

[54] **FLEXIBLE TUBE WINDING AND
EMPTYING DEVICE**

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222/101, 102, 103

[56] **References Cited**

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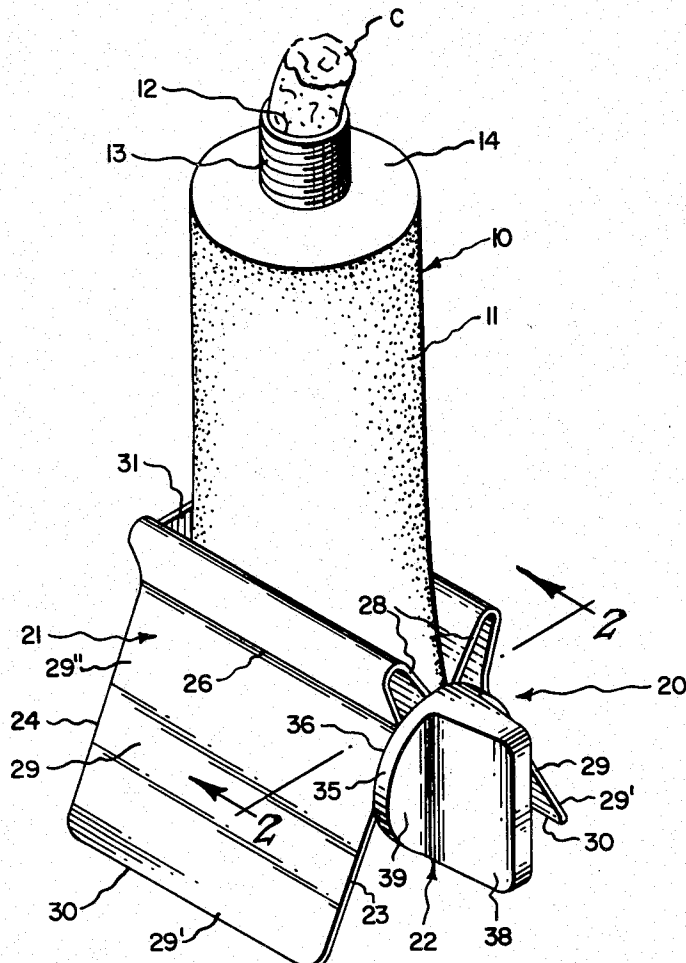
