July 10, 1951 J. T. EFFORD 2,560,523

THERMALLY ACTUATED SPRAYER

Filed Jan. 31, 1950

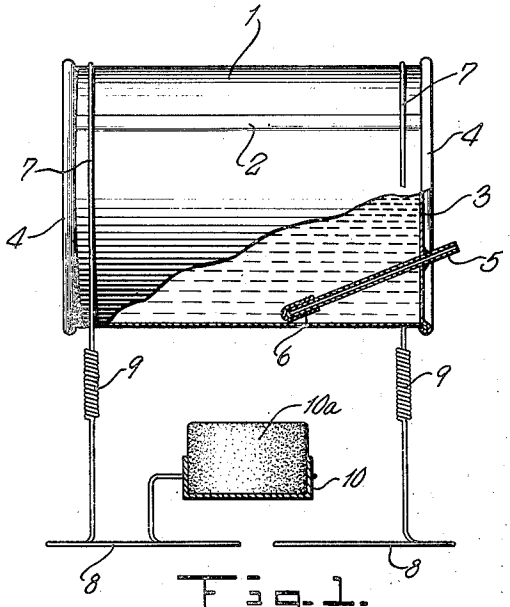


Fig. 1.

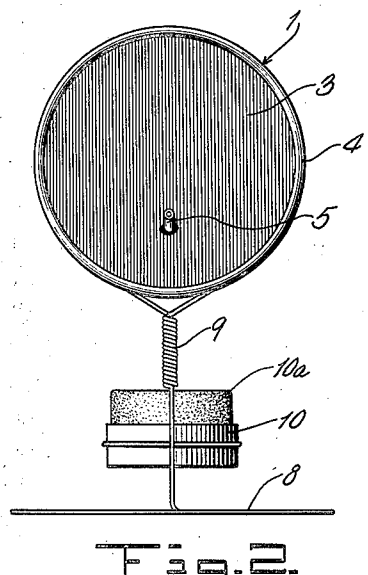


Fig. 2.

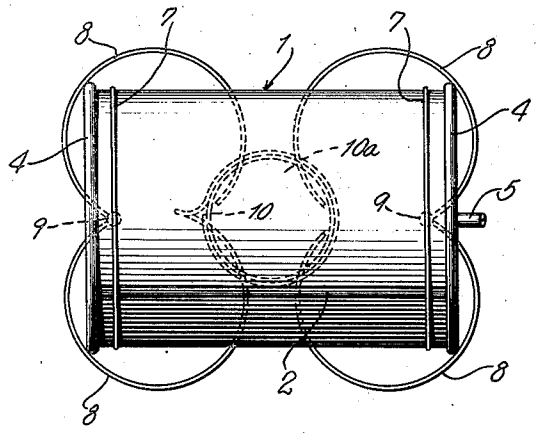


Fig. 3.

INVENTOR.
JOHN T. EFFORD
BY
Kenyon & Kenyon
ATTORNEYS

Patented July 10, 1951

2,560,523

UNITED STATES PATENT OFFICE

2,560,523

THERMALLY ACTUATED SPRAYER

John T. Efford, Stratford, Conn., assignor to Bridgeport Brass Company, Bridgeport, Conn., a corporation of Connecticut

Application January 31, 1950, Serial No. 141,530

1 Claim. (Cl. 222—54)

1

This invention relates to a thermally actuated sprayer of the type furnished the ultimate user in the form of a container hermetically sealing a normally liquid spray material. This container has a spray outlet sealed so that when the container is heated to vaporize or boil the spray material the seal fuses and the spray is ejected by the internal pressure.

Such a type is believed new and is disclosed and claimed in the John T. Efford patent application filed May 1, 1948, Ser. No. 24,463. The present application continues in part this earlier application and includes a new disclosure pertaining to an improvement aimed at providing a lower cost form of the described type of sprayer.

The above outlines the primary object of the present invention, namely, to produce at minimum cost a sprayer of the thermal type. Another object is to attain this low cost objective while producing an effective spray having aerosol characteristics similar to those developed by a sprayer of the type comprising a container having a manually controlled valve and otherwise hermetically sealing a liquefied gas under pressure. This last mentioned type requires a container capable of resisting the pressure required to maintain the gas liquid. The type with which the present invention is concerned requires a container only strong enough to resist the pressure developed when the spray material is vaporized by heating. During this time the spray is continuously ejected so that there is a continuous pressure loss.

