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Grevich et al.

[11] **3,819,194**

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[54] **TUBE HOLDER**

[75] Inventors: **John J. Grevich,** Star Prairie; **John J. Gardetto,** Hayward, both of Wis.

[73] Assignee: **Domain Industries, Inc.,** New Richmond, Wis.

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[21] Appl. No.: **297,816**

[52] **U.S. Cl.**..... **279/23,** 141/313, 141/369, 198/131, 248/108, 269/254 CS, 269/287

[51] **Int. Cl.**..... **B65d 35/56**

[58] **Field of Search**..... 53/253; 141/103, 313, 351, 141/369; 198/131, 133, 210; 248/108, 109; 269/254 R, 254 CS, 287, 288; 279/9 R, 9 A, 23

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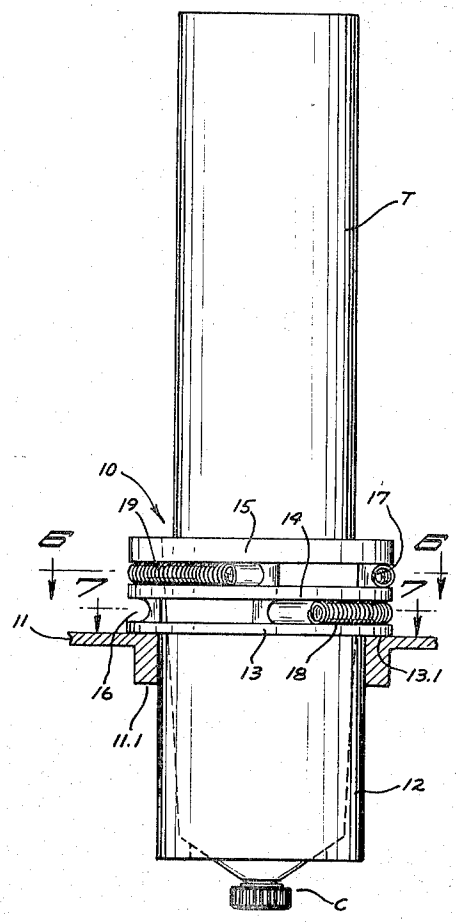
Primary Examiner—Roy Lake
Assistant Examiner—Mark S. Bicks
Attorney, Agent, or Firm—H. Dale Palmatier; James R. Haller

[57] **ABSTRACT**

A device for holding tubes constructed of flexible and collapsible metallic foil, during filling of the tube with paste-like material, the device including a rigid sleeve with a supporting shoulder at the bottom and an oblong interior configuration at the top, slots in the sleeve wall adjacent the top and extending transverse to the axis, and elongate spring retainers in the slots and extending peripherally of the sleeve.

