PACKAGING GAS-PRODUCING MATERIALS

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This invention relates to the securing in position of shaped elements, for example tablets, of gas-evolving substances, which are packed in metal tubes, in a container, preferably a commercial tin.

Such gas-evolving tablets or shaped elements are stacked in metal tubes, and the tubes are closed with stoppers. A plurality of these metal tubes are placed in a conventional tin, which is so dimensioned that the tube engages the base and the cover of the tin and fills the cross-section thereof. The cover and the base are connected to the wall of the tin so as to be gas-tight, for example by flanging and special sealing.

The substances in the tubes may decompose to a certain extent as a result of thermal or chemical action, and gas evolves which exerts a pressure.

The pressure loosens the stoppers by which the tubes are closed, and the gas emerges and presses on the cover and base of the tin so that they curve or bulge out. As a result, the stoppers can slide still further out of the tubes. A consequence of this is that the shaped elements have a certain amount of play with respect to one another in the tubes, rub against one another and are damaged so that they lose their accurate dosage.

If the base, cover and wall of the tin are made so thick that bulging is practically impossible, it would require a considerable amount of material, for example sheet-metal. Moreover, the production of such tins, particularly with a flanged seal, would be difficult and hence also very expensive.

It is therefore an object of the invention to obviate these disadvantages in the use of inexpensive and conventional containers, more particularly metal tins, which are closed by flanging or the like and in which the tubular articles, for example stopper-closed glass tubes are accommodated side by side, said glass tubes containing substances which evolve gas and hence pressure which acts upon the tin closure.

Thus in one embodiment of the invention an intermediate cover or insert is provided which holds the tubular articles in position, independently of the general position of the cover or base of the tin, is completely rigid and bears with its outer edge only on the edge zone of the cover and/or the base of the tin, said zone being practically free of any deformation as a result of the gas pressure evolved.

The position of the intermediate cover is accordingly not affected by changes of shape of the cover and base; it is always maintained. The tubes and hence the stoppers therefore also always remain in their predetermined position.

Containers for tubular articles having intermediate covers which secure the position of the individual articles independently of the general position of the cover or base of the container are well-known, but not for the purpose of securing the position of substances in the form of shaped elements, for example tablets, which are packed in conventional containers, more particularly tins, and which evolve gas and hence pressure. Nor are the known intermediate covers so constructed that their outer edge bears on the edge zone of the cover or base of the tin which is practically not subject to any deformation by the gas pressure.

The diameter of the edge of the insert or intermediate cover is advantageously smaller but only very slightly smaller than the diameter of the tin where the edge of the insert rests on the cover and the base of the tin. This has the advantage, among others, that the insert can be inserted and removed without jamming while it bears as far as possible on the edge zone of the cover and base of the tin which are not subject to deformation.

The inserts may be flat or even slightly curved plates. They may be solid-walled or perforated, for example to give pressure equalisation. The inserts, for example plates, may be made of sheet-metal, cast metal or plastic.

Instead of bend-resistant plates, bend-resistant lattice of metal or plastics may be used, the edges of which are provided with projections which bear on the outer zones of the cover or base.

Between the plates or lattices and the ends of the tubes special discs may be inserted, for example of corrugated paper, cardboard, plastic or rubber, or the like, which effect additional securing of the stoppers.

Metal plates or wire lattices may be coated with a coating of plastic material which forms a sealing-tight closure for the tubes so that the stoppers may be dispensed with if required.

The plates or the like may have corrugations, preferably in that the ends of the tubes fit into the same and are thus additionally secured in position. The profiling may be so constructed in the case of the top plate or the like as to engage into the tubes and replace the stoppers.

If a stopper does not completely seal off its tube, as may occur in exceptional cases, the escaping gas does not have an adverse effect on the flange closure of the tin, because it will at the most result in deformation, for example bulging out of the base and cover; but it may be a source of danger to the user on opening of the tin, if the gas-evolving substances are highly toxic post-control agents, for example if the user opens the tin without a gas mask or in the expectation that the tubes are closed so as to be leak-proof.

This occasional danger which occurs with the new position securing system which all practical experience has shown to be quite satisfactory, is very simply obviated according to a development of the invention by providing the interior of the tin with substances which consume, preferably absorb, the gas.

These substances, for example absorbent substances, are embedded, for example, in a special support, for example a disc, which is disposed, for example, between the rigid intermediate cover and the tubes or between the intermediate cover and the cover or base of the tin. If the material is resilient, the disc may additionally act as a shock absorber and a further means of securing the tubes position.

The substances which absorb or, for example, catalytically consume the gas may be accommodated in a small bag which, for example, is provided detachably on the intermediate cover by means of a clip. This has the advantage, inter alia, that the absorbent substance automatically passes into the tin when the cover is fitted.

The substance, accommodated preferably in a small bag, may alternatively be placed loosely into a cup, the preferably perforated base of which forms the rigid intermediate cover while the wall of the cup bears against the cover of the tin and is fitted to be leak-proof on a retaining projection of this cover. This embodiment has, among others, the advantage that the absorbent substance, its capsule-like container, the intermediate cover and the tin cover form a handy structural component which can easily be assembled and dismantled and in which the substance is well protected on all sides.
Further features, advantages and possible applications of the invention will be apparent from the following description of exemplary embodiments given with reference to the accompanying drawings.

In the drawings:

FIGURE 1 is a central longitudinal section through a tin with the packing tubes disposed therein;

FIGURES 2a and 2b each are a section through the top and bottom end of the tin;

FIGURES 3a and 3b are perspective views in elevation and section respectively of a top and bottom plate-shaped insert;

FIGURES 4a and 4b are a diametral section and a partial plan view respectively of a top end of a tin wall with a shaped insert plate having portions extending into the tube.