A specific example of a thermally actuated sprayer is disclosed hereinbelow with the aid of the accompanying drawings. This is for the purpose of explaining the principles and operation of the various features of the present invention. These features may be incorporated in other forms once they are understood.

In these drawings—

Fig. 1 is a side elevation with the lower right hand portion in section to reveal the internal construction;

Fig. 2 is an end view of Fig. 1; and

Fig. 3 is a top view of Fig. 1.

In this specific example the container 1 is in the form of a tin can of the type known in the tin can industry as a packer's sanitary can. Thus the sheet steel from which the can is made is of 29 gauge maximum and preferably a somewhat lighter gauge. It may be tinned by either hot dipping or electrolytic methods, the latter being preferred. The can body has the characteristic soldered side seam 2 extending longitudinally and the can ends 3 are characteristically flat and are attached to the body by the characteristic rubber or plastic sealed double seams 4.

2

This can contains and hermetically seals therein a normally liquid spray material to provide a package. The can may be filled and the top can end applied by the same type of equipment that food packers use. Cans of this type may be obtained with their insides lacquered with different types of lacquer which are normally provided for use with foodstuffs which tend to react with tin. A lacquered can of this type may have the advantage that its inside is protected in the case of spray materials which might react with tin and cause trouble. If the spray materials do not have this characteristic, an unlacquered can may be used.

A short straight piece of small diameter metal tube 5 extends diagonally through one of the can ends 3 through a suitable hole formed for this purpose. Solder may be used to hermetically seal the tube in the can end. This tube extends diagonally through the can end at a location relatively adjacent but spaced somewhat from the can periphery so that the inner tube end is adjacent, close to or practically in contact with the inside of the can body. This inner tube end is closed by a thermally destructible seal 6. This seal may be either a low temperature melting solder or a thermoplastic material. The inner end of the tube may be dipped into the material so that a sheath is formed around its end. As illustrated, the outside of this seal 6 actually contacts the inside of the can body. The inner tube end is shown close to but not quite reaching the longitudinal center of the can. The outside portion of the tube may be kept short as illustrated.

Preferably the tube 5 extends through the top of the can because this facilitates packing of the liquid spray material. Its point of passage through the can end may be sufficiently far from the seam 4 to avoid interfering with the application of the can end to the can body.

A feature of the invention is that the inner end of the tube 5 with its seal 6 is located remote from the soldered seam 2. As shown by Fig. 1, the arrangement may be such that the thermally destructible seal 6 rests against the can body almost diametrically opposite the seam 2. The distance of separation between the seam 2 and the seal 6 should be made adequate so that, when heat is applied to the container adjacent the seal 6, the heat used to heat the spray material and

the seal 6 does not heat the seam 2 above the fusion temperature of the solder that maintains the seam tight and hermetic.

The illustrated sprayer package includes a stand or support that is connected with the can 1 to form a self-contained unit. This stand is shown as being made from two lengths of wire, each length being looped tightly around one extreme end of the can as at 7 and then extended radially from the can body in a radial plane aligned with the inner tube end and the seal 6 and then looped at right angles as at 8 to form a base or bases. This wire stand may have the wire ends interfastened by solder or the wire may be intertwisted as at 9 to form a purely mechanical connection. One of the wire lengths is looped upwardly from a base portion 8 and provided with a pan 10 which may be a sheet steel stamping. This pan is proportioned to receive a lump or piece of solidified fuel 10a such as solidified alcohol or a hydrocarbon gel.

With the illustrated sprayer package resting on a flat support by way of its base portions 8, the can 1 is horizontally positioned with the tube 5 diagonally pointing upwardly. The can 1 may be the standard twelve ounce packer's sanitary can. A suitable spray material is methylene chloride which is normally liquid and which includes a DDT and pyrethrum mixture or tetraethylpyrophosphate. With this type of material, an inside diameter of .025" is suitable for the tube 5.

The inside of the can 1 and the portion of the tube 5 that contact the spray mixture may be protected by a coating that does not react with the spray material. This may be necessary if a material is used which might cause trouble by its contacting the tin. In some instances, this precaution may prove unnecessary.

