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SPRING TRIGGER ASSEMBLY FOR MIXING DUAL LIQUIDS

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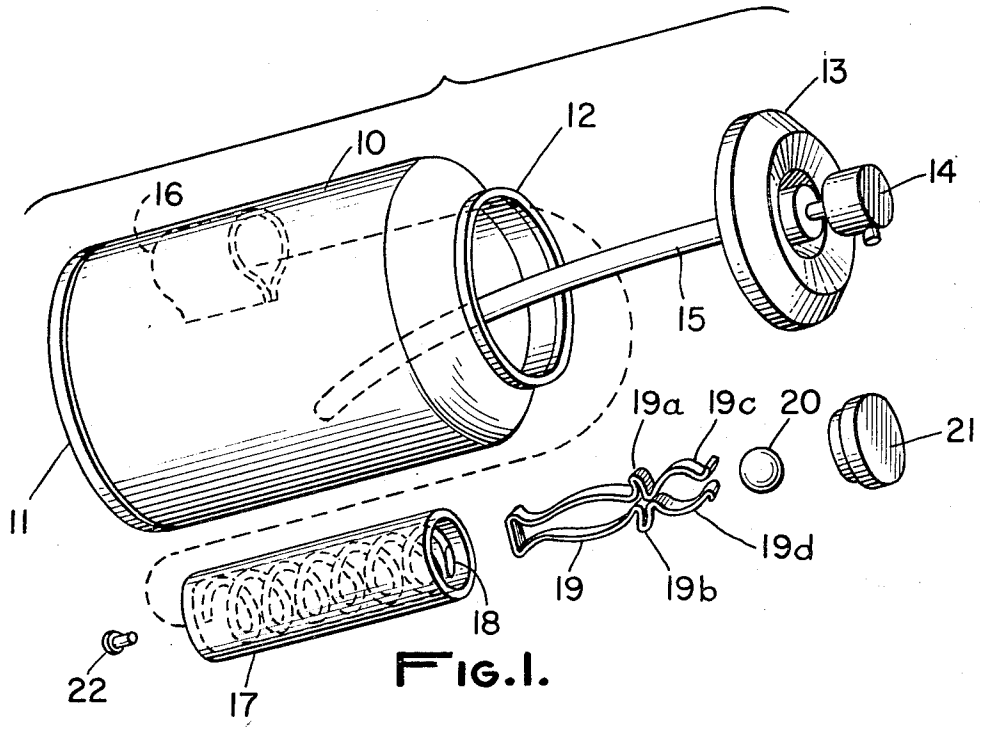


FIG. 1.

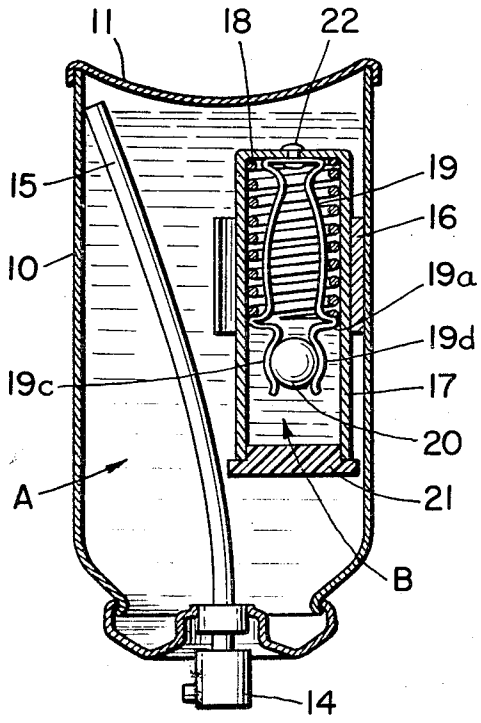


FIG. 2.

