Feb. 16, 1965 H. POLLKLESENER 3,169,654

RECEPTACLE CLOSURE COMPRISING A RESILIENT SPACER

Filed June 24, 1963

FIG. 1

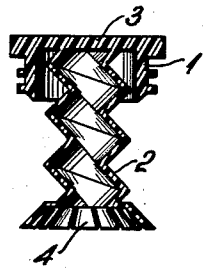


FIG. 5

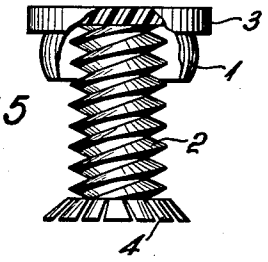


FIG. 2

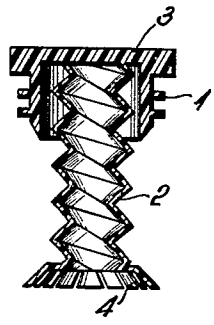


FIG. 6

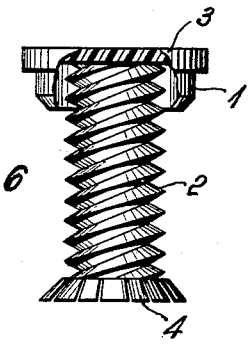


FIG. 3

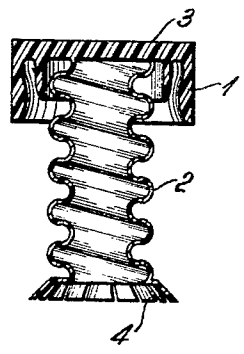
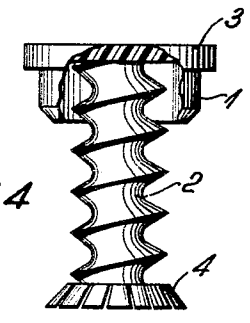


FIG. 4



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RECEPTACLE CLOSURE COMPRISING A RESILIENT SPACER

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8 Claims. (Cl. 215—37)

The invention relates to a receptacle closure comprising a resilient spacer, of use more particularly for closing bottles and tubes containing pharmaceutical piece goods, such as boluses, small granular material or the like. Closures of this kind, which usually take the form of plugs or screw caps, have, as a rule, spacers which are formed on them or introduced into them and which serve to retain the receptacle contents without vibration on the way from the maker or filler to the final consumer. As a rule, closures and spacers of the kind specified are made of softly resilient plastics and, for pharmaceutical purposes, also of plasticiser-free naturally resilient plastics, such as polyethylene.

Unlike the problem of retaining tablets without vibration, it is very difficult to store boluses, granular material and other small piece articles without vibration. To secure the tablets in a tablet tube, all that need be done is to keep the top tablet of the tablet column down by spring force so that the whole tablet column is locked. With small piece goods, however, the surfaces are formed by a large number of individual elements, each of which must be retained individually by the spacer if the many other small articles below are to be clamped against one another and prevented from rubbing against one another. Unlike a column of tablets, where the top pressure-receiving surface, that is, the top tablet, is smooth and, so far as engagement with the end of the spacer is concerned, substantially flat, the surface presented by a filling of boluses and so on is very uneven and is formed purely at random, yet the spacer must adapt itself very well to such surface if it is to lie flush thereagainst and prevent all the articles from moving.

If all that is required is to pack boluses or the like in cylindrical glass tubes of the kind conventional for tablets, closure plugs can be used which have a spacer extension of variable volume; a fit is provided either by the extension, which resembles a hollow member, being pushed in after the manner of a sleeve or by the wall of the extension being formed with slots. Spacer plugs of this kind are unsatisfactory for large filling tolerances such as are found with small piece goods because of the clamping between the various small articles varying, inter alia because if the spacer extension is pushed in too far, it loses its resilience, while slotted spacer extensions may have small articles jam in them if the extensions are over compressed, with the result that the spacer is impaired.

Spacer closure devices having two or three steep rod-like or web-like extensions can bridge considerable height tolerances but can rarely be used for the packing of small piece fillings since the filling material enters the gaps between the steep web-like extensions and becomes jammed in such gaps, with the result that the spacer ceases to operate. According to one suggestion, to prevent the entry and jamming of the articles, the gap between the two or three web-like extensions can be filled up and interconnected by thin skins which, upon compression of the spacer extension, fold inwards or outwards depending upon their arrangement. It is found, however, that skins of this kind between the steep web-like spacer extensions reduce the resilience thereof and do not enable large vertical tolerances to be bridged; consequently, spacer type closure devices of this latter kind are of limited use for the packing of small piece articles.

To obviate the difficulties and for use more particularly in bottle-like bolus tubes, closures are known comprising on the vessel closure a displacement member which extends into the filling, displaces some boluses to the side and some upwards, and thus fills up the remainder of the empty space and retains the filling in position. However, it is only with some kinds of material that a displacement member of this kind can penetrate far enough into the filling; often, the receptacle must be shaken or tilted as well for the individual items to move laterally and upwards. As a rule, the volume of the displacement member disposed on the closure must be adapted to the empty volume resulting from the volume of the receptacle and the volume of the filling for each individual case, and filling tolerances are small.

There are special difficulties, connected with retention of shape and retention of dimensional accuracy of the spacer, in the vibration-free packing of piece articles. The exact shape and dimensional truth of the spacer are of secondary importance in the vibration-free securing of tablet columns since, as a rule, a pressure applied resiliently to the centre of the top tablet is all that is required, but for the vibration-free securing of small articles, the spacer must be very little smaller than the width of the receptacle neck.

