Aug. 23, 1938. J. F. BOYLE ET AL 2,127,548

METHOD OF TREATING CONTAINERS

Filed Aug. 13, 1935

Fig. 1.

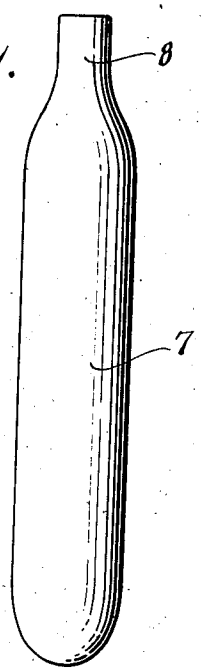


Fig. 2.

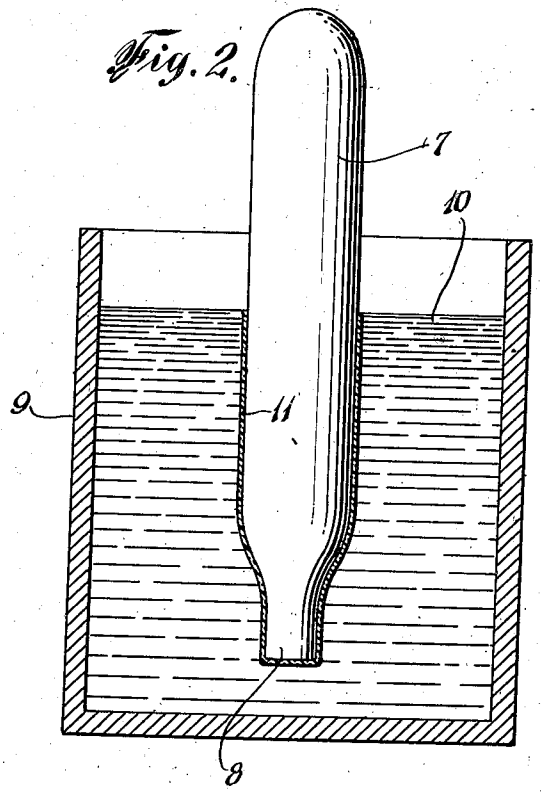


Fig. 3.

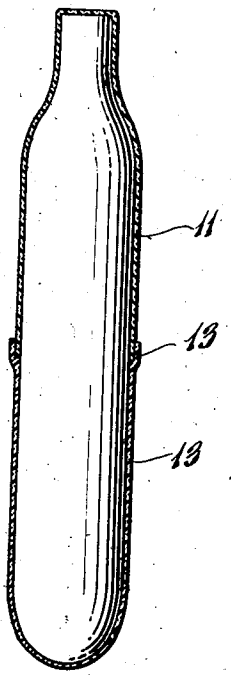
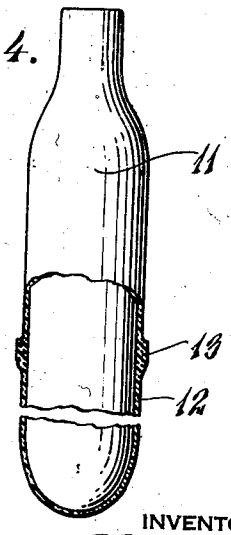


Fig. 4.



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METHOD OF TREATING CONTAINERS

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4 Claims. (Cl. 73—51)

The present invention relates generally to containers for fluids under pressure and is more particularly directed to a method of treating such containers, subsequent to charging and sealing, whereby leakage of the container contents will be visually indicated.

While this invention, as will become manifest, possesses a wide range of utility, for the purposes of this disclosure, we have elected to show and describe it, as it may be practiced in conjunction with so-called gas bottles and more especially the miniature containers of carbon dioxide, commonly known as "sparklets" which are employed in the inflation of flotation apparatus, such as life-preservers of the jacket and vest types. It will be understood, however, that this is merely illustrative and is not to be construed, in any sense, as a limitation of the scope of our invention.