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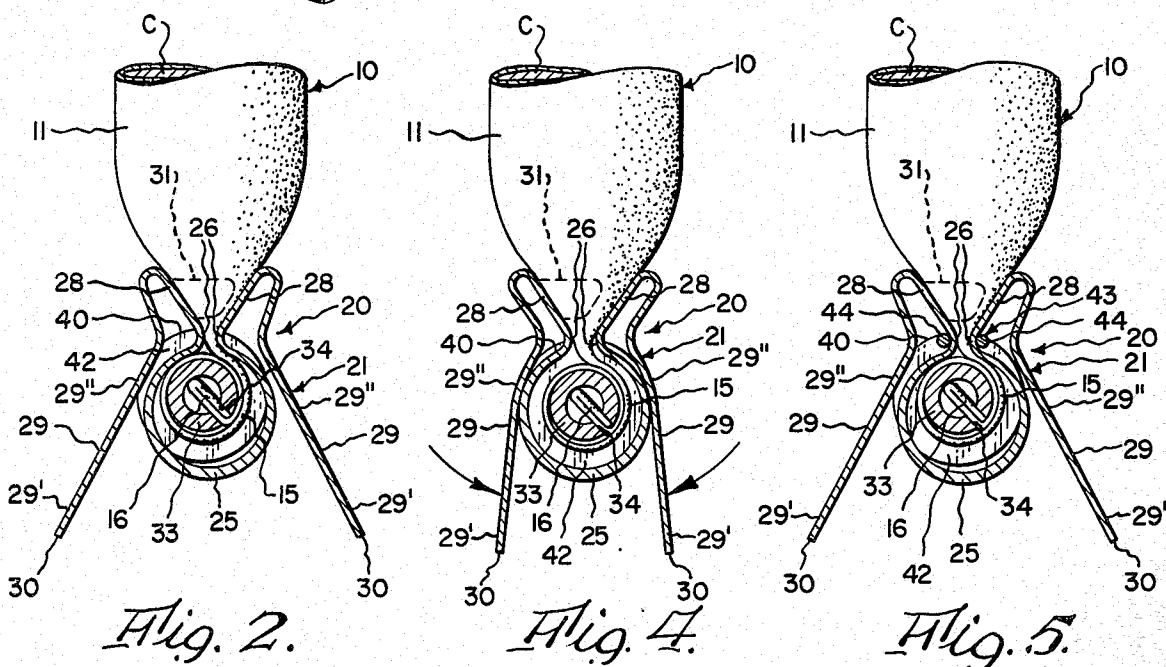
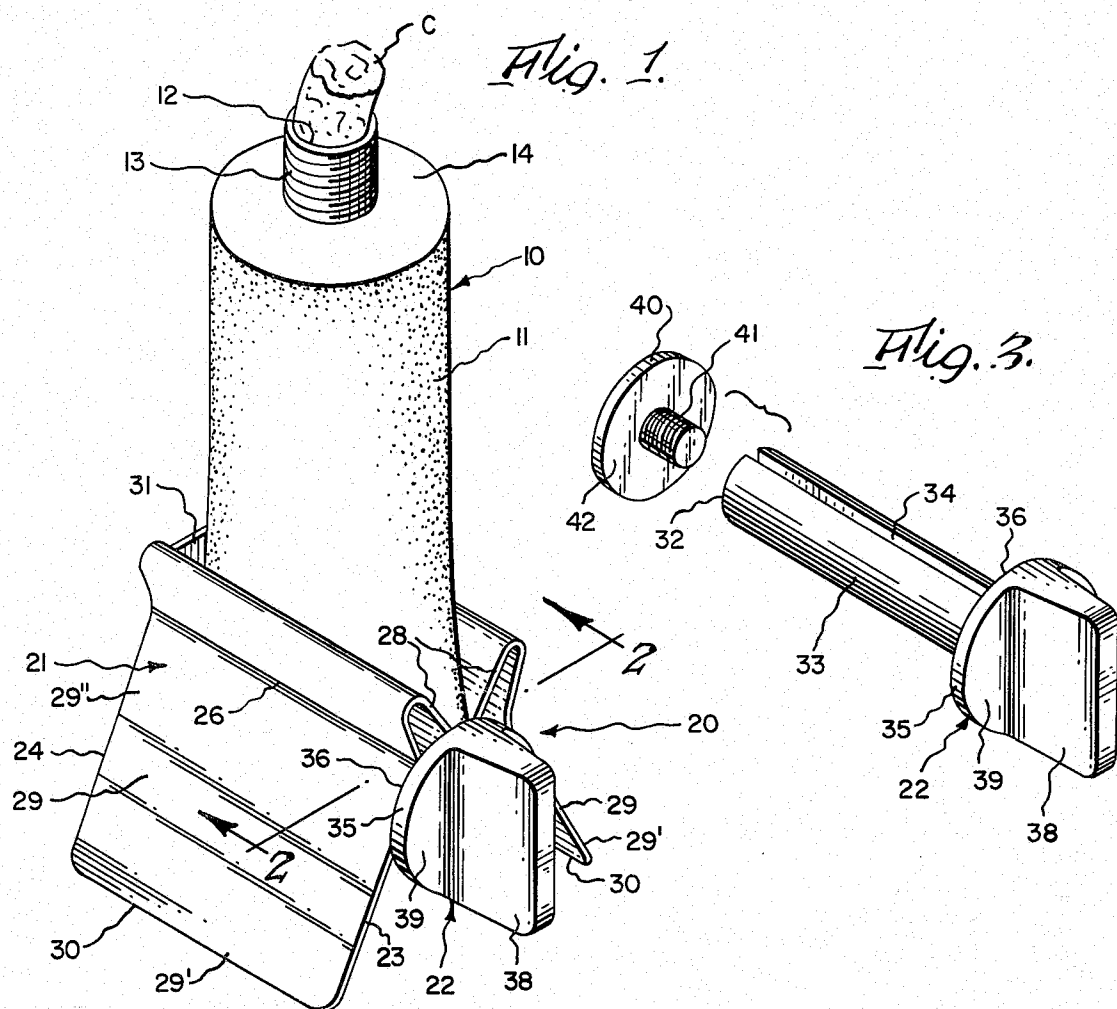
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ABSTRACT

