Oct. 3, 1961 G. T. RIEKE 3,002,648

EXPLOSION PROOF CONTAINER PLUG

Filed March 16, 1959 2 Sheets-Sheet 1

FIG. 1

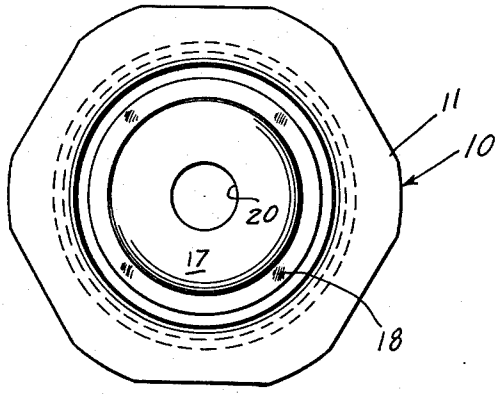
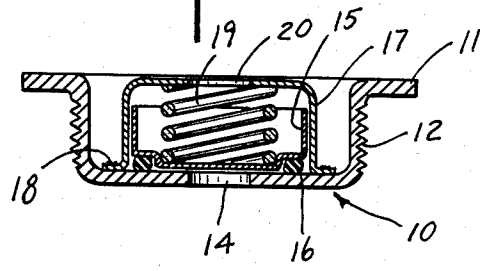


FIG. 2



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FIG. 3

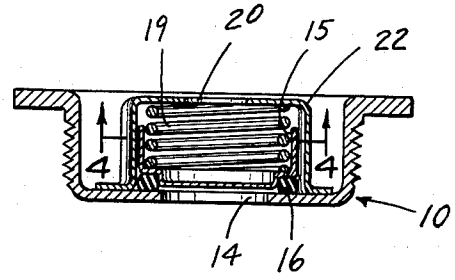
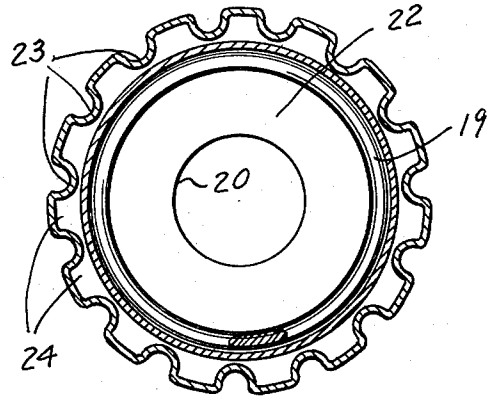


FIG. 4



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EXPLOSION PROOF CONTAINER PLUG

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Filed Mar. 16, 1959, Ser. No. 799,812
3 Claims. (Cl. 220—44)

This invention relates generally to closures for containers such as cans and drums and more particularly, it relates to a plug closure adapted to relieve internal pressure within containers such as drums, cans and the like.

This application is a continuation-in-part of my application for United States Letters Patent Serial No. 734,536 filed May 12, 1958 for "Explosion Proof Container Plug" and assigned to Rieke Metal Products Corporation, Auburn, Indiana, and now abandoned.

In accordance with conventional practice, containers for highly volatile liquids include plug closures which are screwed into a flange in tightly sealing relation thereto in order to prevent leakage of fluids during handling and shipment. Such fluids become highly dangerous when subjected to high temperatures resulting from fires in warehouses and other storage buildings because they volatilize and create excessive pressures within the containers causing them to explode and spread quantities of volatile fluids throughout a fire area. Quite naturally, this results in highly disastrous fires.

The principal object of this invention is to provide a plug closure having valve structure adapted to seal a container under normal conditions and to relieve internal pressure within the container under abnormal temperature conditions.

A further object of this invention is to provide a plug closure having valve structure adapted to seal a container under normal conditions and including a means for venting internal pressure within the container when said valve structure operates to unseal the container.

In accordance with this invention there is provided a plug closure comprising a flanged and threaded member adapted to be screwed into a container and having a centrally disposed pressure release aperture, and a valve operatively associated with said aperture for normally closing it and operative at a predetermined pressure within said container to open said aperture.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a top plan view of the plug closure as provided in accordance with this invention.

FIG. 2 is a transverse cross section of the structure illustrated in FIG. 1.

FIG. 3 is a transverse cross section of the modified form of the invention.

FIG. 4 is a cross section taken on line 4—4 of FIG. 3.