10 Claims, 9 Drawing Figures



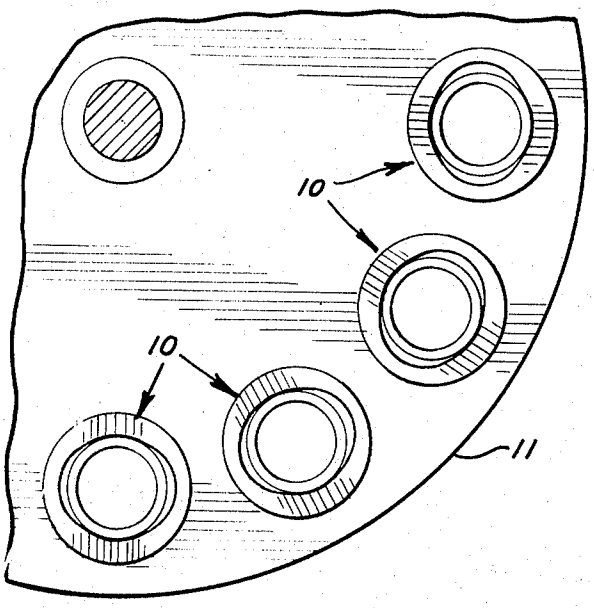


FIG. 1

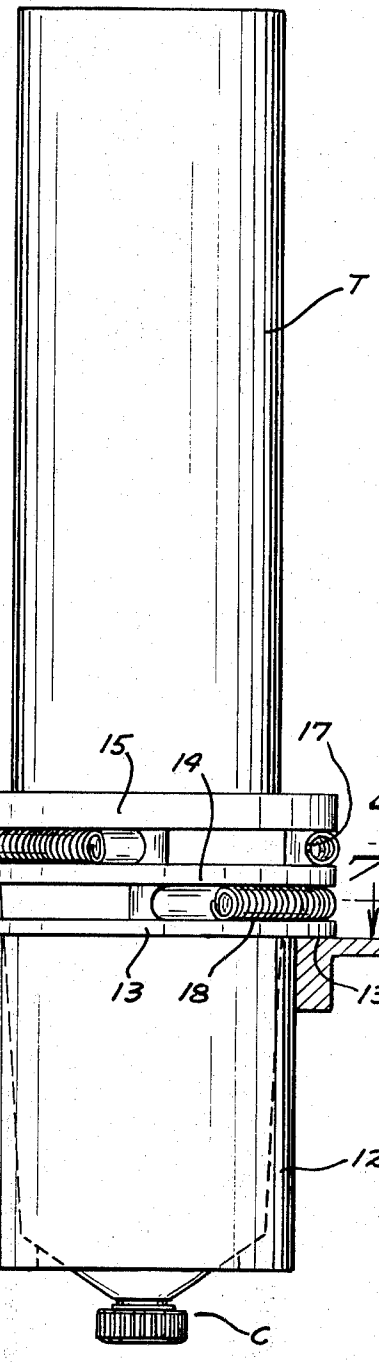


FIG. 2

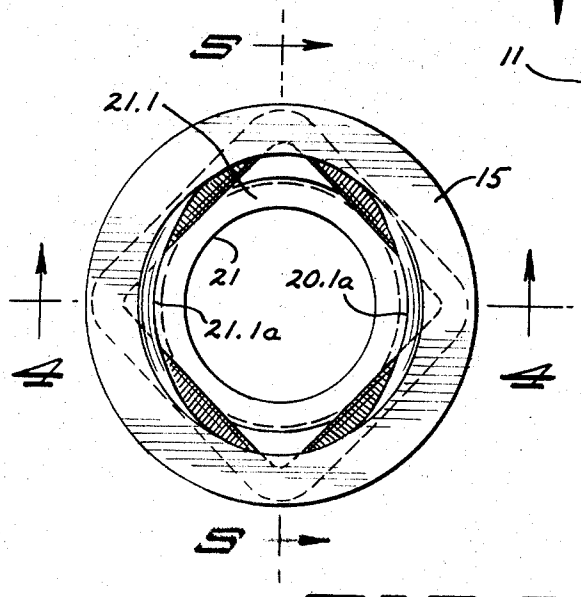


FIG. 3

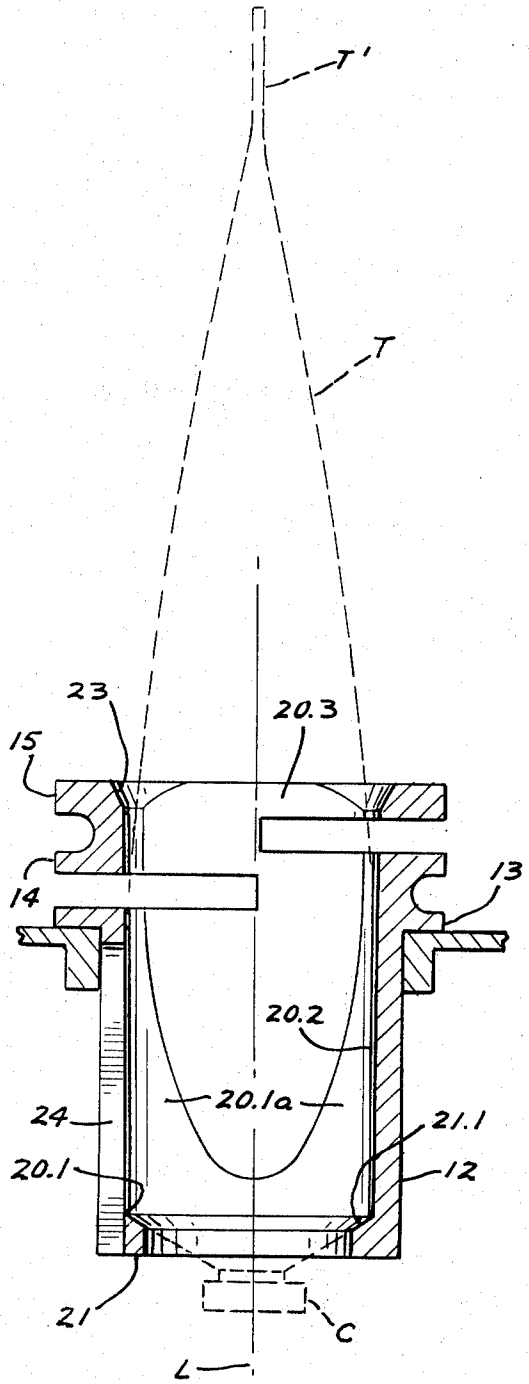

T'
T
23
20.3
15
14
13
20.2
20.1a
24
21.1
20.1
12
21
C
L

FIG. 4

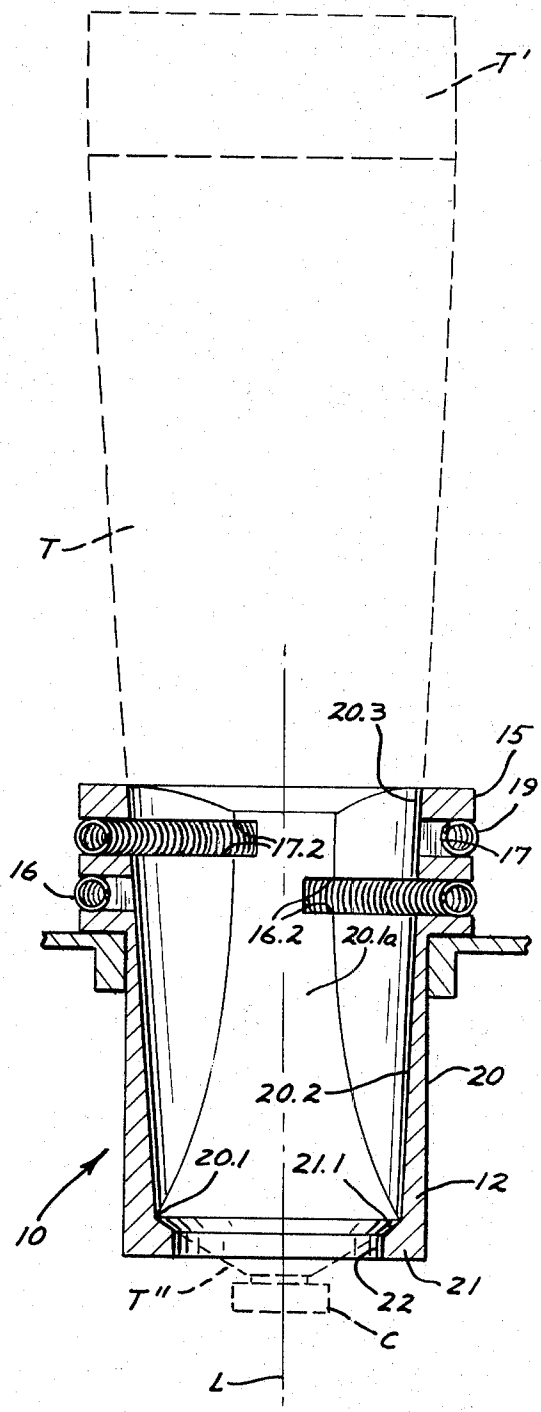

T'
T
20.3
15
19
17.2
17
16
16.2
20.1a
20.2
20
10
20.1
21.1
12
T"
22
21
C
L

FIG. 5

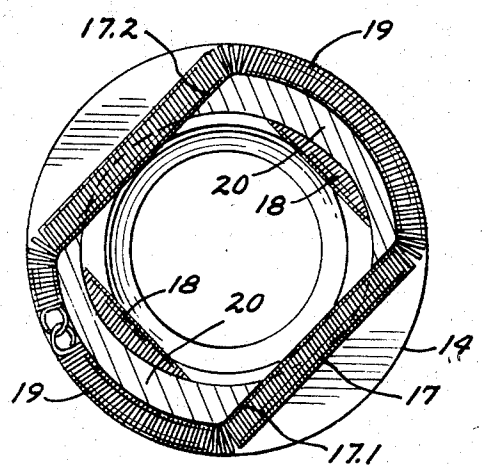


FIG. 6

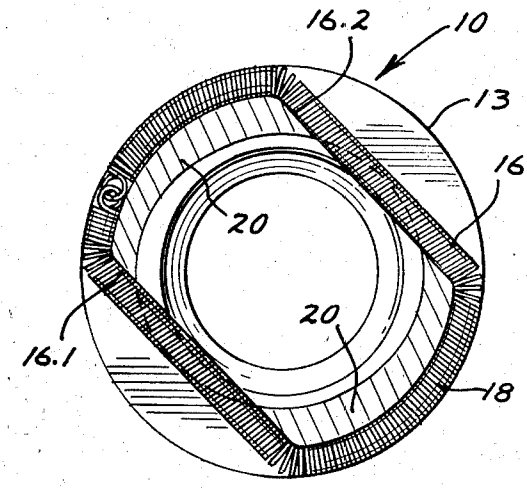


FIG. 7

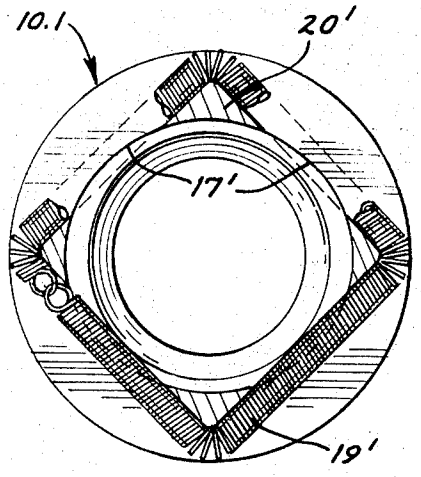


FIG. 8

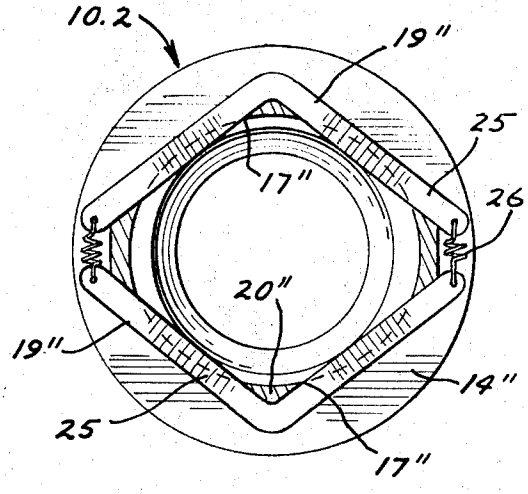


FIG. 9

TUBE HOLDER

BACKGROUND OF THE INVENTION

Paste-like materials such as glazing, putty, caulking compound, adhesives and similar materials that are needed in rather large quantity are oftentimes supplied by the manufacturer to the customer in large collapsible tubes which are