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SPRAY PRODUCT PACKAGE AND METHOD OF PACKAGING SPRAY PRODUCTS

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This application is a continuation-in-part of my pending application, Serial No. 603,876, filed August 14, 1956.

This invention relates to the packaging of spray products in suitable spraying containers under pressure, more particularly engine starting fuel of the type comprising ether, a lubricant such as colloidal graphite dispersion, and an anti-oxidant.

In spraying the engine starting fuel, the mixture is maintained in a suitable spraying container under gas pressure. In ordinary methods of packaging, the mixture is merely loaded into metal containers, usually of a convenient size capacity, about twelve ounces, and a propellant gas added. The containers are usually provided with a suitable valve which when opened permits the contents to be ejected in a stream or spray. This ordinary packaging is such that after a certain amount of the contents has been ejected, the propellent gas pressure is lost to such extent that anywhere from 25 to 50 percent of the product, such as the fuel mixture, remains in the can and is lost to the user.

The principal object of this invention is to so package a product that all or all but a negligible quantity of the product will be dispensed by the propellent gas originally loaded into the container.

Another important object of this invention is to provide for the packaging of an ether type engine starting fuel in lightweight metal containers, for spray dispensing from said containers, in such manner that the loaded containers can be safely transported at very high altitudes and whereby the fuel can be virtually entirely dispensed in a spray form, at extremely low temperatures, for example, as low as 90 degrees below zero Fahrenheit.

My methods and processes permit the use of compressed gases, such as nitrous oxide, propane, carbon dioxide, and combinations of these, as the propellent gas. The mixing of these gases in combinations allows almost the full amount of product to be put in the container instead of taking up the available space with propellent. This is a considerable advantage over the use of liquified gases. It is possible with my invention to expel from the consumer container, products in outside temperatures as low as 90 degrees Fahrenheit below zero, and yet have these filled consumer containers stand heat tests up to 400 degrees Fahrenheit, if the container is initially built to stand the pressures, without losing the expellent gas pressure or jeopardizing the function of the product, this comprising also an important storage safety factor.

I can, for example, package injection type diesel and gasoline engine starting fluid, by my methods, to great advantage.

Take a formula as follows: By weight—

95.2%	refined ethyl ether
4.7%	colloidal graphite dispersion (as a lubricant)
0.1%	anti-oxidant
100.0%	

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The ether is the ordinary commercial grade or better and supplies an easily vaporized combustion material. The colloidal graphite dispersion is the kind commonly sold as "DAG Dispersion #154," and is to avoid dry start of the engine as the ether tends to cut the cylinder lubricants. Hence, a solid colloidal graphite is used as a lubricant in this compound.

The anti-oxidant is preferably 2–2 prime methylene bis (4-methyl 6-tertiary butyl phenol). This is to prevent the formation of corrosive acids and spontaneously explosive peroxides.

Sorbitant mono-oleate may be used in amount of about 10 percent of the total compound, with a reduction of the ether content to the same extent, to keep the lubricant of the compound in suspension in the ether.

Packaging this engine starting fuel in suitable small metal containers, for example, twelve ounce capacity, to be dispensed by gas pressure similarly to the packaging and dispensing of other gas pressure dispensed spray or like container products, I can package in several ways, as following more particularly described.

In one of my methods, which permits a regular production line arrangement, I start with a supply of empty open top cans which are moved progressively in the steps where first the lubricant and anti-oxidant in the selected proportions are loaded into the cans at room temperature, ordinarily about 70 degrees Fahrenheit, next the desired quantity of refrigerated ether in liquid form at a temperature ranging preferably from zero to plus 20 degrees Fahrenheit is placed in the can, then a self closing valve is loosely placed in the open top of the container to loosely close the opening, next the valve is crimped to the can to seal the can, and finally the propellent gas is added. This last is a very important step and must be performed in a distinctive manner, to wit, injected through the self closing valve, suddenly, and at a high pressure. For a twelve ounce can, I use a total of 202 grams of the product and inject 18 grams of gas at 450 pounds pressure. This sudden injection of the gas at high pressure is the critical factor. I have observed that whatever is the temperature of the product in the can, the force of the sudden injection of the gas into it causes the temperature of the product to rise. The gas apparently enters into combination with the product and together they cause at that moment, an increase of the total pressure inside of the can. It also follows from this, that if the temperature of the product is low or is lowered, prior to the injection of the gas, the temperature of the combination in the can does not rise as high as it would otherwise. For this reason I prefer to refrigerate the product, for example, the ether of the engine starting fuel, before placing it in the can. The package is ready for use anytime after it is loaded with the product and gassed. However, when the filled can is stored for a time after the can has been gassed, the temperature and pressure will both drop. I have found that due to my method of gassing the product, it remains constantly at a pressure sufficient to expel practically all of the contents of the can, no matter what the temperature may be at which the filled can is stored or used. I have observed that almost immediately after the gas is injected into the can, the gauge pressure reads from 85 to 90 pounds per square inch. In brief, despite the high injection pressure used in injecting the gas, the total pressure in the filled can afterwards drops. It is, therefore, evident to me that the product has absorbed or mixed with some of the gas so that the product and the gas are expelled together instead of the gas merely exerting pressure against the product and the gas thereby losing its propellent force as the quantity of the product lessens in the can. The consumer gets more product too than by prior methods in which as much as half the content is merely to expel the contents.