Carbon-dioxide containers, as is well known, are produced in various sizes and shapes, depending largely upon the work to which they are to be applied. For example, for inflating collapsible boats, aircraft emergency flotation gear and other inflatable devices, as well as in the use of the gas as a fire extinguishing agent, the containers are equipped with appropriate discharge controlling valve mechanism, such mechanism usually being affixed to a container that has been charged and sealed with a rupturable or breakable material. This original seal, of course, is designed to permit of the storage of the charged containers until such time as it is desired to apply the discharge controlling mechanism thereto, in the installation of the container as a part of an emergency or other equipment.

With the miniature bottles or containers for carbon-dioxide, the same procedure is followed, the containers being of a size to be inserted in a pocket of a life-vest or jacket with a seal-rupturing element attached thereto, so that when it is desired to use the vest or jacket, the gas may be instantly liberated into it by the actuation of a pull-cord, as in releasing a parachute from its pack. Since, the various flotation media that are designed for inflation by the use of carbon-dioxide are primarily intended for emergency purposes, it will be evident that it is of the utmost importance that the container be fully charged when inflation is to be effected. If, because of an imperfect seal, or through careless handling, or form other causes, there has been a leakage of gas from the container, the results to those dependent upon the functioning of the flotation device may be extremely hazardous.

At the present time, while it may be assumed that a container which has been charged and sealed in conformity with standard practice, will deliver the gas on demand, there is no way of determining whether the supply has been diminished or exhausted, as may be the case. In other words, the gas may leak or escape from the container, without that becoming known, the external appearance of the seal and of the container, under close inspection, giving no indication of its seepage. It is known, in fact, that many casualties have resulted from the installation of supposedly fully charged containers in emergency apparatus, but, as pointed out, under existing conditions, that is a hazard that cannot be obviated.

Therefore, it is the primary object of this invention to provide a simple, economical and practical method of conditioning a container for detecting and indicating the leakage of fluid therefrom, especially one wherein the fluid is under pressure and that is supposedly hermetically sealed and otherwise proof against leakage.

It is also an important object of this invention to provide a method of treating a charged and sealed container, without affecting the container itself or the characteristics of the contained fluid, whereby leakage of the fluid will be visually indicated.

Another object of this invention is to provide a protective coating for metal containers generally and especially for containers of fluids under pressure, as in the use of carbon-dioxide, whereby oxidation will be prevented and the life of the container consequently increased.

A further object of our invention is to provide a method to render the cost of production of gas containers of the types referred to herein more economical than at present, by making it possible to use cheaper grades of metals in their manufacture or formation and by eliminating those treatments, either of the metal of which the containers are composed or of the containers themselves, that are now essential to prevent corrosion, the application of our leak-detecting medium thereto accomplishing these important aims in addition to attaining the primary objective of our invention, as hereinbefore set forth.

Briefly, our invention contemplates a method of treating a metal container, subsequent to sealing, whereby the entire container, including the seal, will be enveloped or enclosed in a homogeneous conforming protective coating of a material having characteristics which will make its application simple and economical and, at the same

time, insure to those relying upon such containers, as in their use in emergency apparatus, against the hazards of unknowingly depending upon partially or wholly exhausted containers for the performance of the work for which they are designed.

Other objects and advantages flowing from the practicing of our invention will doubtless become manifest as the description proceeds and we would have it clearly understood that we reserve unto ourselves all rights to the full range of equivalents of the steps of our method and of the material herein specified as well as the means of application and the avenues of use, to which we may be entitled under our invention in its broadest aspect.

In the accompanying drawing, we have elected to show the application of our invention, in a simple and inexpensive way, to a conventional gas bottle, such as is designed to contain carbon-dioxide for use in the inflation of emergency equipment, the bottle being of a weight and size that will permit of its placement within a pocket or compartment of a life jacket or vest in readiness for the perforation of the seal to liberate the gas for the performance of its intended function, when required. Obviously, the invention may be practiced with the same ease and economy in conjunction with larger containers and those designed for other fluids, or for solids or semi-solids, within the purview of the appended claims.