A device is provided for progressively advancing the contents of a flexible tube longitudinally along a usable portion thereof toward an opening provided through a first end of the tube, and for winding a flattened spent portion of the tube which is arranged proximate a second end thereof. The device includes a pair of opposed jaws, a spring portion arranged to urge the jaws to move toward one another, and a rotatable turn-key adapted to receive the second end of the tube. When the turn-key is rotated, a flattened spent portion of the tube is wound around the turn-key, a usable portion of the tube is drawn between the jaws and flattened, and the contents of the tube are advanced longitudinally along the usable portion toward the opening. The device may further include a pair of lever arms which may be squeezed together to separate the jaws and facilitate insertion and removal of a tube.

12 Claims, 9 Drawing Figures





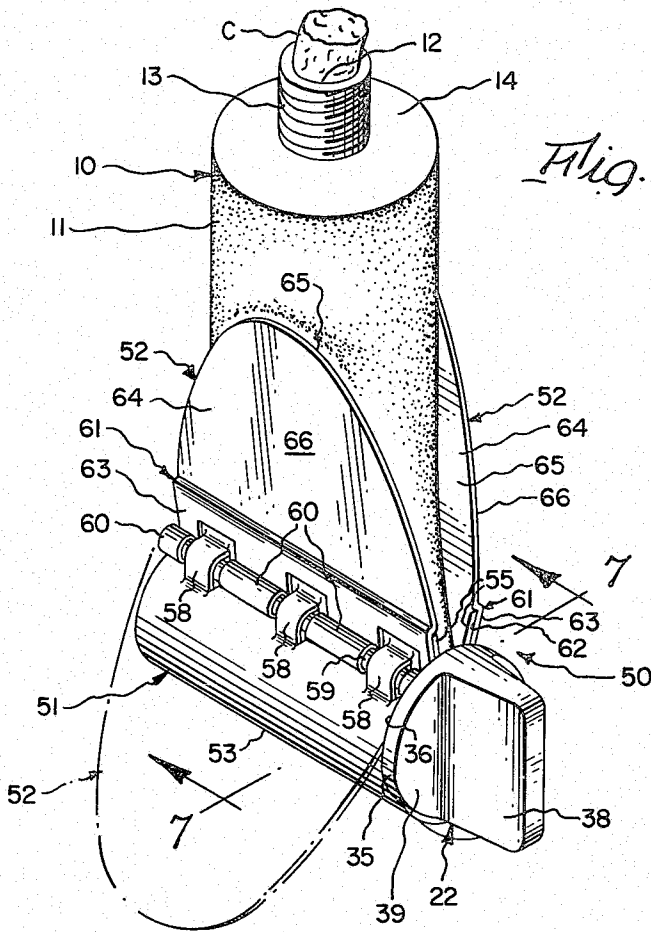
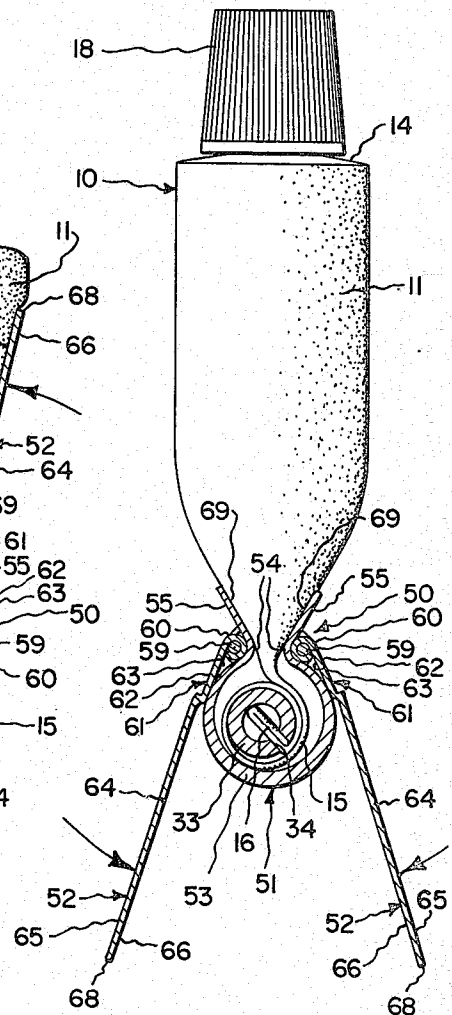
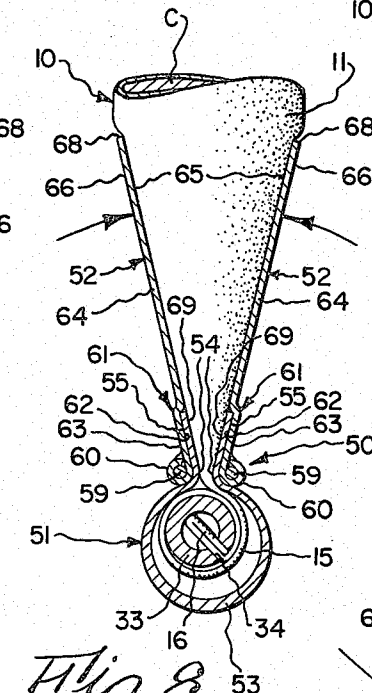
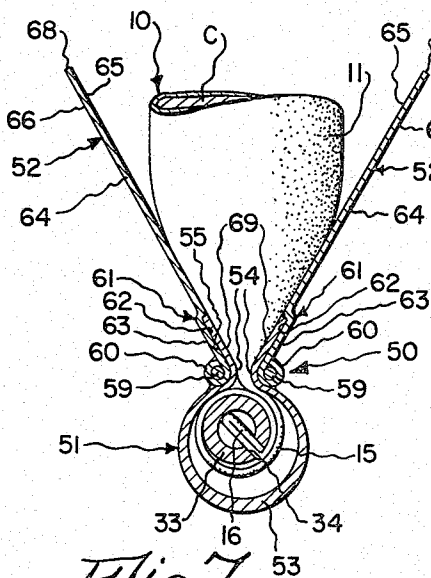
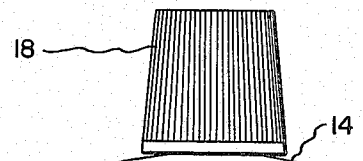


Fig. 9.



FLEXIBLE TUBE WINDING AND EMPTYING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to devices for progressively advancing the contents of a flexible tube longitudinally along a usable portion thereof, and for winding a flattened spent portion of the tube.

2. Description of the Prior Art

Hausmann et al. U.S. Pat. No. 3,525,457 and Manning U.S. Pat. No. 2,214,507 severally disclose prior art devices having a pair of rigid jaws between which a flexible tube may be drawn.

Borkenhagen et al. U.S. Pat. No. 3,219,238 and Keefer U.S. Pat. No. 2,542,678 disclose prior art devices wherein a flexible tube is drawn between two co-operative jaws, one of which is stationary and the other of which is movable.