With some spray materials, the low melting temperature solders have their normal melting temperatures increased abnormally by reaction with the materials. In such instances, the solder should be protected from the material by a suitable coating. Preferably one of the various presently available thermoplastic materials is used for the seal 6 in the case of such spray materials.

The pan 10 is preferably proportioned to hold the solidified fuel 10a in a size suitable for heating the material just high enough to keep the spray material boiling during the operation of the device. The seal 6 may be provided with a destruction temperature approximately coinciding with the temperature of the spray material required for the development of proper spraying pressure.

Upon igniting the piece of solidified fuel 10, the spray material starts to heat. In the case of methylene chloride, a temperature of about 180° F. develops the proper pressure, and in that instance the seal 6 should be of a composition that melts or softens adequately to blow out at about this temperature. As heating starts, the round shape of the can permits convection currents of the spray material to agitate the spray material to tend to prevent premature destruction of the seal 6. The seal 6 fuses when the contents of the can are practically uniformly heated to about 180° F. in the case of the exemplary materials. The outside of the can 1 immediately above the fuel 10a may rise above the softening temperature of the solder used by can manufacturers in making ordinary sanitary cans. An important advantage is that this does not cause trouble at the soldered seam 2 because the latter is well away from this zone of localized temperature.

Just about as the material reaches 180° F. or shortly therebefore, the seal 6 softens so that the internal pressure can drive the spray material through it and out the tube 5. The small diameter of the tube 5 in conjunction with its length creates a spray having aerosol characteristics if not of true aerosol nature. Any particles of the seal that are blown up through the tube 5 are positively kept soft and fluid or plastic so the pressure flow can continue. The tube is immersed in the hot spray material throughout most of its length, its short outside end being kept hot by conduction.

Due to the fact that the entire sprayer package can be made so economically, the device may be discarded after being used once. Other than for the small diameter tube 5, the production cost of the package is little more than that connected with any other canned product. The tube is relatively inexpensive. With most practical spray materials, a .025" inside diameter is suitable when the length of the tube 5 is about 2 inches. The tube need not be seamless but may be any small sized tube. When the inside diameter is small it is possible to obtain a true aerosol or to closely approach such a dispersion. In the interest of economy the tube may be made as short as is consistent with obtaining the desired spray.

The spray material may be any normally liquid material and this liquid material may contain or carry various types of active ingredients depending on the purpose for which the sprayer package is intended. The material suggested is suitable as a general insecticide. The important thing is that the present invention provides for a very inexpensive thermally actuated sprayer package which can be produced by those familiar with canning procedures and which represents a practical and substantially foolproof device.

In some instances it may be preferable to positively fix the wire loops or loops 7 non-rotatively to the can body 1 by spots of solder. The location of the soldering points is relatively immaterial in this instance because, when the device is in operation, it will not matter if the solder lets go, since there will be no chance for the can 1 to turn when in use and standing stationary. The tube 5 is illustrated as being made of metal and installed in the can end by the use of solder. This is an inexpensive and practical way to install it.

It is to be understood that the flat can ends are applied mechanically with a soft material such as rubber or a plastic providing gaskets for fluid-tightness. The can manufacturer provides cans with one end applied to each and a sufficient number of ends to close the other end of each. Machinery is available for automatically filling the cans and applying the can ends.

The can may also be made from tin-mill black plate with a suitable coating other than tin preventing possible reaction between the steel and the contents of the can and rusting of the can's outside. The can material may be any metal of adequate low cost comparable to the materials suggested.

I claim:

A spray package including a can having a cylindrical body wall and flat end walls, said body wall having a longitudinally extending seam sealed with solder, a substantially straight metal tube passed diagonally through one of said end walls at a location spaced from said wall's pe-

riphery and having an inlet end inside of said can at a location adjacent to the inside of said body wall approximately centrally respecting its length and spaced from said seam and having an outlet end on the outside of said can, a thermally destructible seal on said inlet end and closing it until heated, a normally liquid spray material inside of and fluid tightly enclosed by said can and adapted to vaporize when heated, and a stand connected with said can and adapted to support it horizontally with the portion of said body adjacent said inlet end and said seal downwardly and with said stand having a fuel piece support positioned below said portion.

JOHN T. EFFORD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,244,302	Lynn et al.	June 3, 1941