FIGURES 5a and 5b are the similar diametrical sections of the bottom end of the tin;

FIGURE 6 is a perspective view of a rigid intermediate cover with a clip and a flat bag which is retained by said clip and which, for example, contains a substance having a gas-absorbent action; and

FIGURE 7 is a longitudinal section through a capsule-like housing which is formed by the tin cover, the rigid intermediate cover and its somewhat raised edge, and which has a bag containing, for example, gas-absorbing substance, without regard to the cavity of said housing.

FIGURE 1 shows the tin with a wall 1, a cover 3 and a base 4, both of which are rigidly connected to the wall so as to be leak-proof by means of a conventional flange closure as shown, for example, at 3a and 4a. The interior of the tin is filled by small tubes 2 which are placed parallel to the tin wall and which contain tablets 5 of gas-evolving substance, for example a pest control agent on an aluminum phosphate base. The tubes are closed by stoppers 6. Between the tubes 2 and the cover 3 and the base 4 are disposed substantially rigid inserts or intermediate covers 7 and 8, of which the edges are bent outward to form the flanges 9 and 10 respectively bear against the zones 9a and 10a of the cover and base respectively; these zones practically do not participate in any deformation, for example bulging, of the cover and base by gas pressure. Between the inserts 7 and 8 and the tubes 2 discs 13 and 14 are loosely inserted and absorb the gas. Curvatures or bulges 12 reliably obviated by the present invention are shown in broken lines in FIGURES 2a and b.

FIGURES 4a and 4b show a corrugated plate 77, the profiles of which extend into the tubes themselves while FIGURES 5a and 5b show a corrugated plate 88, the profiles of which project into the interstices between the tubes. In both cases, stoppers and any special intermediate layers may be dispensed with if these plates, for example, consist of rubber, plastic, paper-coated sheetmetal or plastic close the tubes firmly and in leak-proof manner.

FIGURE 6 shows a rigid intermediate cover 15 with a raised edge 16 which bears on the periphery of the tin cover or tin base which practically do not undergo deformation. A clip 17, which preferably consists of resilient material, for example steel strip, is rigidly fitted, for example, by spot welding 18, to the cover. The clip retains a flat gas-permeable bag 19 which contains the gas-absorbing substance. The cover base is provided with apertures such as 26, through which gas evolved inside the tin passes directly to the gas-permeable bag and through the latter to the substance which, for example, has a gas-absorbent action and which completely absorbs all the gas which may evolve.

FIGURE 7 shows a tin cover 22 with a flanged edge 23 for the broken-line tin wall 1. The cover has a bead 24 which faces the interior of the tin and on which is fitted the wall 25 of a cylindrical cup, the base 26 of which has apertures, for example 27, 28. Inside the cup is disposed a bag 29 which, for example, contains a gas-absorbent substance. The tubes 2 are also shown in broken-lines.

Obviously the invention is not limited to the embodiments shown and described, but is capable of many modifications and changes.

1. A package comprising a sealed container having a wall portion and a cover portion and a base portion each having edge zones connected to said wall portion, a plurality of substantially tubular articles having at least one open end arranged side by side in said container, an intermediate rigid cover member arranged between said articles and said cover portion, and an intermediate rigid base member arranged between said articles and said base portion, said intermediate cover and base members bearing only by their outer edge portions on said edge zones of the cover and base portions respectively, said tubular articles containing a gas-evolving substance, said cover member and base member operatively engaging the ends of the articles to prevent longitudinal displacement thereof.

2. A package comprising a sealed container having a wall portion and a cover portion and a base portion each having edge zones connected to said wall portion, a plurality of substantially tubular articles arranged side by side in said container, each of said articles comprising a tube having an open upper end, a stopper sliding said upper end and a permanently closed base end, an intermediate rigid cover member arranged between said articles and said cover portion, and an intermediate rigid base member arranged between said articles and said base portion, said intermediate cover and base members bearing only by their outer edge portions on said edge zones of the cover and base portions respectively, and engaging the stoppers and base ends respectively of said tubes, said tubular articles containing a gas-evolving substance.

3. A package as claimed in claim 2, wherein the intermediate cover and base members each consist of a bend-resistant flat plate.

4. A package as claimed in claim 2, wherein the intermediate cover and base members each consist of a bend-resistant plate provided with stiffening rings.

5. A device according to claim 3, in which the plates are perforated.

6. A device according to claim 5, in which the edge of each of the plates is shaped to form a flange, the outside diameter of which is only slightly less than the inside diameter of the container in the region of the plate.

7. A device according to claim 1, in which the members are bend-resistant lattices of rigid material having bent-over edge parts.

8. A device according to claim 3, in which intermediate discs of corrugated deformable material are positioned between the plates and the tube ends with their stoppers and the tube base ends.

9. A device according to claim 1, in which at least one end of each of the articles is open and the cover and base members are coated with a sealing material on the side facing the open ends of the articles.

10. A device according to claim 1, in which the interior of the container is provided with a gas-consuming substance having an absorptive action.

11. A device according to claim 10, in which the gas-consuming substance is embedded in a fixed support.

12. A device according to claim 10, in which the gas-consuming substance is accommodated in a flat gas-permeable bag by a clip on the side of the rigid intermediate cover member facing the container cover portion.

13. Apparatus according to claim 10, in which the gas-consuming substance is disposed in a bag accommodated in a cup having a cylindrical wall, the perforated base of said cup forming the intermediate cover member while the wall of the cup bears its free edge against the con-
tainer cover portion and is fitted tightly onto a retaining bead of the container cover portion.

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