Additional details of other prior art structures may be revealed in McLaughlin U.S. Pat. No. 3,134,507, Riaha U.S. Pat. No. 3,214,064, and Farrow U.S. Pat. No. 2,808,963.

SUMMARY OF THE INVENTION

The present invention provides a device for advancing the contents of a flexible tube longitudinally along a usable portion thereof toward an opening provided through a first end of the tube, and for winding a flattened spent portion of the tube which is arranged proximate a second end thereof.

The inventive device minimally includes a pair of opposed jaws arranged to move toward and away from one another and adapted to act transversely upon a part of the tube which may be arranged between the jaws, biasing means operatively engaging the jaws to continuously urge each of the jaws to move toward the other to compressively flatten a part of the tube which is arranged between the jaws, and a rotatable turn-key having a shank portion provided with a longitudinal slot adapted to receive the second end of the tube. The jaws separate the usable portion of the tube from the flattened spent portion thereof.

When the turn-key is rotated, the spent portion is wound around the shank portion, a usable portion is drawn between the jaws and flattened, and the contents of the tube are advanced longitudinally along the usable portion toward the opening.

In one embodiment, the biasing means may include a spring portion formed integrally with the jaws. In a modified embodiment, the biasing means may include an external spring clip arranged to act on the outer surfaces of the jaws.

The jaws may be provided with guide portions to guide or direct the usable portion between the jaws when the turn-key is rotated.

The device may further include a lever arm operatively associated with each jaw and arranged laterally of a body member. The lever arms may be squeezed together to separate the jaws and facilitate insertion or removal of a tube.

In a modified embodiment, the lever arms are pivotally connected to the jaws and may be moved to engage the guide portions, or moved to engage the body member. When engaged with the guide portions, these arms may be squeezed together to express the contents from

the tube. When engaged with the body member, these arms may be squeezed together to separate the jaws.

Accordingly, one object of the present invention is to provide a device for progressively advancing the contents of a flexible tube longitudinally along a usable portion thereof toward an opening provided through a first end of the tube.

Another object is to provide a device for winding a flattened spent portion of a flexible tube which is arranged proximate a second end thereof.

Another object is to provide a device for progressively advancing the contents of a flexible tube longitudinally along a usable portion of the tube toward an opening provided through a first end thereof, and for winding a flattened spent portion of the tube which is arranged proximate a second end thereof.

Another object is to provide a device capable of expressing a practical maximum quantity of contents from a flexible tube.

Another object is to provide a simple and inexpensive device for expressing the contents from a flexible tube.

These and other objects and advantages will become apparent from the foregoing and ongoing specification, which includes the drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective exterior view of a first preferred embodiment of the device, this view illustrating the device in association with a flexible toothpaste tube and expressing the contents therefrom through an opening provided through the upper end of the tube.

FIG. 2 is a fragmentary transverse vertical sectional view thereof, this view taken on line 2—2 of FIG. 1, and illustrating the opposing jaws separating the upper usable portion of the tube from the lower spent portion thereof, the lower end of the tube engaged in the turn-key slot, the spent portion of the tube wound around the shank portion of the turn-key, and the lever arms associated with each jaw.

FIG. 3 is a perspective exterior view of the turn-key and further illustrating the optional retaining disc in exploded aligned relation to the tubular open end of the turn-key shank portion.

FIG. 4 is a fragmentary transverse vertical sectional view thereof similar to FIG. 2, but illustrating the lever arms being squeezed together in the direction of the arrows to cause the lever arms to pivot about lateral adjacent portions of the body member to separate the jaws.

FIG. 5 is a fragmentary transverse vertical sectional view of a slightly modified embodiment of the device, this view being similar to FIG. 2 but illustrating the biasing means as further including a spring clip arranged to act on the jaws.

