizing the remaining forces on the material causing the discharge and permitting a sudden cessation of the material discharge through the orifice.

In subsequent operation of the calking device, or dispenser, as illustrated in Figs. 1 and 2, additional portions of material may be discharged by re-engagement of the ratchet mechanism and the reoperation of the movement means whereby the plunger 20 and affixed plate 19 readvance to recontact and redeform diaphragm 17 so as to repropel the pressure-relief member 16 and material towards the nozzle 11. Cessation of this additional material discharge may be reaccomplished by repetition of the aforescribed cessation procedure of the initial material discharge. Subsequent discharges of material remaining in the tubular container 14 may be made by repeating previously described procedures until the tubular container has been exhausted of material. In all cessations of discharges of these portions of material the pressure-relief member of this invention causes a sudden cessation of material discharge through the orifice 12.

In Fig. 3, wherein a dispenser utilizing a cartridge material container refill 22 is illustrated, the operation of the pressure-relief member of this invention is similar to the operation as described for the dispenser of Figs. 1 and 2. Plunger 20 and affixed plunger plate 19 on forward movement by a suitable movement means contact and compress and deform diaphragm 17 to a deformed position and cause pressure-relief member to move forward towards the nozzle propelling the material contents so that material is discharged through orifice 12 of nozzle 11. Side wall 18 of pressure-relief member 16 acts as a guide means by guiding on the inner surface of side wall 23 of cartridge-container refill 22 with the clearance between side wall 18 and side wall 23 being such that little or no material leaks into the clearance. Cessation of the forward movement of the pressure-relief member 16 and retraction rearward, or withdrawal rearward, or freedom to retract rearward of plunger 20 with affixed plate 19 permits diaphragm 17 to recover to the undeformed position as illustrated in Fig. 3. Material within the cartridge refill container 22 flows into the volume encompassed by the position of the undeformed diaphragm 17 to equalize the remaining forces on the material causing discharge, thus permitting

5

sudden cessation of material discharge through the orifices 25 and 12. Additional portions of material within the cartridge-container refill 22 of Fig. 3 may be discharged by subsequent repetition of the operations causing forward movement of plunger 20. These material discharges may be discontinued by repetition of the afore-
described cessation steps of the forward movement of
plunger 20 followed by slight rearward retraction, or
withdrawal, or freedom to retract rearwardly of plunger
20 with the pressure-relief member of this invention
causing a sudden cessation of material discharge.

The operation of the embodiments of the pressure-relief member of this invention that are illustrated in Figs. 4, 6, 7, and 8 is the same as the operation described for the embodiments illustrated in Figs. 1, 2, and 3. Forward movement of a propelling means deforms a diaphragm and propels the pressure-relief member thus propelling a material for discharge through an orifice. Cessation of the forward movement of the propelling means and withdrawal rearwardly or freedom to retract rearwardly of the propelling means permits material to flow into the volume encompassed by the position of the undeformed diaphragm permitting a sudden cessation of the material discharge through the orifice.

Alternatively, an embodiment of a pressure-relief member of this invention may for the deformable member in place of a diaphragm comprise a thin film membrane as illustrated in Fig. 5, or may comprise combinations thereof. In the operation of a pressure-relief member having a thin film membrane, the forward movement of a plunger and attached plunger plate deforms the membrane so that the membrane conforms to the surface of the plunger plate. Rearward movement of the plunger and attached plunger plate permit the thin film membrane to inflate with material and dissipate the forces remaining on the material that cause material discharge. Unlike the diaphragm of one embodiment of the pressure-relief member of this invention, the thin film membrane does not have a self-recovering type of action to create a void wherein the material may flow, but depends on the forces remaining on the material to inflate the thin film membrane. Accordingly, the thin film membrane should be of material and thickness that permit easy inflation.

The diaphragm of the pressure-relief member of this invention may have sufficient resiliency to self-recover completely to the undeformed position upon rearward movement of the plunger and plunger plate, or the diaphragm of the pressure-relief member of this invention may be such as requires some slight force from the forces remaining on the material to recover to an undeformed position and thus function in a manner somewhat similar to the embodiment of this invention illustrated in Fig. 6.

A pressure-relief member of this invention having a diaphragm with sufficient resiliency to self-recover to an undeformed position upon removal of the deforming force and the rearward movement of the plunger and affixed plunger plate, affords an advantage in that a vacuum may form within the void encompassed by the position of the undeformed diaphragm and this vacuum may assist in suctionally drawing material into the void.

In Figs. 1 to 5, inclusive, the pressure-relief member of the invention comprises a one-piece unit having an integral side wall of a guiding means, and a diaphragm. It is to be noted that in this embodiment preferably the side wall is of a greater thickness than the thickness of the diaphragm. Plastic and rubber compositions, known to the art as having chemical resistance to the viscous materials utilized and known to have suitable resilient properties, may be molded by conventional equipment and means to form a pressure-relief member of this invention.