somewhat like toothpaste tubes, only considerably larger in size. These collapsible tubes are oftentimes made of flexible, but heavy gauge metallic foil which retains its shape and may be rolled up to shorten the overall length of the tube as the paste-like material is dispensed for use.

Such collapsible flexible tubes may be filled and then processed to be ready for packing in cartons and shipment to the customer, on a turret machine which carries the tubes to a number of stations where various functions are performed in relation to the tube. The metallic foil tubes are filled with the dispensing end and cap thereon in a depending orientation and with the open bottom end facing upwardly. In various steps, the open end of the tube will pass beneath a filling spout, will be pressed together so as to be closed, whereupon the flexible and the collapsible metallic foil tube assumes a flat configuration at its end and the intermediate portion of the tube which actually contains the paste-like material has an oblong or elliptical shape which merges into a cylindrical shape adjacent the dispensing end; and subsequently the tube being filled passes through a number of stations wherein the tube is rolled downwardly and then firmly clamped shut so as to form an efficient closure requiring subsequent dispensing of the paste-like material by removing the cap at the opposite end.

Whereas the dispensing end of the collapsible tube retains a substantially circular or cylindrical form as it passes from one station to another on the turret, the opposite end and most of the length of the tube changes from its original cylindrical shape to an oblong or elliptical shape, and this change in shape must be accommodated in order to prevent unnecessarily denting or deforming the tube.