FIG. 6 is a perspective exterior view of a further modified embodiment of the device having its lever arms pivotally mounted on the jaws, this view illustrating, in solid, such arms in a raised condition ready to be squeezed together to express the contents from the tube, and also illustrating, in phantom, the position of such arms in a lowered position, ready to be squeezed together or separate the jaws.

FIG. 7 is a fragmentary transverse vertical sectional view thereof, taken generally on line 7—7 of FIG. 6, and illustrating the normal raised position of the lever arms in cross-section.

FIG. 8 is a fragmentary transverse vertical sectional view thereof, similar to FIG. 7, but illustrating the

raised arms being displaced toward one another in the direction of the arrows to express the contents from the tube.

FIG. 9 is a fragmentary transverse vertical sectional view thereof, similar to FIG. 7, but illustrating the lever arms in the lowered position, shown in phantom in FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

At the outset, it should be clearly noted that like reference numerals are intended to identify the same elements and/or structure throughout the several drawing figures, as such elements and/or structure may be further described or explained by the entire written specification of which this detailed description is an integral part.

The present invention provides a device for progressively advancing the contents C, such as toothpaste, of a flexible tube 10 longitudinally along a usable portion 11 of the tube toward an opening 12 (FIG. 1) provided through an externally threaded raised collar 13 suitably secured to the upper first end 14 of the tube, and for winding a flattened spent portion 15 of the tube which is arranged proximate a lower second end 16 thereof (FIG. 2). As best shown in FIG. 1, the collar 13 is externally threaded to receive a cap 18 (FIG. 9) by which opening 12 may be selectively closed.

As used herein, the expression "flexible tube" is intended broadly to include any size or type of flexible tube which may be squeezed or otherwise deformed to express the contents therefrom. The contents of such flexible tubes might typically include, but is not limited to, toothpaste, hair cream, gel, paste, putty, and the like. Moreover, the "usable portion" of the tube is intended to generally identify that portion of the tube which may contain the particular contents of the tube in sufficient usable quantity to be expressed when the tube is squeezed or deformed. On the other hand, the "spent portion" of the tube is intended to identify that portion of the tube which has been deformed or flattened and from which a practical quantity of such usable contents have been expressed.

In each of the several preferred embodiments illustrated in the drawings and hereafter described, the device minimally includes a pair of opposed jaws arranged to move toward and away from one another, biasing means operatively engaging the jaws to urge each jaw to move independently toward the other, and a rotatable turn-key.

Referring now to FIGS. 1, 2 and 4, a first embodiment of the device, generally indicated at 20, is shown as including a body member 21 and a rotatable turn-key 22.

As best shown in FIG. 2, the entire body member 21 may be integrally formed by suitably bending a transversely-elongated substantially rectangular sheet or blank of material, such as spring steel, perpendicularly to its front and rear transverse edges 23, 24, respectively, to provide the body member with a central substantially tubular spring portion 25 having an upwardly-opening generally C-shaped cross-section extending longitudinally between the front and rear edges 23, 24, respectively, of the blank; a pair of longitudinally-extending opposed inwardly-facing convex jaw portions 26, 26 arranged at the upper opening of spring portion 25 and adapted to move toward and away from

one another; a longitudinally-extending guide portion 28 continuing upwardly and outwardly from each jaw portion; and a longitudinally-extending lever arm portion 29 continuing downwardly from each guide portion to be arranged laterally proximate the spring portion 25 and terminating in a lowermost longitudinally-extending foot or edge 30 upon which the device may rest when not in use.

In this first embodiment, the spring portion 25 functions as biasing means to continuously urge the jaw portions 26, 26 to move independently toward one another. If desired, the tubular wall of spring portion 25 may be radially-thickened (FIG. 2) or otherwise strengthened to provide the biasing spring portion 25 with sufficient spring-like characteristics to urge jaws 26, 26 together with adequate force to flatten any part of tube 10 which might be interposed therebetween.