In Figs. 6 to 10, inclusive, are shown embodiments of

6

the pressure-relief member of this invention comprising two or more parts. In these embodiments the diaphragm or membrane is a material having suitable chemical and resilient properties, such as a rubber or plastic, and the guiding means is a suitable rigid material, such as a metal.

The exact configuration of the guiding means of the pressure-relief member of this invention may be varied considerably. It is to be understood that the shape of the material container may also be varied and, while tubular cylindrical material containers have been illustrated, the material container may be, for example a fluted tube, a tube of square, triangular, elliptical, or rectangular cross section or of other suitable design. The guiding means of the pressure-relief member of this invention should be of a design compatible with the material container in that the guiding means should be capable of guiding on the inner surface of the material container in a slidable substantially material-tight engagement continuously thereon so as to wipe and clean the inner surface of the material container relatively free of material with little or no material leaking around the guiding means. In this way material is discharged through the orifice of the container without substantial leaking rearward towards the plunger.

The pressure-relief member of this invention may be incorporated in a material cartridge container refill as a combined end-cap pressure-relief member for the material cartridge container refill, thus replacing a conventional end cap while still serving the purposes of this invention when the cartridge container refill is installed in a dispenser. For example, many calking materials are shipped and merchandized in a rigid paper tubular cartridge having an end cap which may receive a plunger and attached plunger plate for subsequent movement of the end cap through the cartridge to propel calking material from one end of the cartridge having an orifice. With the combined end-cap pressure-relief member of this invention installed as an end cap on a paper tube cartridge of calking material a ready shipping and merchandizing containers for calking material, or the like, is available. Also, when the same cartridge container refill of calking material having a combined end-cap pressure-relief member of this invention is placed in a calking gun, a pressure-relief member for the purposes of this invention is available.

It will be understood, of course, that, while the forms of the invention herein shown and described constitute preferred embodiments of the invention, it is not intended herein to illustrate all of the possible equivalent forms or ramifications of the invention. It will also be understood that the words used are words of description rather than of limitation, and that various changes, such as changes in shape, relative size, and arrangement of parts, may be substituted without departing from the spirit or scope of the invention herein disclosed.

What is claimed is:

1. A pressure-relief device in combination with a cartridge of viscous material for use in a dispenser of the viscous material, the cartridge comprising an elongated container having a discharge outlet at its forward end and its rearward end closed by the pressure-relief device, said pressure-relief device including: a flexible deformable member in contact with said material and axially displaceable; and a longitudinally elongated guide means slidably disposed in said cartridge, and connected to and extending rearwardly of said flexible deformable member; whereby upon applying pressure to said deformable member against the viscous material the viscous material is dispensed through the discharge outlet, and upon releasing the applied pressure said deformable member flexes and there is a sudden cessation of the viscous material dispensed through said discharge outlet.

2. The pressure-relief device in combination with the cartridge of claim 1 in which said flexible deformable member comprises a rearwardly projecting dome-shaped diaphragm of a resilient material.

7

3. The pressure-relief device in combination with the cartridge of claim 1 in which said flexible deformable member comprises a rearwardly projecting dome-shaped diaphragm of a resilient material, in which said guide means comprises a rigid cylinder, and in which said pressure-relief device includes a means connecting said flexible deformable member and said guide means.

4. The pressure-relief device in combination with the cartridge of claim 1 in which said flexible deformable member comprises a thin inflatable membrane.

5. A pressure-relief device in combination with a dispenser comprising an elongated container containing a viscous material and having a discharge outlet at its forward end, the pressure-relief device at its rearward end, and a means for propelling the material through the discharge outlet located rearwardly of the pressure-relief device, said pressure-relief device including: a flexible deformable member unattached to the means for propelling; and a longitudinally elongated guide means slidably disposed in the elongated container, and connected to and extending rearwardly of said flexible deformable member; whereby upon applying the means for propelling to said flexible deformable member the viscous ma-

8

terial is dispensed through said discharge outlet, and upon releasing the applied means for propelling said deformable member flexes and there is a sudden cessation of the material dispensed through said discharge outlet.

6. The pressure-relief device in combination with the dispenser of claim 5 in which said flexible deformable member comprises a rearwardly projecting dome-shaped diaphragm of a resilient material.

7. The pressure-relief device in combination with the dispenser of claim 5 in which said flexible deformable member comprises a thin inflatable membrane.

References Cited in the file of this patent

UNITED STATES PATENTS

1,270,835	Jersemann	July 2, 1918
1,751,128	Cocks	Mar. 18, 1930
2,111,582	Crewe	Mar. 22, 1938
2,659,517	Reinhardt	Nov. 17, 1953
2,778,541	Sherbondy	Jan. 22, 1957

FOREIGN PATENTS

468,627	France	Apr. 29, 1914
---------	--------	---------------

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,923,442

February 2, 1960

Henry S. Maras

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 17, for "pressing" read -- present --;
line 31, before "controlled" insert -- is --;

Signed and sealed this 28th day of June 1960.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents