

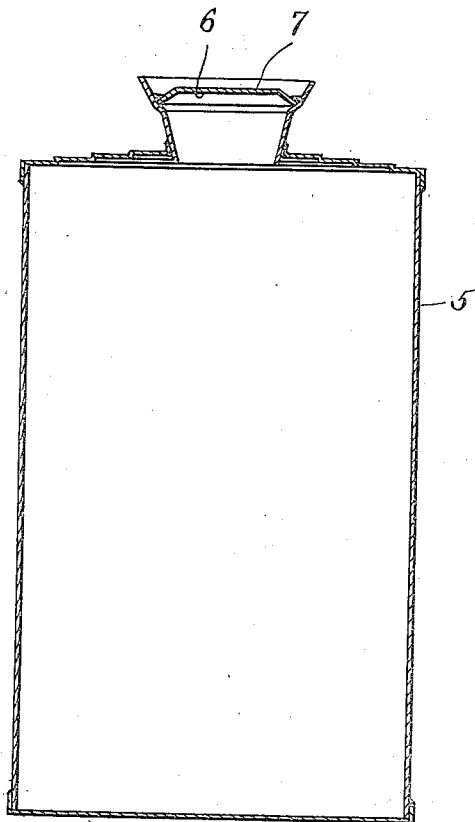
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PRESERVATION OF ETHER

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PRESERVATION OF ETHER.

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This invention relates to the preservation of ether and to an ether package wherein ether can be preserved and prevented from deteriorating.

5 Ether for anæsthetic and other uses can be preserved in glass containers but it is more usual to ship and store it in metal containers which are usually coated with tin. In such containers the ether has been
10 found to decompose with the resulting development of peroxides and other decomposition products which sometimes make the ether unfit for anæsthetic and similar uses. The reason for the decomposition is not
15 known, but so far as I can determine the decomposition reactions are catalyzed by the tin and iron which are in the metal containers. The decomposition of ether in metal
20 containers of the character described is particularly undesirable when the ether is to be utilized for purposes such as anæsthesia.

It is the object of the present invention to avoid the decomposition of ether in metal containers and to provide a method of preserving ether and a container therefor in
25 which the ether can be preserved indefinitely.

Other objects and advantages of the invention will be apparent as it is better understood by reference to the following
30 specification and to the accompanying drawing of an ether container which represents the preferred mode of applying the invention.

I have discovered that the presence of a
35 relatively small quantity of copper in a metal container will avoid deterioration of ether. The exact function of the copper in this connection cannot be stated definitely, but presumably it acts as a catalyst poison
40 or anti-catalyst and thus prevents the catalytic effect of the tin and iron. Regardless of the explanation, I have demonstrated the fact that ether does not decompose in the presence of even a very small amount of
45 copper.

The copper can be employed in various ways. A simple application of the invention involves the introduction of a small
50 piece of metallic copper or of an alloy containing copper to the container with the ether. Only a small amount of copper is necessary. Similarly, about 1% of copper in the solder which is used in making the container will serve the purpose if the sol-

der is exposed at the interior surface. Another simple method of supplying the copper consists in washing the interior of the container with an acidified solution of a copper salt such as copper sulphate which is reduced by the tin to produce a flashing
55 of copper on the interior surface of the container or the edges of the tin plate may be flashed with copper. Of course, the copper can be applied to the surface of the metal
60 from which the container is manufactured either before or after the container is finished. Thus, the tin plate can be coated with copper either electrolytically or otherwise before the container is made therefrom,
65 or the tin plate can be retinned with an alloy containing copper. As little as 0.5% of copper in the tin coating seems to be sufficient. The bottom only of the containers can be made of copper or of copper-coated metal. The amount of copper used
70 may be greatly in excess of the amount indicated as the minimum although an excess of copper is unnecessary and serves no additional useful purpose.

Although copper may be used in various
75 ways as hereinbefore indicated to accomplish the purpose of the invention, I prefer to employ a thin copper disk or a metal disk coated on one of its surfaces with copper to seal the container. After the container has
80 been filled the disk is applied to the top and soldered. If the disk is merely coated the copper surface should be exposed on the interior of the container. The metal used
85 should be sufficiently thin to permit cutting with a knife or similar tool when the container is to be opened. The copper disk or the copper coating thereon affords ample protection for the ether and effectively prevents the decomposition thereof.

I have found that ether when packaged in metal containers in the presence of copper introduced in any of the several ways indicated does not disclose the presence of
90 peroxides or other decomposition products even after storage for relatively long periods. If the amount of copper is very small as in the use of copper-containing solder or of metal having its edges flashed with copper, the protection may not be complete. If sufficient copper is present, however, the ether
95 will not decompose. Ether which is stored and shipped in containers including copper
100
105

is a superior product and can be utilized for purposes which require the highest quality of the product.

Referring to the drawing, 5 indicates a container of the usual form. The container is made of tin plate, for example, and has, therefore, a coating 6 of tin upon the interior surface. A disk 7 of copper or copper-coated metal is soldered to the top of the container.

Any of the expedients hereinbefore mentioned can be employed, either alone or in combination. It is not essential to the accomplishment of the object of the invention that the ether shall be protected from contact with the tin. It is not necessary, therefore, that the interior surface of the container be coated entirely with copper. The mere presence of copper in the container either as a separate metal, as an alloy, or as a flashing of copper on all or a part of the surface, is sufficient to afford the desired protection for the ether, and the presence of copper in any form and in an amount exceeding about 0.5% of the amount of tin which is in contact with the ether will prevent deterioration of the ether in the container. Of course, the container could be made entirely of copper or of an alloy containing copper, but this is not at present commercially feasible because of the cost of such containers as compared with similar containers made from tin plate.

Various changes may be made in the method of preserving ether as hereinbefore indicated and in the corresponding details of the container as well as in the form and construction thereof without departing from the invention or sacrificing any of the advantages thereof.

I claim:—

1. The improved method of preserving ether from deterioration in metal contain-

ers, which comprises storing the ether in the presence of copper.

2. The improved method of preserving ether from deterioration in metal containers, which comprises introducing metallic copper with the ether to the container.

3. The improved method of preserving ether from deterioration in metal containers, which comprises coating a portion of the interior surface of the container with metallic copper and storing ether in the container.

4. The improved method of preserving ether from deterioration in metal containers, which comprises providing metallic copper in the container and storing ether in the container.

5. The method of preserving ether from deterioration in metal containers, which comprises washing the interior surface of the container with a solution of a copper salt to deposit a coating of copper thereon and storing ether in the container.

6. The improved package containing ether and comprising a metal container including copper.

7. The improved package containing ether and comprising a metal container having a coating including copper on the interior surface.

8. The improved package containing ether and comprising a container having an exposed interior surface containing copper.

9. The improved package containing ether and comprising a container and a closure therefor having an exposed interior surface containing copper.

10. The improved package containing ether and comprising a container and a disk secured to the top thereof having an exposed interior surface containing copper.

In testimony whereof I affix my signature.

FERDINAND W. NITARDY.