

Sept. 23, 1969

3,468,289

D. BROIDA  
INSECT TRANSPORTING PACKAGE

Filed April 21, 1967

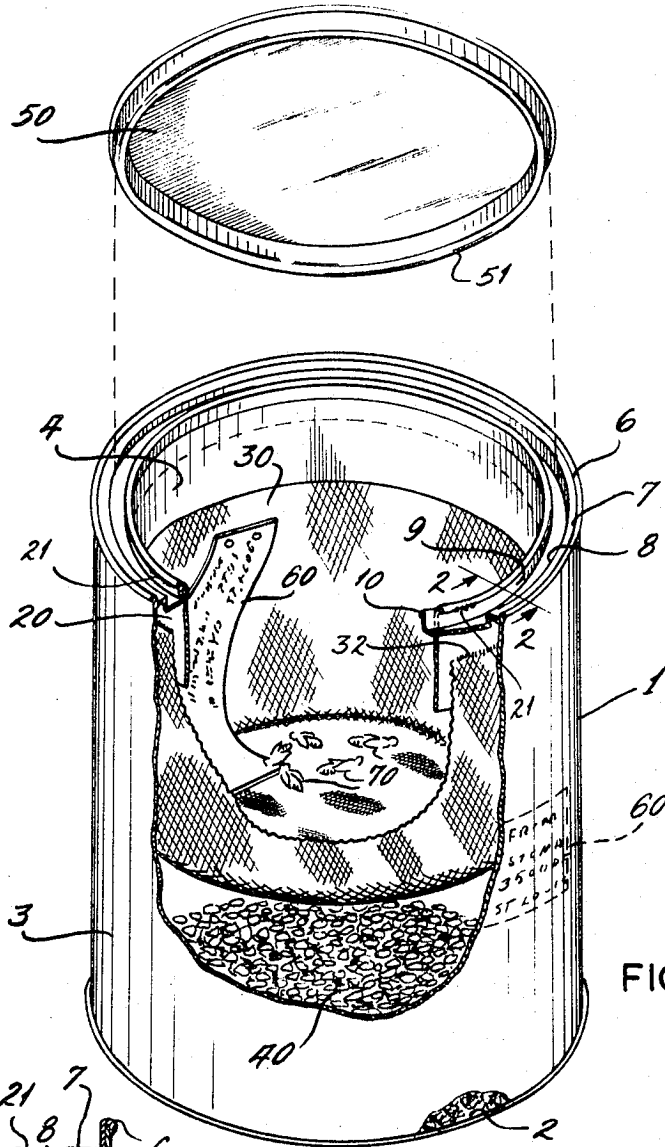


FIG. 1

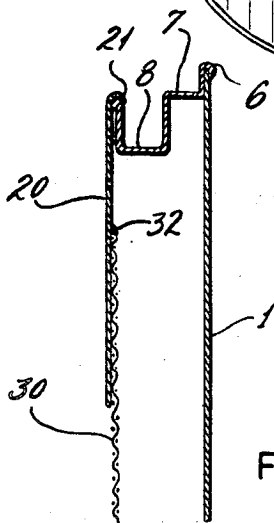


FIG. 2

INVENTOR:  
DANIEL BROIDA  
BY *[Signature]*  
ATTORNEY

1

2

3,468,289

**INSECT TRANSPORTING PACKAGE**

Daniel Broida, Ladue, Mo., assignor to Sigma Chemical Company, a corporation of Missouri  
 Filed Apr. 21, 1967, Ser. No. 632,764  
 Int. Cl. A01k 1/00, 97/04; B65d 25/00

U.S. Cl. 119-15

10 Claims

**ABSTRACT OF THE DISCLOSURE**

An insect package in the form of a shipping container having an open-topped can body, a foraminous basket in the can body defining an insect receiving basket and, between the basket and the can bottom a desiccant chamber containing a desiccant, and a tight lid closure for the open top. A pre-addressed mailing label in the basket when the container is distributed and insects in the basket when the package is shipped to a processing center. A method of processing fireflies which includes catching them, refrigerating them without freezing them, putting them into the container described, sealing the container and shipping the package to a processing center.

