Jan. 26, 1926. 1,570,732

K. W. EMERSON

VACUUM INDICATOR FOR SEALED CANS AND THE LIKE

Filed Feb. 4, 1924

Fig. 1.

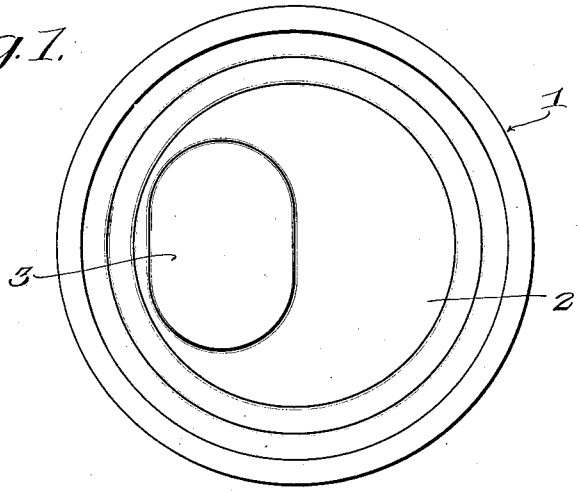


Fig. 2.

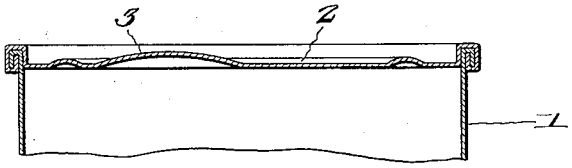
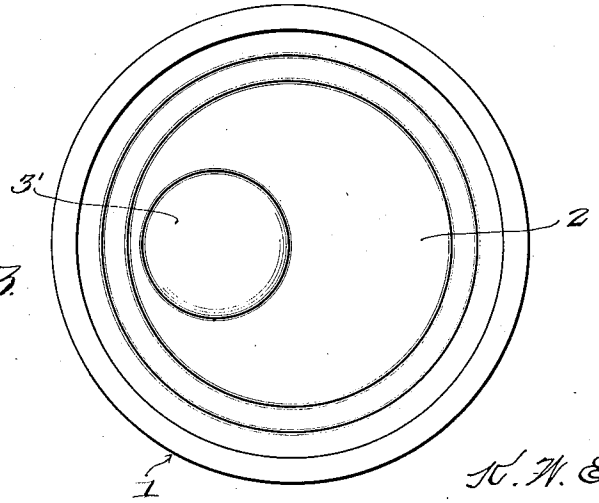


Fig. 3.



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UNITED STATES PATENT OFFICE.

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VACUUM INDICATOR FOR SEALED CANS AND THE LIKE.

Application filed February 4, 1924. Serial No. 690,463.

To all whom it may concern:

Be it known that I, KENNETH W. EMERSON, a citizen of the United States, residing at Honolulu, in the Territory of Hawaii, have invented certain new and useful Improvements in Vacuum Indicators for Sealed Cans and the like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to an improvement in cans and similar receptacles for fruits, vegetables, meats and other food products and commodities and has for its object to provide the can, preferably the top or end thereof, with a panel-like section of restricted area that is deformed or extruded so as to have a normal bias or trend to bulge outwardly, but which will bulge or convex inwardly relatively to the adjacent surface of the can when the pressure within the can differs from the external or atmospheric pressure by a given amount, after the can has been sealed, so that the deformed or panel-like section constitutes an indicator of the degree of vacuum within the can and an index to the condition of the contents of the can.

One application of the invention is illustrated in the accompanying drawing, in which—

Fig. 1 is a plan view of a typical can top having the indicator applied thereto,

Fig. 2 is a partial vertical section of a standard can with the top applied thereto and the indicator section of the top in its normal or outwardly convexed relation.

Fig. 3 is a view similar to Fig. 1 showing a modified form of indicating section.

The usual canning process as applied to fruits, vegetables or similar commodities involves sealing the can with either a permanent or a removable top, in such manner that a partial vacuum is produced and maintained in the can, which partial vacuum is brought about either by exhausting the air and gases from the can preparatory to the sealing of the latter, or by effecting the sealing while the contents of the can are at a temperature considerably higher than that of the atmosphere, so that, when the can and its contents have been cooled to atmospheric temperature, the gaseous pressure within the can will be considerably lower than that of the atmosphere outside the can. It has been proposed heretofore to employ the differential pressures within and without the can to cause a deformation of the sealing head of the can, as a whole, to serve as an index of the condition of the contents of the can, that is to say, the partial vacuum induced in the can during the processing and sealing operations serving to cause the plane surface of the can top to bulge inwardly more or less, and conversely, when the gaseous pressure produced within the can by the spoiling of the contents, exceeds atmospheric pressure by a sufficient amount, the entire surface of the can top bulges outward and becomes what is known as a "swell" or "springer". It has been found that the inward or outward bulging of the can top, as a whole, does not constitute a sufficient or reliable index of the condition of the can contents. Spoilage of can goods is frequently induced by the presence of one or more minute leaks in the can, too small to be immediately detected, but large enough gradually to admit air which often contains microorganisms capable of inducing spoilage of the can contents. This entrance of air destroys the normal vacuum within the can, but does not cause the can tops heretofore in use to change shape or indicate the entrance of air. Canned goods in this potentially spoiled condition are a source of great inconvenience, financial loss, and loss of reputation to a manufacturer. Spoilage may take place in storage, in transit, or in the hands of dealers or consumers. If the minute leaks become plugged with solid particles of the can contents the gaseous pressure due to the activities of microorganisms may produce "swells" or "springers," the pressure may cause large leaks, and more or less forcibly eject the can contents, with highly undesirable results.