When the contents of the receptacle are tablets which offer to the free end of the spacer a bearing surface aligned with the receptacle axis, the spacer elements can be shaped uniformly. Small items, however, offer a highly irregular surface to the free end of the spacer, with the result that the spacer is deformed irregularly and the vibration-free storing of the receptacle contents is impaired. In addition to these deformations which occur in use, the closures, which are made of an injection mouldable resilient plastics, and the spacers are deformed in manufacture, for when the injection moulded parts are removed from the injection mould the exact geometric shape, more particularly of the spacers, is provided inadequately, if at all. Technically speaking, this does not matter greatly if there is a sufficient difference between the width of the aperture in the vessel mouthpiece and the width of the aperture required in the spacer ends, but this distortion is very important when, as is the case with small articles, the spacer end must be very similar in size to the width of the opening in the receptacle if all the items at the surface of the contents near the aperture are to be engaged. Even in cases where the closure elements are introduced into the receptacle aperture by hand, so that closure can be performed satisfactorily, considerable wastage is likely with automatic supply and introduction of the closure elements into the receptacle aperture if the position of the spacer end, more particularly if such end is in the form of a ring-like structure, does not have an accurate geometric shape and is not exactly in the correct axial position. It is found in such a case that, when introduced automatically, the closure element seats on one side of the receptacle aperture edge, with consequent breakage or deformation of the receptacle which is usually made of glass or plastics or thin metal.

The invention obviates these disadvantages and provides a receptacle closure having a resilient spacer and of use more particularly for the mechanical packing of pharmaceutical piece goods, such as boluses or granular substances or the like.

The invention provides a receptacle closure having a resilient spacer and made preferably of naturally resilient plastics, such as polyethylene, and intended more particu-

larly for the vibration-free packing of pharmaceutical piece goods, such as boluses or the like, wherein the spacer comprises a thin-walled tube whose wall is corrugated in the manner of a screwthread which can have one or more starts, and the fold shape resembles, for instance, a circular screwthread or a V screwthread. It has been found that a bellows-like tubular spacer retains its shape very well when the spacer tube is corrugated in the manner of a screw thread, and the resilience of such a spacer is found very suitable for the vibration-free packing of small piece goods; the shape of the screwthread can be varied, and the number of starts can be varied, and the screwthread shape can be varied, to provide a very simple means of varying the rigidity and springiness of the spacer and to meet varying requirements. A bellows-like member having folds resembling screwthreads can be removed from an injection moulding machine with complete retention of its geometric shape and, therefore, with very great dimensional and geometric truth, so that the axis of the spacer coincides satisfactorily with the axis of the closure member and the shape of the spacer end is dimensionally and geometrically true. This further development of the invention enables the spacer closure member to be introduced automatically into the mouthpiece or aperture of the receptacle, with the result of mechanical packing free from rejects.

Further particulars of the invention will become apparent from the following description of the embodiments diagrammatically illustrated by way of example in the accompanying drawings.

The various embodiments are of spacer closure members made of polyethylene whose spacers are in the form of thin-walled tubes having walls corrugated bellows-fashion like screwthreads. A closure member **1** has as resilient spacer a bellows-like member **2** which is injection moulded directly onto that surface of a gripper plate **3** of the closure **1** which is near the receptacle; at the end near the receptacle, the bellows-like member **2** has a ring which comprises a number of flaps **4** and which substantially covers the width of the packing receptacle, such as a small tube or flask or bottle or the like. Since the folds in the bellows-like member resemble a screwthread, the member **2** can be compressed dead axially without lateral deviation.

FIGURE 1 illustrates a closure plug **1** which has sealing strips. Moulded onto the plug **1** is a bellows-like member **2** whose corrugations form a single-start screwthread of rectilinear shape.

FIGURE 2 shows a spacer in the form of a bellows-like member **2** whose creases form a single-start screwthread, and where the profile flanks of the folds in the member **2** are curvilinear.

FIGURE 3 shows a push-over cap in which the shape of the folds in the moulded screwthread-like bellows-like

member **2**, which as in the previous figures is corrugated in the manner of a single-start screwthread, is in the form of a circular screwthread.

FIGURE 4 shows a spacer in the form of a bellows-like member **2**, the shape of whose folds is combined from a circular screwthread profile and a V screwthread profile.

FIGURE 5 illustrates a bellows-like member **2** whose folds form a two-start screwthread.

FIGURE 6 shows a closure member in which the folds of a screwthread-like bellows-like member **2** resembles a three-start screwthread.

In the diagrammatic illustrations in the drawings, roundings of the crests and roots of the screwthread profiles which might be advisable for manufacturing reasons are not shown.

I claim:

1. Receptacle closure comprising a resilient spacer for the vibration-free packing of the receptacle contents, characterized in that the spacer takes the form of a thin-walled tube whose wall is corrugated in the manner of a screwthread.

2. Receptacle closure as set forth in claim 1, characterized in that the wall of the spacer tube is corrugated in the manner of a multiple-start screwthread.

3. Receptacle closure as set forth in claim 1, characterized in that the fold shape of the spacer tube is formed in the manner of a round screwthread.

4. Receptacle closure as set forth in claim 1, characterized in that the fold shape of the spacer tube resembles a V screwthread.

5. Receptacle closure comprising a resilient spacer for the vibration-free packing of the receptacle contents, characterized in that the spacer takes the form of a thin-walled tube whose wall is corrugated in the manner of a screwthread, and a ring of flexible flaps is disposed at the free end near the receptacle of the bellows-like spacer tube.

6. Receptacle according to claim 5, said flaps extending from the end of the screwthread radially outwardly and downwardly.

7. Receptacle according to claim 6, the receptacle closure comprising a closure member, said corrugated tube being integral with said closure member.

8. Receptacle according to claim 1, the receptacle closure comprising a closure member, said corrugated tube being integral with said closure member.

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