The only known prior art is U.S. Pat. No. 3,147,018 which has a construction substantially different than the present invention and utilizes many moving parts, all of which must function perfectly and simultaneously to prevent any deformation of the container during the various stages of operation.

BRIEF SUMMARY OF THE INVENTION

The present invention is a holder for such flexible and collapsible sleeves to accommodate the different shapes that various portions of the tube take during the filling procedure. While the metallic foil tube is in cylindrical condition, it is firmly held in a predetermined position so that the open end of the foil tube is in the correct position during the filling step, and further so that when the filling is completed and the open end of the tube is to be flattened for closing, it will be in the correct position so that automatic equipment can efficiently engage and close the open end of the tube. As the open end of the tube is flattened for closing, the major portion of the length of the metallic foil tube has its shape changed from cylindrical to a somewhat flattened shape so that in cross section, the foil tube will have an oblong or elliptical shape. This oblong or elliptical shape is accommodated without producing any

dents in the foil tube. After the tube has been flattened, the tube continues to be held against any transverse movement, either in the direction of the major axis of the elliptical shape or in the direction of the minor axis of the elliptical shape. This substantially rigid positioning and holding of the metallic foil tube is necessary in order to allow automatic machinery to crease and fold the flattened end of the foil tube as this tube is rolled downwardly to form an efficient and permanent closure.

Ultimately the filled flattened closed tube is to be removed from the turret and, of course, the tube must be in proper position so that the foil tube can be readily gripped.

The holder for the foil tube is formed of a rigid sleeve having a shoulder at the bottom interior to support the dispensing end of the foil tube. The sleeve interior has a substantially cylindrical shape adjacent the bottom shoulder and the interior has cylindrical segments opposite each other and extending upwardly along the sleeve interior toward the top. The sleeve interior has wall portions opposite each other and between said cylindrical segments, which are cut away into an enlarged configuration which is oblong in cross-sectional shape so as to accommodate the oblong or elliptical shape of the metallic foil tube.

The upper portion of the rigid sleeve has transverse slots through the inner periphery in which lie spring retainers to engage and retain the metallic foil tube against transverse movement.

While the metallic foil tube is cylindrical in shape, the tube is held against transverse movement in the sleeve by the cylindrical segments of the interior periphery. When the shape of the metallic foil tube is changed, from cylindrical to an oblong or elliptical shape, the metallic foil tube substantially withdraws away from the cylindrical segments of the interior sleeve periphery, and is retained away from these cylindrical segments by the spring retainers; and when the metallic foil tube changes from its cylindrical shape to the oblong or elliptical shape, the corresponding elliptical portions of the sleeve interior engage and retain the metallic foil tube in position and the springs retain the tube against transverse movement in the direction of the minor axis of the elliptical shape.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a top plan view of a turret in a machine for filling flexible and collapsible tubes and incorporating the tube holder therein.

FIG. **2** is a side elevation view of a tube holder with a portion of the turret illustrated in vertical section.

FIG. **3** is a top plan view of the tube holder.

FIG. **4** is a detailed section view taken at **4—4** in FIG. **3** and illustrating the shape of the flexible tube after the tube has been filled and pinched into a closed position.

FIG. **5** is a detailed section view taken approximately at **5—5** of FIG. **3** and also illustrating in dotted lines the shape of the flexible tube after the tube has been filled and pinched into a closed condition.

FIG. **6** is a transverse detail section view taken approximately at **6—6** in FIG. **2.**

FIG. **7** is a detail section view taken approximately at **7—7** in FIG. **2.**

FIG. **8** is a detail section view, similar to FIG. **6,** and illustrating a modified form of the holder.

FIG. 9 is a detail section view illustrating a second modified form of the apparatus.

DETAILED DESCRIPTION OF THE INVENTION

One form of the invention is illustrated in the drawings and is described herein.

