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TSUNETOSHI KOBAYASHI

2,880,691

VACUUM LOSS INDICATOR FOR SEALED CONTAINERS

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Fig. 1

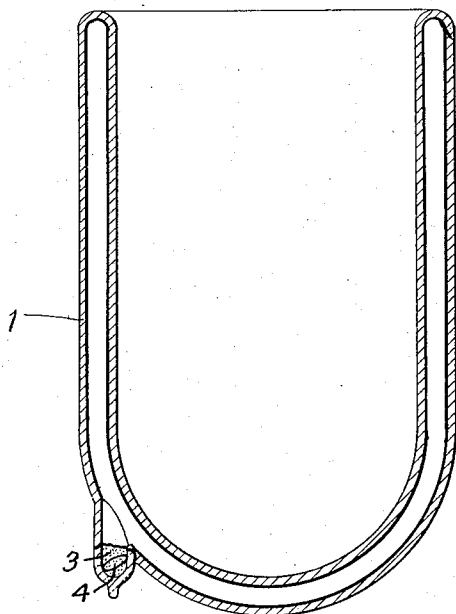
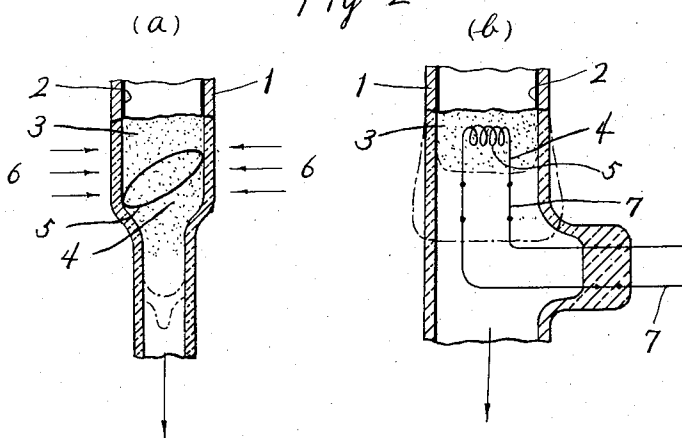


Fig 2



INVENTOR.

TSUNETOSHI KOBAYASHI
BY *Otto John Mung.*

1

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VACUUM LOSS INDICATOR FOR SEALED
CONTAINERS

Tsunetoshi Kobayashi, Tokyo, Japan

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7 Claims. (Cl. 116—114)

This invention relates to containers subject to evacuation.

The object of the invention is to provide such container with means permitting outside detection of the degree of evacuation.

The invention will be explained with reference to the accompanying drawings.

Fig. 1 shows a vertical cross-section view of a thermos.

Figs. 2A and B are fragmentary cross-sectional views showing details of the invention.

Evacuated bottles usually lose their necessary degree of vacuum during use, owing to inadequacy of sealing means, cracks in the glass, or because of the initially insufficient degree of vacuum in the container. Up to present, it has been difficult to detect insufficient evacuation from outside, until corruption of the contents of the container occurs.

This invention makes it possible to detect the deterioration or insufficiency of vacuum in an evacuated envelope or evacuated bottle from outside. For this purpose materials easily oxidized and subject to change in color under influence of oxygen are so affixed by conventional vacuum plating means conventionally known to the art, such as "sputtering" to the inside of the container, that the plated portion can be seen from outside.

As an example, after the inside 1 of the container has been plated with silver, 2, part of it 3 will be subsequently removed. As an alternative to the removal of a part of the inside surface at 3 may be protected beforehand from becoming plated and be free from a silver deposit.

Then tungsten or nickel wire 4, already plated with some alkali earth metal, e.g. barium, manganese, etc. is put into the container before it is connected to a vacuum pump for subsequent pumping operation.

Immediately prior to, or after, sealing the container, high frequency current 6 is applied to the above mentioned tungsten or nickel wire, for instance, by means of the electric lead wire 7.

In this manner, the barium can be spread and affixed, by vacuum plating means, to the glass surface of the above mentioned portion where the silver plating has been removed or absent from the beginning, permitting

2

visual inspection of the fixed surface of the metal barium inside the thermos from outside.

Thus, it is possible to detect any leakage of the contents from outside due to the presence of air in the container, whether it is the result of insufficiency of vacuum degree from the beginning, inadequacy of sealing means, or cracks in the glass, since the coating of the alkali earth metal will become oxidized and its color changed to milk-white. If there occurs only a slight amount of air in the container, the oxygen will become solidified there, owing to oxidization of the barium or manganese therein, thus absorbing it and preventing the reduction of the vacuum there.

I claim:

1. An indicator for showing the loss of vacuum from an evacuated envelope having an exterior wall and an interior wall, said wall having a transparent portion and a silvered opaque portion, said transparent portion having an electrically deposited color sensitive coating of an alkali earth metal on said interior wall, whereby the presence of a gas causing the loss of vacuum changes the color of the coating.

2. An indicator for showing the loss of vacuum from an evacuated envelope as claimed in claim 1, wherein the said coating comprises barium.

3. An indicator for showing the loss of vacuum from an evacuated envelope as claimed in claim 1, wherein said coating comprises manganese.

4. An indicator for showing the loss of vacuum from an evacuated envelope as claimed in claim 1, wherein said coating was deposited by electrically heating a coiled element.

5. An indicator for showing the loss of vacuum from an evacuated envelope having an exterior wall and an interior wall, said wall having a transparent portion and a silvered, opaque portion, an electrode within said evacuated envelope with electric connections protruding there-through, said electrode having a coating of an alkali earth metal, whereby application of a high-frequency current to said electrode causes deposition of said alkali earth metal on said interior wall, and whereby the presence of a gas causing the loss of vacuum changes the color of the coating.

6. An indicator as claimed in claim 5, wherein said alkali earth metal comprises barium.

7. An indicator as claimed in claim 5, wherein said alkali earth metal comprises manganese.

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