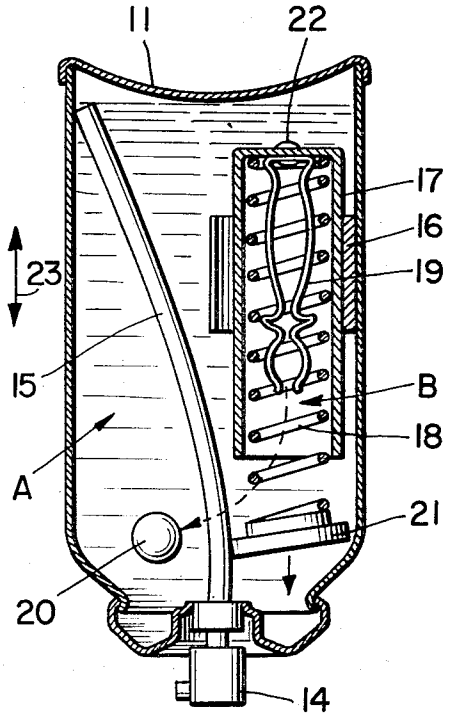


FIG. 3.

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SPRING TRIGGER ASSEMBLY FOR MIXING DUAL LIQUIDS

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U.S. Cl. 222—145 5 Claims

ABSTRACT OF THE DISCLOSURE

A spring trigger assembly is provided for placing, first and second liquids in first and second containers normally separated, into communication with each other for mixing. The assembly itself is included in the second container and comprises a coiled compression spring, a spring trigger means, and an inertia means cooperating with the spring trigger means to hold the compression spring in a compressed state and, when shaken loose from the spring trigger means, to release the compression spring so that it can expand to thereby open the second container and provide communication between the liquids.

This invention relates generally to mixing of liquids normally held in a separated state and more particularly to a novel inertia activated spring trigger assembly for effectively removing a barrier between two liquids so that they can mix upon actuation of the inertia mechanism.

BACKGROUND OF THE INVENTION

While the present invention will find use in any situation in which it is desired to effect a mixing between two liquids or fluids which are normally maintained in a separated condition, the preferred embodiment of the invention will be described in conjunction with aerosol type cans such as used for spraying paint and the like wherein a catalyst constitutes one of the liquids to be maintained separate from the resin or other liquid until such time as a spraying operation is to take place.

Heretofore, it has been proposed to form a can containing at least two compartments which are sealed from each other. The catalyst and resinous materials are placed in the compartments respectively and caused to be mixed immediately prior to use. Such devices as have been provided heretofore, however, are relatively expensive to manufacture in large quantities primarily because of difficulties in forming the dual compartment container itself.

In my U.S. Pat. No. 3,591,089 issued July 6, 1971 there is described and claimed a portable spray means for dual liquids wherein first and second containers are provided, the second container being disposed in the first container and an inertia means being incorporated in the second container to shatter the same upon shaking thereof whereby catalyst in the second container can mix with resin in the first container. While the device as described in this patent will work, there is always the possibility of undue shaking of the can which might shatter the interior container prior to actual use. If the frangibility of the interior container is made sufficiently strong to prevent accidental shattering by the inertia device, when it is actually desired to shatter the container to mix the liquids an excessive shaking force may be required and thus it is possible that some frustration on the part of the user may occur.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

The present invention has to do with a spring trigger assembly for facilitating the mixing of dual liquids which may usefully be employed in aerosol type spray cans such as that described in my heretofore referred to United States Patent but wherein various previous difficulties are avoided.

More particularly, the present invention contemplates unique inertia responsive triggering means which can be carefully controlled so that liquids may be mixed only in response to deliberate manual shaking of the can and wherein positive action is assured in placing the dual ingredients in communication with each other.

In its preferred form, the structure comprises a barrier normally separating the first and second liquids to be ultimately mixed together with a main spring means which may take the form of a fairly strong compression spring, a trigger spring means, and an inertia means such as a small ball bearing or mass holding the trigger spring means in a first position to secure the main spring means in a compressed state. With this arrangement, a deliberate shaking is necessary to remove the inertia means which, upon separation from the trigger spring means permits the trigger means to move to a second position thereby releasing the main spring means which is then free to expand with sufficient force to strike the barrier and remove the same.