The tube holders **10** are illustrated in FIG. 1 to be mounted upon a turret plate **11** which is a part of a filling and packing machine for filling the flexible and collapsible tubes for holding a paste-like material. Such tubes are constructed of various types of material, but oftentimes are formed of extruded heavy gauge metallic foil; and such tubes may also be formed of molded plastic. As illustrated in FIG. 2, such tubes T are supplied in cylindrical form so that the tube has a substantially circular cross-sectional shape. The lower end of the tube T is closed and is provided with a short and threaded dispensing spout to which a cap C has already been applied. The opposite end of the tube is completely open and unobstructed. The tube holder **10** includes a rigid sleeve **12** which may be formed of substantially rigid molded plastic such as high density polyethylene, and the exterior periphery of the sleeve **12** is substantially cylindrical so as to fit snugly in any one of the mounting bosses **11.1** of the turret **11**. The turret **11**, in one type of machine, has twelve such bosses **11.1** so that the tube holder and the tubes being filled and closed will stop at each of twelve stations as the turret revolves. The rigid sleeve **12** has a plurality of transversely outwardly projecting flanges **13**, **14** and **15** adjacent the upper portion of the sleeve to define peripheral grooves **16** and **17** therebetween to confine spring retainers **18** and **19** which in this embodiment are annular metal coil springs but could be formed from rubber or plastic O-rings or endless bands. The flange **13** also defines a ledge **13.1** which rests upon the turret **11** adjacent the opening through boss **11.1**.

The rigid sleeve **12** has a peripheral sidewall which varies in internal configuration from bottom to top. The internal periphery **20.1** at the bottom of the sidewall **20** is substantially cylindrical or circular in shape. At substantially all portions of the internal periphery, such as at **20.2** and **20.3** of the internal periphery of the sidewall, the internal periphery has an oblong cross-sectional configuration. As a result, the distance across the length of the oblong configuration at **20.3** in FIG. **5** is substantially greater than the distance across the width of the oblong configuration at **20.3** illustrated in FIG. **4**. As illustrated in FIG. **5**, the sidewall **20** progressively decreases in thickness toward the top of the sidewall, and the internal periphery of the sidewall tapers convergently in a downward direction in portions of the sidewall as illustrated in FIG. **5**. This oblong shape and tapering configuration of the internal periphery of the sidewall will accommodate and very closely approximate the shape of the flexible tube T when the upper portion T′ of the tube is flattened and pinched together to close the tube as illustrated in dotted lines in FIGS. **4** and **5**. It should be understood that the condition of the tube T as illustrated in FIGS. **4** and **5** is the first step in a multi-step closing operation during which the upper flattened portion T′ of the tube is progressively creased and folded downwardly to form a permanent closure.

At the lower end of the sleeve wall **20**, an inwardly protruding annular flange **21** defines a tapering or sloping shoulder surface **21.1** for supporting the correspondingly tapering closure wall T″ of the tube. The flange **21** protrudes only a short distance inwardly so as to define a large opening **22** through which the cap C moves when the tube T is loaded into the holder **10** and subsequently removed therefrom.

In order to allow the springs **18** and **19** to engage and retain the tube T against transverse movement, the sidewall **20** of the sleeve **12** is provided with a number of transverse slots **16.1**, **16.2**, **17.1** and **17.2** providing communication between the interior of the sleeve **20** and the grooves **16** and **17**, respectively. The slots **17.1** and **17.2** are disposed opposite each other, and the slots **16.1** and **16.2** are also disposed opposite each other, but transversely and obliquely with respect to slots **17.1** and **17.2**. It will be seen that segments of the springs **18** and **19** protrude through the sleeve wall **20** to lie transversely of the sleeve adjacent the internal periphery for engaging the tube T and being deformed thereby when the tube is inserted into the sleeve for gripping and holding the sleeve against transverse movement.

It is most important that the retainer springs **18** and **19** engage the somewhat flattened tube T as illustrated in FIGS. **4** and **5** to prevent transverse wobbling or movement of the tube T in a direction across the width of the oblong shape of the internal periphery **20.3**, and, accordingly, the slots **16.1**, **16.2**, **17.1** and **17.2** are arranged so that the segments of springs **18** and **19** which protrude into the internal periphery of the sleeve converge in acute angles at the ends of the oblong configuration of the internal periphery. The tube T when somewhat flattened as illustrated in FIGS. **4** and **5**, will lie directly against the internal periphery of wall **20** at the ends of the oblong internal periphery, but will be spaced from the internal periphery of wall **20** across the width of the oblong configuration as illustrated in FIG. **4**. The springs **18** and **19** are particularly important for preventing transverse displacement or movement of the tube T to the left or right as illustrated in FIG. **4**.