The present invention is designed to make use of the differential pressures within and without the sealed can to indicate the loss of the normal vacuum inside the can and thereby enable the early detection of potentially spoiled cans, without waiting for the tardy, insufficient and unreliable indications of the can tops heretofore in use. This desired result is obtained by deforming a relatively small section or area of the can,

preferably the top, as illustrated in the drawing, in which 1 indicates the body of the can, 2 a typical top for hermetically sealing the can and 3 the deformed section of the can top, which, as indicated in Fig. 1, is produced by pressing or otherwise distorting a restricted section of the can top, so that the latter has a normal outward bulge or convexity of substantially lenticular form, which will respond to a force applied normal to the convex surface and flip or bend inwardly when such applied force exceeds the resiliency or spring-like tendency or bias of the section to bulge outwardly. When the gaseous pressure within the can is reduced during the processing operations, and the top is applied to seal the can, and the reduced pressure or partial vacuum within the can reaches a certain degree, the predominant outside atmospheric pressure forces the indicator section inwardly, so that said section assumes the opposite relation from that shown in Fig. 2, the bulge of the section being inward and the section appearing as a distinct depression or concavity in the top of the can and affording an index of the extent or degree of vacuum in the can. Conversely, when the vacuum is reduced beyond a predetermined point, due to a leak in the can, or to the generation of gas within the can, the indicator panel will flip outwardly and assume its normal outwardly bulged or convexed relation. It is usually advantageous to form the section 3, as indicated in the accompanying drawing, in the can top eccentric to the latter.

It will be seen, therefore, that the deformed panel or section constitutes an accurate indicator of the degree of vacuum within the can, convexing inwardly when the reduction of pressure within the can reaches a certain amount and automatically springing outwardly when the interior pressure reaches a predetermined value. The value of the differential of pressure, inside and outside the can, at which the panel will flip outwardly, is dependent on the area of the panel or deformed section, the amount of deformation, the resiliency of the material of which the can is formed and the fatigue of the material due to deformation, so that by standardizing these factors in the selection of the material and the operations to produce the deformation, the degree of vacuum within the can at which the detector panel will flip inwardly or outwardly may be accurately determined, thereby affording an infallible index of the condition of the contents of the can.

It is a common practice to strike the heads of filled and sealed cans with a small hammer or striker, attempting to detect by the resulting sound whether or not the cans are "leaks". With the can tops heretofore employed this tapping method is highly unreliable. With the cans embodying the present invention the sound of the leak cans, with the panels in the resulting outwardly projecting position, is so wholly unlike that of the cans with the normal vacuum that there is no mistaking the difference. This constitutes an added advantage of the present invention and makes the use of the tapping test a reliable adjunct to visual inspection.

The particular shape or form of the indicator section 3, as indicated in Figures 1 and 2, is oval, but obviously any other desired form may be employed, as, for example, that of a disc, as indicated at 3′ in Fig. 3.

What I claim is:

1. A vacuum indicator for sealed cans comprising a relatively small section of the can deformed to a normal outward convexity adapted to assume an inwardly convexed relation to the surface of the can when the pressure within the can is less by a given amount than the external pressure, and to resume the normal outward convexity when the pressure inside the can approximates the atmospheric pressure.

2. A vacuum indicator for sealed cans comprising a relatively small integral section of the can top having a normal bias to convex outwardly and adapted to convex inwardly when the pressure within the sealed can is less by a given amount than the external pressure, and to resume the normal outward convexity when the pressure inside the can approximates the atmospheric pressure.

3. A vacuum indicator for sealed cans comprising a relatively small substantially lens-shaped integral section of the can top having a normal bias to convex outwardly and adapted to assume an inwardly convexed relation to the plane of the top when the pressure within the can is less by a given amount than the external pressure, and to resume the normal outward convexity when the pressure inside the can approximates the atmospheric pressure.

4. A vacuum indicator for sealed cans comprising an eccentrically disposed substantially lens-shaped section of the can top having a normal bias to convex outwardly and adapted to convex inwardly when the pressure within the sealed can is less by a given amount than the external pressure, and to resume the normal outward convexity when the pressure inside the can approximates the atmospheric pressure.

In testimony whereof I affix my signature.

KENNETH W. EMERSON.