In the drawing:

Figure 1 is a view in elevation of a conventional type of so-called gas bottle or container, prior to the application of our invention thereto.

Figure 2 is illustrative of a step in our method of treatment of the bottle shown in Figure 1, for attaining the objectives to which this invention is directed.

Figure 3 is a view in elevation of a container to which our invention has been applied, with the coating material cut away parallel to the longitudinal axis of the container, and,

Figure 4 illustrates a bottle embodying our invention, showing the enveloping coating partly broken away to disclose its disposition upon the outer surface of the container.

Referring now to the drawing in detail, in which like characters of reference are employed to designate similar parts in the several views, 7 indicates the container or bottle which, at present, is constituted of rustless steel, or of a metal subjected to a treatment to resist oxidation. The container, as will be apparent, is of an elongated configuration and embodies a neck 8 which, when the container has been charged, receives a seal of frangible material, as a soft metal, which is designed to seal the passage therethrough and prevent the escape of the contained fluid. However, in many instances, the seal may be imperfect, because of a poor jointure between the sealing metal and that of the container, permitting the gas to escape, or leakage may develop through the seal itself, due to shrinkage and a resultant porosity where there has been an improper combination of the alloys entering into its composition. Again, a faulty sealing operation or careless handling or storage after charging, may be productive of leaks past or through the seal, or through the container itself. In any event, irrespective of the causes which contribute to the escape of the gas from the containers, the leakage, except in those instances where there may be a relatively major rupture of the seal or a readily discernible fault in its jointure with the container metal, cannot be detected, the container, in so far as may be determined from its external appearance being in perfect condition and fully charged. The gas or fluid, because of its characteristics lends no aid to detection of its seepage, so that it will be entirely obvious that under existing practice a partially discharged or wholly exhausted container may be inserted in a piece of emergency equipment.

By the use of our invention, any uncertainties as to the condition of a sealed container, in so far as the efficiency of its charge is concerned, are eliminated by the provision of means whereby leakage, even of infinitesimal proportions, is visually indicated upon the container itself, and without resorting to costly and complicated testing operations, as have been proposed.

In carrying our invention into effect, we apply to the exterior of the container which has been previously charged and sealed, an enveloping coating of a preferably elastic material which has an affinity for the container metal of the requisite adhesive characteristics to render it virtually an integral part of the vessel. In the practical use of our invention, it has been found that latex possesses all of the attributes which are essential to the attainment of the objectives thereof, in a simple and economical manner. It is elastic and readily adheres to the metal shell, while, at the same time, it does not deteriorate under atmospheric conditions which impair the properties of commercial rubber. The application of the coating may be accomplished in various ways, but it has been demonstrated that the most satisfactory results are obtained by a dipping or immersion process.

In Figure 2, we have shown a method which may be followed, wherein a vat 9 contains the latex in solution, as indicated at 10. The container 7 is immersed in this solution for a part of its length, approximately one-half, the head-end being preferably initially treated or dipped. Obviously, the latex will adhere to and form an enveloping covering or coating, as at 11, of the portion of the container that has been entered therein, when permitted to set and harden, the curing being effected, of course, at a temperature which will not produce undue expansion of the fluid within the container. Following the completion of the initial coating operation, the remainder of the container is treated in a similar manner, the immersion, however, being to a sufficient depth to produce a bond with the coat first applied. In other words, the second dipping operation completes the enveloping of the container, with a zone 13 in which the sequentially applied coatings 11 and 12 overlap and coalesce to produce a homogeneous skin upon the exterior of the bottle or container and its seal.

The inherent toughness of the latex and the control of its thickness which may be exercised in the application of the coating will provide a skin that will resist an appreciable amount of abrasive action, such as may be encountered in the handling and storage of the container, without impairment. Also, it is impervious to moisture, so that a container coated therewith will not corrode or rust. Thus, as will be manifest, by the use of our invention, instead of producing the containers from rustless steel or treating them chemically to render them non-corrosive, metals of the cheaper grades may be used in their manufacture, the cost of the latex application being

far less than that of any of the standard rust-proof processings.