Although the springs **18** and **19** assist materially in retaining the tube T against transverse movement in the holder **10**, the shape of the interior periphery of the sidewall **20** of the sleeve also is effective in restraining the tube T against transverse movement. Whereas the lower portion **20.1** of the inner periphery of the sidewall is cylindrical about the axial center line L of the sleeve **12**, arcuate segments **20.1***a* of the inner periphery of the wall **20** which extend entirely from the bottom to the top of wall **20**, are also cylindrical about the center line L. These arcuate segments **20.1***a* are disposed diametrically across from each other, and are sufficiently broad so that the cylindrical outer surface of the tube T, as it is first inserted into the holder **10**, is illustrated in FIG. **2**, will snugly fit against the cylindrically shaped arcuate segments **20.1***a* of the sleeve sidewall so as to prevent transverse wobbling of the tube T in the sleeve **20** toward the endwise directions of the oblong cross-sectional configuration of the internal periphery. It should be understood that, although the internal periphery, above the lower cylindrical portion **20.1**, is oblong in configuration, the internal periphery is not truly elliptically shaped because the opposite arcuate segments **20.1***a* are cylindrically shaped about the center line L.

The top of the sleeve **12** is beveled at **23** adjacent the open top of the internal periphery in order to readily

receive the tubes during insertion of the tubes. The bevel **23** extends around a substantial portion of the periphery of the sleeve **12,** but is unnecessary adjacent the ends of the oblong interior configuration.

The sidewall **20** of the sleeve had an elongate upright slot **24** therethrough and extending upwardly from the lower end substantially to the lowermost external flange **13.** The slot **24** permits access into the interior of the sleeve **12,** but does not materially weaken the sleeve because the interior flange **21** is completely annular and continuous around the entire periphery.

In some instances it may be desirable to lengthen the sleeve **20** above the uppermost flange **15** to give additional support for the tube being filled and closed.

In the alternative form illustrated in FIG. **8,** the holder is indicated in general by numeral **10.1** and is constructed substantially the same as holder **10** illustrated in FIGS. **1 – 7.** However, instead of having two separate retainer springs protruding slightly into the sleeve interior through access slots at two different elevations along the length of the sleeve, the holder **10.1** has four separate slots **17′**, all lying in a single plane at one location along the length of the holder so as to receive a single peripheral spring **19′** and thereby allow the sides of spring **19′** to protrude through the sleeve sidewall at four different locations and grip the tube periphery to restrain the tube against tranverse movement in the holder. The slots **17′** are formed so that the remaining sidewall **20′** exists only in column or post-like structures adjacent the ends of the slots **17′** for guiding and retaining the spring **19′** in position. As in the first form of the holder **10,** the spring **19′** lies between adjacent flanges, one of which, **14′**, is illustrated in FIG. **8.**

The form of the invention illustrated in FIG. **9** is also similar in most respects to the holder **10** in the form of the invention illustrated in FIGS. **1 – 7** and similar to the holder **10.1** of FIG. **8.** The holder **10.2** of FIG. **9** also has four separate slots **17″** lying in a single plane and formed entirely through the sidewall **20″** at a location between adjacent flanges, one of which, **14″**, is illustrated.

Retaining means **19″** to retain the tube T against transverse movement in the holder R, in this form of the invention, formed of substantially rigid rods **25** of such a size as to lie in the slots **17″** and protrude through the slots bearing against the sides of tube T. The rods **25** may be formed of any tough and durable material such as high density polyethylene, nylon, Teflon, or a rust resistant metal. Preferably the rods **25** are formed of a light weight material which has a minimum of inertia and is readily moved by the rather light weight tubes T when the tubes are inserted. The rods **25** are bent intermediate their ends so as to lie in and protrude through adjacent grooves **17″**, and the opposite ends of each of the rods **25** is disposed adjacent the corresponding ends of the other rod. The rods are interconnected with each other by tension springs **26** which permit the rods **25** to be moved apart, but which continuously urge the rods **25** inwardly toward each other and toward the tube that may be held by the holder **10.2.**