I can also package the product, with the same results, by first mixing all the ingredients, refrigerating the mixture, and feeding the mixture at a low temperature into the can, then following the several steps as outlined in the method just foregoing disclosed.

Refrigerating the mixture or the ether, before placing it in the can is also a safety factor since thereby the ether can be freely handled and very little, or only negligible amounts thereof, will be lost by vaporization or dissipation into the surrounding atmosphere. This is in addition to the benefits derived from keeping the temperature down within desired limits at the time the gas is injected.

The ether type engine starting fuel is given as an example, however, other products can also be successfully packaged by the same methods, with the same beneficial results, and in any event, with considerable savings to the consumer who thereby gets more product for his money.

Tests have shown that the safety factor in my method is so great that engine starting fuel of the kind described, packaged by my method has been approved for air transportation by the Interstate Commerce Commission.

What I claim is:

1. A method of packaging an ether type engine starting fuel and a propellant gas in a light weight metal can, for spray dispensing of said ether type engine starting fuel from said can, said filled can being explosion proof at very high altitudes and at very high temperatures, said material being dispensable virtually completely in spray form from said container at temperatures as low as −90° F., comprising the steps of inserting into an empty open end can a predetermined quantity of colloidal graphite dispersion and an anti-oxidant, where the percentage of colloidal graphite dispersion is approximately 4.7% of the ultimate content of said can, inserting in said can a quantity of refrigerated ether in liquid form at a temperature between approximately 0° F. and 20° F., said quantities being sufficient approximately to fill said can, placing a self-closing valve on the open end of the can, crimping the valve to the can, and adding a propellant gas in gaseous form to the can via said self-closing valve, said propellant gas being a mixture of carbon dioxide and nitrous oxide in gaseous form, wherein the step of adding said propellant gas is accomplished by injecting a measured quantity of said propellant gas through said self-closing valve substantially instantaneously and at sufficiently high pressure that said propellant gas appreciably increases the temperature of the contents of said can, the quantity of said gas injected into said can and the pressure of said gas as injected being such that the pressure of said gas internally of said can after termination of injection of said gas is materially smaller than the pressure at which said gas in injected into said can via said valve.

2. The combination according to claim 1 wherein the injection pressure of said gas is approximately 450. pounds per square inch.

3. The combination according to claim 1 wherein the injection pressure of said gas is approximately 450. pounds per square inch and the final pressure of said gas in said can is approximately 85. pounds per square inch.

4. A method of packaging an ether type engine starting fuel and a propellant gas in a lightweight metal can for spray dispensing of said ether type engine starting fuel from said can, said filled can being explosion-proof at very high altitudes and at very high temperatures, said material being dispensible virtually completely in spray form from said container at temperatures to as low as −90° F., comprising the steps of inserting into an empty open end can a predetermined quantity of ether type engine starting fuel constituents including a lubricant of the kind to avoid dry start of the engine, and ether in liquid firm, sufficient substantially to fill said can, sealingly affixing a self closing valve on the open end of the can and adding a propellant gas in gaseous form to the can through said self closing valve, wherein the step of adding said propellant gas is accomplished by injecting a measured quantity of said propellant gas through said valve substantially instantaneously and at a sufficiently high pressure so that said propellant gas appreciably increases the temperature of the contents of said can, the quantity of said gas injected into said can and the pressure of said gas during injection being such that the pressure of said gas internally of said can after termination of injection of said gas is materially less than the pressure at which the gas is initially injected into said can.

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