Now, while the latex is tough and wear-resistant as well as impervious to moisture, it is also elastic and when applied to the container as described, to virtually become a part thereof, will still react elastically to internal pressures, such as may result from leakage past or through a seal or through the wall of the container itself, howsoever small the seepage may be, and visually indicate the imperfect condition of the container, by its distortion in the form of a bubble or globule. As will be evident, an irregularity of this kind in the normally smooth surface of the skin or coating will be immediately detected, even under a most casual examination, so that the user is safeguarded from the hazards which can not be avoided under the existing conditions which prevail in the employment of carbon-dioxide as an agent for inflating emergency or life-saving equipment. Of course, in some instances, the leakage may be of proportions to rupture the latex covering, but as in the case of the globule, the break will be readily perceived on an inspection, by the unskilled, as well as one versed in the art.

In the use of bottles for charging fire-extinguishers, or for inflating collapsible boats and other apparatus, the tell-tale coating may be applied with the same advantages to the users or purchasers of the bottles, thereby avoiding the difficulties which flow from attempts to perform the desired work with a partially or completely exhausted container. Also, containers for foodstuffs and other materials may be subjected to a coating of elastic material in conformity with our invention, to provide an hermetic seal therefor, as is desirable in canning coffee, for instance, or for indicating possible contamination of the contents, because of imperfections in the container or its seal, it being apparent that the internal pressure would act upon the coating, as heretofore described, to visually indicate the imperfect condition of the container or its seal. In lieu of latex, rubber may be employed in the production of the coating, or an elastic material in which cellulose forms the base, or, in fact, any material which may be applied to the container in such a way as to form an hermetic envelope therefor having characteristics which will permit it to respond to internal pressure to change its physical aspect to visually indicate the condition of the container to the observer.

While we have described certain materials and the sequence in which the steps entering into our method may be followed, as pointed out these may be varied to meet requirements of production and use. For example, means may be employed to dip the entire container in a single continuing operation or by an intermittent movement, by manual or mechanical media, and effect air-curing of the coating, without impairing its effectiveness, or the second coating, if the described method is followed, may be performed immediately after the first coating is applied or at an appropriate stage between the first immersion and the curing of the skin section produced thereby. All of such departures from the specific steps herein set forth as illustrative of the practicing of our invention, whereby our objectives may be attained, are within the spirit and scope of our invention as defined by the claims.

We claim:

1. A method of treating metallic containers of fluids under pressure when sealed, to indicate leakage of the container contents, which consists in immersing the sealed container in a solution of adhering elastic material and then permitting said material to set and harden to form a permanent smooth homogeneous skin enveloping the container and the sealing element, said skin being adapted to react elastically in response to internal pressure to indicate leakage of the container contents.

2. A method of treating metallic containers of fluids under pressure when sealed, to indicate leakage of the container contents, which consists in coating the sealed container with latex, then permitting the latex to cure at substantially atmospheric temperature to form a permanent enveloping skin upon the container and seal, said skin being adapted to react elastically to visually indicate leakage of the container contents.

3. A method of treating metallic cartridges of carbon-dioxide when sealed, to indicate leakage of the cartridge contents, which consists in applying to the exterior of said cartridge and to the seal a permanent coating of elastic material, then permitting said material to harden to form a homogeneous skin completely enveloping said cartridge and the seal thereof, said skin being capable of reacting elastically to pressure induced by leakage of the cartridge contents to visually indicate such leakage.

4. A method of treating metallic cartridge type containers of carbon-dioxide retained under pressure, subsequent to a charging and sealing operation, to indicate leakage of the container contents, which consists in immersing approximately one-half of the container in a solution of latex, effecting curing of the latex at a temperature below that which will detrimentally expand the contained fluid, then dipping the remainder of the container in such solution, and permitting the second applied coating to set and harden in coalescence with the first applied coating to form a homogeneous skin conformingly enveloping the container and seal, said skin being capable of activation by internal pressure to visually indicate leakage of the container contents.

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