Since the inertia means in the form of a ball is held captive by the trigger spring means, there is no possibility of accidental operation of the device in normal handling. On the other hand, deliberate shaking of the can in a specified manner will release the ball without undue frustration thereby releasing the much larger striking force provided by the compression spring to assure a positive breaking of the barrier so that the liquids are placed in communication with each other.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention will be had by now referring to a preferred embodiment as illustrated in the accompanying drawings in which:

FIG. 1 is an exploded perspective view of a typical aerosol type spray can for use with two liquids or ingredients which are to be mixed together immediately prior to a spraying operation and incorporating the spring trigger assembly of the present invention;

FIG. 2 is a cross section of the various components of FIG. 1 in assembled relationship showing the relative positions of the parts when the liquids are to be maintained in a separated state; and

FIG. 3 is a view similar to FIG. 2 showing the relative position of the parts immediately after deliberate shaking of the container in order to mix the ingredients.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 there is shown an aerosol can or first container **10** having its bottom end closed at **11** and having a reduced diameter or neck portion **12** shaped to receive a cover **13** incorporating the usual push button spray valve **14**. A tubular stem **15** extends from the valve and terminates within the container and serves as an exit passage for liquids in the container under pressure.

In accord with the present invention, there is provided means **16** in the form of a metallic bracket for holding a second container shown in the exploded view exterior of the first container **10** at **17**. This second container may serve to carry a second liquid to be normally held separated from a first liquid in the first container **10**. As shown, it is of elongated tubular shape and is arranged to receive a main spring means preferably in the form of a relatively strong compression spring **18**.

Cooperating with the spring **18** is a spring trigger means **19** of a general U-shaped configuration and including lateral shoulders **19***a* and **19***b*. The ends of the U arms are indicated at **19***c* and **19***d* and are adapted to receive an inertia means in the form of a small solid metal ball **20**. The assembly is completed by a cap **21** arranged

to be frictionally received on one end of the second container **17** in such a manner that if the cap is struck internally by a force along the axis of the container, it will be removed.

Referring now to the assembled relationship illustrated in FIG. 2, it will be noted that the second container **17** may be firmly held in the holding clamp **16** so that it is stationary with respect to the first container **10**. The compression spring **18** in turn is illustrated as in a compressed state against the other or closed end of the second container **17**. The trigger spring means in the form of the U-shaped member **19** has the base portion of the U secured to this other or closed end of the second container as at **22** in such a manner that the arms of the U-shaped member are surrounded by the coils of the compression spring **18**, the axis of the compression spring being coaxial with the elongated second container **17**. With the inertia means in the form of the metal ball **20** held between the ends of the arms of the U-shaped member as shown, the arms are spread apart such that the shoulders **19***a* and **19***b* overlie the end of the compression spring to hold the same in a compressed state.

In FIG. 2, the cap **21** is shown closing the second container **17** and suitable liquids designated A and B normally to be held separated are shown in the respective first and second containers.

In the case of a paint spray type aerosol can, the liquid A constitutes resin and the liquid B a suitable catalyst to be mixed with a resin A immediately prior to a spraying operation.

FIG. 3 shows the manner in which the two liquids can be placed into communication with each other by a deliberate shaking of the container. In FIG. 3 it will be noted that the ball **20** has been shaken loose from between the ends of the arms of the U-shaped member thereby permitting them to move together in their natural biased position. This movement in turn removes the shoulder portions from holding the compression spring so that the compression spring is released with substantial force sufficient to strike the cap **21** and knock it free of the second container **17**. The liquids A and B can then mix.

OPERATION

The operation of the spring trigger assembly will be evident from the foregoing description.

Initially, the compression spring **18** is disposed in the second container **17** and the trigger spring means in the form of the U-shaped member **19** inserted axially between the coils of the compression spring. The ball **20** is inserted between the ends **19***c* and **19***d* to spread the arms of the U-shaped member so that the shoulders **19***a* and **19***b* will engage the free end of the compression spring **18**. The assembly is then urged within the second container **17** to compress the spring **18** and the base portion of the U-shaped member **19** is secured to the closed end of the secondary container **17** so that the compression spring is held in a compressed state. Thereafter, the second container **17** is filled with the liquid B and the cap **21** then forced in place to close the tube.