Referring to the drawings, this invention comprises a cupped plug member **10** having a peripheral flange **11** and a threaded portion **12** whereby the plug member **10** may be screwed into what is commonly called the flange of a container such as a drum, can or the like.

Plug member **10** is provided with a pressure relief aperture **14** which communicates with the interior of the container to which the plug member is affixed. For closing aperture **14** under normal temperature conditions, there is provided a cupped valve **15** and a sealing washer **16** so disposed as to prevent escape of fluid through aperture **14**.

Valve **15** is retained in its sealing position by means of a spring retaining member **17** welded to member **10** or otherwise affixed thereto at spaced points such as **18** and compressing a coil spring **19** into engagement with valve **15**. Spring **19** may be designed to respond to predetermined pressures within a container of the order of 14 to 18 lbs. per square inch, thereby to permit valve **15** to move out of sealing engagement with member **10**. Retainer **17** is provided with an aperture **20** so that gases from within the container may escape through aperture **14** and around the edges of valve **15** and out through the aperture **20**. It will be noted that valve **15** has an outer diameter slightly less than the internal diameter of retainer **17**, thereby permitting escape of gases. Spring **19** may also be designed to reseal valve member **15** with member **10** at a minimum pressure of the order of 10 lbs. per square inch.

FIGS. 3 and 4 illustrate the modification of this invention wherein the plug member **10**, cupped valve **15** and sealing washer **16** are essentially identical to the corresponding members illustrated in FIGS. 1 and 2. It is found in certain applications of this invention that the sealing washer **16** may expand when the valve **15** moves upwardly under heavy pressure, such expansion being sufficient to seal off the venting space between valve **15** and the spring retaining member **17**. Thus, the valve **15** is not effective to unseal the container to permit flow of gases through aperture **14**, around the edges of valve **15** and out through the aperture **20**.

In order to provide venting under relatively high pressures the modification of this invention illustrated in FIGS. 3 and 4 is provided with a spring retaining member **22**, the sidewalls of which are formed with spaced rib portions **23**, thereby to provide spaced channels **24** at regular intervals around the circumference of member **22**.

In operation, the modification shown in FIGS. 3 and 4 functions similarly to that shown in FIGS. 1 and 2 except that even though the sealing washer **16** may expand into the space between valve **15** and retainer **22**, the channels **24** are not sealed off by washer **16**. Gases from within the container may flow through aperture **14** into the channels **24** and outwardly through the aperture **20** in retainer **22**.

From the foregoing description, it will be apparent that this invention provides a plug closure which renders a container relatively explosion-proof in the sense that rise of external temperature will not cause accumulation of pressure within a container sufficiently high to explode the container and cause dangerous distribution of volatile fluids. It will be obvious to those skilled in the art that the plug closure of this invention may be designed to relieve container pressures at any desired maximum pressures.

The invention claimed is:

1. A pressure relief plug comprising a flanged and threaded plug having a centrally disposed pressure relief aperture, a cup-shaped spring retainer mounted on said plug with its open end facing said aperture and having an escape aperture in its bottom, said retainer having inwardly opening peripheral channels, a cup-shaped valve of smaller diameter than that of said retainer and slidably mounted within said retainer in abutment with the surfaces of said plug surrounding said relief aperture to normally close said relief aperture, and a spring compressed between said retainer and said valve for holding said valve in closed position against predetermined maximum pressure.

2. A pressure relief plug comprising a flanged and threaded plug having a centrally disposed pressure relief aperture, a cup-shaped spring retainer mounted on said plug with its open end facing said aperture and having an escape aperture in its bottom, said retainer having peripheral channels opening inwardly and extending axially of said retainer from the bottom thereof to the mounting on said plug, a cup-shaped valve of smaller

diameter than that of said retainer and slidably mounted within said retainer, a sealing washer in abutment with the surfaces of said plug and said retainer surrounding said relief aperture to normally close said relief aperture and said channels, and a spring compressed between said retainer and said valve for holding said valve in closed position against predetermined maximum pressure.

3. A pressure relief plug comprising a plug having a pressure relief aperture, a spring retainer mounted on said plug and facing said aperture, a cup-shaped valve slidably mounted within said retainer, said retainer having peripheral channels opening inwardly toward said valve and extending along the length of travel of said valve, a sealing washer engaging the surfaces of said plug and said retainer surrounding said relief aperture to normally close said relief aperture and said channels, and a spring compressed between said retainer and said valve for holding said valve in closed position against predetermined maximum pressure.

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