**BACKGROUND OF THE INVENTION**

It is frequently necessary in the preparation of biochemicals for research, to collect and process insects. The package and method of this invention have particular application to the collecting and processing of fireflies to obtain the luciferase and luciferin now required for research. Heretofore, it has been necessary either to process the fireflies at or near the site of their capture, or to incur serious losses in the numbers of suitable insects which reach the processing center. It has been customary, in the processing of fireflies for the recovery of luciferin and luciferase, to dehydrate them quickly by the use of a high vacuum desiccator, or to store them below 0° C. until suitable equipment is available.

One of the objects of this invention is to provide an insect package which ensures the safe arrival of substantially all of the insects packed in the package, which is simple and sturdy.

Another object of this invention is to provide a method of processing insects which is simple, practical, and effective and the initial steps of which can be performed by people unskilled in the biochemical process art.

Other objects will become apparent to those skilled in the art in the light of the following description and accompanying drawing.

**SUMMARY OF THE INVENTION**

In accordance with this invention, generally stated, an insect package is provided which includes a strong can body with imperforate bottom and side walls and an open top, a foraminous screen which defines an insect-receiving basket between itself and the open top and a chamber between itself and the bottom, desiccant material in the chamber, and a removable closure member in substantially airtight engagement with the can to seal the open top. Preferably, the open top is defined by an annular flange with a channel in it which in turn is defined at the radially inward side by a wall with an inwardly turned upper edge. A band with an outwardly turned upper edge is fitted within the compass of the wall with the outwardly turned upper edge resting upon the inwardly turned edge of the flange. The screen is secured to the band, and the band is tacked to the wall, preferably by tacking the outwardly turned upper edge of the band the inwardly turned edge of the flange. Also, the desiccant is preferably regenerable and, in any case, is of a size

and shape to be confined to its chamber by the screen. A preaddressed mailing label can be contained loosely in the basket when the package is sent from the processing center, and applied to the outside of the can body when the package is returned with its burden of insects. The method of this invention includes dehydrating fireflies directly with granular desiccant at atmospheric pressure.

The preferred method of this invention includes capturing fireflies, refrigerating the fireflies but without freezing them, until the fireflies are torpid, placing the torpid fireflies in the foraminous basket of a container containing a desiccant in a chamber separate from the basket, sealing the container, and shipping the container to a center for further processing. The refrigerated fireflies are dehydrated by the desiccant and, when shipped to arrive within five to seven days after being placed live and torpid in the can, arrive at the processing center in excellent condition for processing to extract luciferin or luciferase. If he is persuaded that the fireflies should be alive when placed in the basket and the lid put on the container promptly after they are introduced to the basket, even a child can perform the process successfully, which is what is desired.

**BRIEF DESCRIPTION OF THE DRAWING**

In the drawing, FIGURE 1 is a fragmentary view in perspective, partly broken away, showing one illustrative embodiment of insect package of this invention; and

FIGURE 2 is a fragmentary sectional view taken along the line 2-2 of FIGURE 1.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring now to the drawing for the illustrative embodiment of insect package shown, reference numeral 1 indicates a steel can body with an imperforate bottom wall 2 and side wall 3, and an open end 4, the opening in which is defined by an annular flange 6. The annular flange 6 has a rim 7, a channel 8 and an inner wall 9, defining the radially inner side of the channel 8. The wall 9 has an inwardly turned upper edge 10.

A steel band 20, with an outwardly turned upper edge 21 is fitted within the compass of the wall 9, with the outwardly turned upper edge 21 of the band resting upon the inwardly turned upper edge of the wall 9. The edges 10 and 21 are tacked, as by soldering, to secure the band. A metal wire screen basket 30, formed into the shape of a cup, is secured to the radially outside of the band 20, as by soldering, as indicated at 32. The screen basket 30 defines an insect-receiving compartment between the screen and the top of the can, and a desiccant chamber between the screen and the bottom of the can. Granular desiccant 40 is contained in the chamber.

A cover 50, also imperforate, is provided with a rib 51 complementary to the channel 8, and, when pressed into place, forms a substantially airtight seal for the can.

A shipping label 60 indicated in dotted lines, is contained loosely in the basket when the package is shipped from the processing center, and is mounted on the outside of the can when the package is sent back to the processing center.

Fireflies 70 are contained in the basket when the package is shipped to the processing center. While only a few fireflies are here shown, in practice, the basket may contain any number, as long as there is sufficient empty space to permit circulation of the dry air for removal of moisture by the desiccant. The basket can, for example be about two-thirds full. In any event, it is important that the desiccant be of a character and amount to ensure that the fireflies (or in other applications, other insects) can be completely desiccated from the fresh state.