The container **17** is then secured within the bracket **16** in the interior of the first container **10**. This first container **10** may then be filled with the liquid A and the cover structure **13** secured in place.

The ball **20** is sufficiently securely held between the arm ends **19***c* and **19***d* of the trigger spring means so that it will not shake loose or separate under normal handling of the container **10**.

When it is desired to use the container for, for example, spraying purposes, the container is inverted to the position shown in FIG. 2 and given a hard up and down shake in the direction of the double headed arrow **23** of FIG. 3. This action provides a sufficiently large accelerating force to the ball **20** to separate it from the U-shaped member to collapse together in their naturally biased position. This action then removes the shoulders **19***a* and **19***b* from the compression spring thereby releasing the compression spring as described heretofore such that it will strike the cap **21** and open the second container **17**. The ball will then freely float within the first container **10** and the user simply continues shaking the can the sound of the ball against the sides of the can indicating that the ingredients are now in communication with each other and are properly being mixed.

The user can then upright the can and operate the spray head assembly **14** shown in FIG. 1 in the usual manner to effect a spraying operation.

Since the force exerted by the main compression spring can be made fairly large whereas a relatively small force is only necessary to dislodge the ball from the trigger spring means, a positive removal of the barrier between the two liquids such as the cap is assured and yet an undue amount of shaking to dislodge the inertia device is not necessary.

While, as noted, the invention has been described with respect to aerosol spray cans, it is to be understood that the principles are applicable to any situation in which it is desired to hold two liquids or fluids normally separated and thence permit them to combine or mix for any specific desired purpose. The invention accordingly, is not to be thought of as limited to the specific application described.

What is claimed is:

1. A spring trigger assembly for placing first and second liquids normally separated by a barrier into communication with each other comprising, in combination:

(a) a main spring means;

(b) a trigger spring means; and

(c) an inertia means holding said trigger spring means in a first position to secure said main spring means in a compressed state, said inertia means being separable from said trigger spring means under action of a given accelerating force to thereby permit said trigger spring means to move to a second position releasing said main spring means, said main spring means upon being released striking said barrier to remove the same.

2. A spring trigger assembly for placing first and second liquids normally separated into communication with each other for mixing, comprising, in combination:

(a) a first container for carrying a first liquid;

(b) a second container for carrying a second liquid;

(c) means for securing said second container within said first container;

(d) a coiled compression spring in said second container;

(e) a spring trigger means in said second container; and

(f) inertia means in said second container holding said spring trigger means in a first position to secure said coiled compression spring in a compressed state, separation of said inertia means from said spring trigger means permitting said spring trigger means to move to a second position to release said compression spring, expansion of said compression spring opening said second container whereby its interior is placed into communication with the interior of said first container.

3. An assembly according to claim **2**, in which said second container is of elongated tubular shape and includes a cap at one end frictionally secured to said end for closing said second container and removable from said end to open said second container upon being struck by a given force, said compression spring being coiled in the other end of said container in coaxial relationship therewith such that when it is released, it expands to strike said cap and thereby open said second container.

4. An assembly according to claim **3**, in which said spring trigger means comprises a generally elongated U-shaped member having its arms biased together, each arm including a lateral shoulder extending outwardly, the base of the U-shaped member being secured to said other

end of said second container, said compression spring surrounding the arms of said U-shaped member, said inertia means comprising a ball receivable between the upper ends of the arms of said U-shaped member to spread said arms so that the lateral shoulders overlie the upper end of the compression spring to hold it in said compressed state, shaking of said second container with a predetermined acceleration causing said ball to shake loose from between the ends of said arms to permit them to come together so that said compression spring is released.

5. An assembly according to claim 4, in which said first container is an aerosol can and said second container incorporates a liquid which when mixed with the contents of said can provides an expanding solution for spraying.

References Cited

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206—47 A; 239—304