It will be seen that this invention provides a new and novel holder for flexible and collapsible tubes during filling of the tubes and during the successive steps required for closing the tubes and forming a permanent closure at the end of the tube through which the tube is filled. The holder sleeve accommodates the tube in cylindrical form and adequately holds it against transverse movement within the sleeve so that the filling machinery will be able to place the paste-like material into the tube. The holder also is shaped to accommodate the shape of the tube after it has been transformed from a cylindrical or circular cross section to a flattened or generally oblong or elliptical cross section. Peripheral springs are provided for engaging the periphery of the tube at several locations for restraining the tube against transverse movement in the holder sleeve. The tubes may be readily and easily inserted and removed and will be accurately held for the performance of the various filling and closing functions that must be performed in connection with the tube during the filling closing stages.

What is claimed is:

1. A holder for a flexible tube during filling and closing, comprising:

a rigid upright sleeve to receive the flexible tube therein;

support means at the bottom of the sleeve to support the tube; and

elongate, linearly extending spring retainer means extending transversely of and within the sleeve and adjacent upper interior peripheral portions of the sleeve and in widely spaced relation above said support means to engage and resiliently bear against portions of the flexible tube to retain the tube against movement transversely of the sleeve.

2. The holder set forth in claim **1** and the sleeve having elongate slots through the interior periphery of the sleeve adjacent the top of the sleeve and receiving said elongate spring retainer means therein.

3. The holder set forth in claim **2** and the retainer means including a plurality of elongate resiliently flexible spring segments lying in said slots to be flexed outwardly and to resiliently bear inwardly against the flexible tube to retain the tube against movement transversely of the sleeve.

4. The holder set forth in claim **2** and the retainer means including a plurality of elongate and substantially rigid elements lying in said slots and extending transversely of the sleeve and adjacent interior peripheral portions of the sleeve, and spring means urging said elements inwardly of the sleeve to bear against the tube and retain the tube against movement transversely of the sleeve.

5. The holder set forth in claim **2** and the retaining means including an elongate spring extending around the exterior periphery of the sleeve and having linear portions lying in said slots to engage and bear against the flexible tube within the sleeve.

6. The holder set forth in claim **2** wherein a first pair of slots in the sleeve are disposed opposite each other and a second pair of slots disposed opposite each other and transversely of said first pair of slots, the first and second pair of slots being spaced from each other endwise of the sleeve, the retainer means including endless coil springs encompassing the sleeve and having elongate segments thereof lying in said slots to engage and hold the tube, the elongate setments of the springs being oriented to converge with each other to engage and retain adjacent portions of the flexible tube.

7. A holder for retaining a flexible tube against transverse movement to facilitate progression of the tube to a number of filling and closing stations, comprising:

a rigid upright sleeve to receive the flexible tube therein, the bottom of the sleeve having a substantially cylindrical inner periphery, the inner periphery at the top of the sleeve being oblong, the width of the oblong being the shortest distance across the oblong and being substantially the same as the diameter of the cylindrical periphery at the bottom of the sleeve;

means at the bottom of the sleeve to support one end of the tube therein and to permit the opposite open end of the tube to protrude upwardly beyond the sleeve to be filled and then flattened for closing the tube; and

elongate spring retainer means extending transversely of and within the sleeve and adjacent upper interior peripheral portions of the sleeve to engage and resiliently bear against portions of the flexible tube to retain the tube against movement transversely of the sleeve.

8. The tube holder according to claim **7** and said elongate spring retainer means protruding slightly into the interior of the sleeve in a direction across the width of the oblong to bear against the tube and restrain the tube against movement transversely of the sleeve and in a direction transversely of the oblong configuration.

9. The tube holder according to claim **7** and said sleeve having substantially cylindrical segments of the inner periphery extending from bottom to top, said cylindrical segments extending around substantially the entire inner periphery of the sleeve adjacent the bottom thereof and said cylindrical segments adjacent the top of the tube being disposed opposite each other and extending peripherally only along opposite sides of the oblong configuration.

10. The tube holder according to claim **7** and said elongate spring retainer means having elongate portions lying in grooves communicating with the inner periphery of the sleeve, a pair of said elongate segments of the spring retainer means being convergent with each other at each end of the oblong configuration to engage and grip corresponding portions of the flexible tube when the tube has been flattened into an oblong cross-sectional configuration.

* * * * *