In assembling the package, the desiccant is put into the bottom of the can, the basket, attached to the band is inserted through the top of the can, and the band and wall, preferably along the turned edges, are secured, as by soldering. The desiccant is preferably regenerable, and may be of any suitable type such as granular silica gel, activated alumina, or a prilled form of silica gel. A pre-addressed shipping label is put into the basket, the cover is put on, and the cans are shipped or otherwise distributed to firefly hunters.

The firefly hunters catch the fireflies, put them into a refrigerator while they are still lively, until the chilling of the fireflies renders them torpid. However, the fireflies from which luciferin and luciferase are to be extracted are preferably not frozen. When the fireflies are chilled, and torpid, the cover 50 is removed from the package, the shipping label is removed from the basket and mounted on the outside of the can, and the fireflies are put into the basket 30. The cover is then replaced as quickly as possible. Preferably when the basket is about two-thirds full, the package is shipped, usually by mailing, to a center for further processing. For fireflies from which luciferin and luciferase are to be extracted, the shipment is preferably made within five days after the first firefly is put into the basket.

The fireflies are desiccated from their torpid state, and when they reach the processing center within approximately five to seven days maximum from the time of their capture, they are in excellent condition to permit the extraction of the luciferase and luciferin which is what is desired to be obtained from the fireflies in the illustrative example of this application.

Merely by way of illustration and not by way of limitation a can body having volume of a quart can be equipped with a basket 2½ inches high and about ¾ inches in diameter, of which height the band occupies 1 inch. The can body is approximately ¾ inches in diameter, 4¾ inches in height, and the desiccant can occupy 2½ inches of volume. Such a volume of prilled silica gel desiccant weighs approximately one pound.

Numerous variations in the construction of the package of this invention within the scope of the appended claims will occur to those skilled in the art in the light of the foregoing disclosure. For example, the shape of the container and its proportions can be changed. Any moisture-proof or moisture barrier-equipped material can be used for the construction of the container, as long as it can be shipped conveniently and safely. These are merely illustrative.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. An insect transporting package comprising a strong can body having imperforate bottom and side walls and an open top, a foraminous screen mounted on said side walls, spaced therefrom and from said bottom defining an upwardly opening insect-receiving basket between it-

self and said open top and a chamber between itself and the said bottom, desiccant material contained in the said chamber, and a removable closure member in substantially airtight engagement with said can at its open top and forming a sealed container therewith.

2. The package of claim 1 including a plurality of fireflies within said basket.

3. The package of claim 1 wherein the open top is defined by an annular flange with a channel in it and the closure member has an annular rib complementary to said channel and seating therein.

4. The package of claim 3 wherein the channel in the flange is defined on its inboard side by a wall with an inwardly turned upper edge, a band with an outwardly turned upper edge is fitted within the compass of said wall, with said outwardly turned edge resting upon the inwardly turned edge, and said screen is secured to said band.

5. The package of claim 4 wherein the outwardly turned edge of the band is tacked to the inwardly turned edge of the wall.

6. The package of claim 5 wherein the desiccant is a regenerable granular material the granules of which are larger than the foramina of the screen.

7. The package of claim 1 wherein a pre-addressed mailing label is contained loosely in said basket.

8. The method of processing living fireflies comprising capturing said fireflies; placing said fireflies in a foraminous compartment in a container containing a desiccant, in a chamber separate from said compartment; sealing said container, and shipping said container to a processing center.

9. The method of claim 8 including the step of refrigerating the fireflies before they are placed in the compartment.

10. The method of claim 9 wherein the refrigerated fireflies are rendered torpid without freezing, and placed in the compartment while torpid.

#### References Cited

##### UNITED STATES PATENTS

311,764	2/1885	Johnson	27—11
1,388,085	8/1921	Ault	6—9
1,503,958	8/1924	McC Campbell	27—11
1,727,078	9/1929	Pinard	6—9
2,316,607	4/1943	MacDonald	119—2
2,540,758	2/1951	Rinnman	299—24
2,563,364	8/1951	Proctor	119—2
2,740,546	4/1956	Kowalski	220—16
3,083,663	4/1963	Stuchbery et al.	220—24 X

ALDRICH F. MEDBERY, Primary Examiner

U.S. Cl. X.R.

6—9; 43—55; 220—16, 20