The body member 21 is shown further provided with a rear edge piece 31 formed integrally with left guide portion 28 and subsequently bent to lie transversely in the space between the upwardly divergent guide portions (FIG. 2) in a vertical plane substantially perpendicular to the longitudinal axis of spring portion 25. This rear edge piece 31 may be optionally provided to maintain the usable portion 11 of the tube in aligned relation to jaws 26, 26 and guide portions 28, 28 and to direct or guide the usable portion between the jaws when the turn-key is rotated.

As best shown perspectively in FIG. 3, the turn-key 22 has, from left to right, and upwardly-opening C-shaped vertical left end face 32, a horizontally-elongated tubular shank portion 33 provided with a longitudinally-extending radial slot 34, a large diameter vertical disc 35 arranged at the right end of shank portion 33 and having a rearwardly-facing annular vertical left face 36 and a longitudinally-raised rectangular boss or lug 38 extending forwardly from its right face 39 to form a handle portion which may be grasped to facilitate manual rotation of the turn-key.

As best shown in FIG. 3, a retaining disc 40 may be optionally provided to engage the rear end portion of shank portion 33. This retaining disc 40 is shown as having an externally threaded horizontal stud 41 projecting forwardly from its vertical right face 42 to suitably engage the open tubular left end of the shank portion. While the stud 41 is specifically shown as being configured to threadedly engage this shank portion, the stud may be alternatively configured to press or snap into engagement with the rear end of the turn-key.

After the turn-key shank portion 33 has been longitudinally inserted into spring portion 25 (FIG. 2), the retaining disc 40 may be suitably threaded into engagement with the left end of the shank portion. When so assembled, the turn-key will be effectively retained within spring portion 25, since the spaced faces 36, 42 of the turn-key and disc will be arranged to abut the adjacent edges 23, 24, respectively, of the body member 21 to prevent further longitudinal sliding movement of the turn-key relative thereto.

When the device 20 is operatively associated with tube 10, the lower end 16 of the tube will be inserted into turn-key slot 34, an intermediate flattened spent portion 15 of the tube will be arranged below jaws 26, 26 and wound around the turn-key shank portion 33, and an upper usable portion 11 of the tube will be arranged above the jaws. As heretofore described, the spring portion 25 will urge the jaws 26, 26 to move in-

dependently toward one another to compressively flatten any part of the tube which may be arranged or drawn therebetween.

Hence, when the turn-key handle is rotated in a clockwise direction (FIG. 2), a usable portion of the tube will be drawn downwardly through the jaws and flattened therebetween, and a lower flattened spent portion below the jaws will be wound around the shank portion 33 of the turn-key. It will be apparent to those skilled in this art that as the usable portion of the tube is pulled downwardly through the jaws, the compressive wiping action of the jaws on the tube will cause the contents thereof to be advanced longitudinally along the tube toward the upper end thereof.

To remove the tube from the device, the operator may first remove retaining disc 40 from the turn-key to enable the turn-key to be longitudinally withdrawn from within spring portion 25. Thereafter, the operator may grasp the lowermost marginal parts 29' of lever arms 29 and squeeze lower ends 30 together to cause an intermediate part 29'' of each lever arm to initially contact an adjacent lateral part of spring portion 25 (FIG. 4), and thereafter pivot about the contacted spring portion to separate jaws 26, 26 and guide portions 28, 28 (FIG. 4). With the jaws separated in this manner, the turn-key 22 and tube 10 may be longitudinally withdrawn from the spring portion 25 of body member 21. Thereafter, the operator may manually unwind the tube from the shank portion and remove lower tube end 16 from slot 34 to separate the tube from the turn-key. Alternatively, the operator may simply pull the wound tube longitudinally away from the key.

To insert a fresh tube into the device, the operator may first grasp and suitably manipulate a lower portion of the tube so as to flatten this end portion and initially advance the contents thereof toward the upper first end of the tube. Thereafter, the lower end 16 may be inserted into slot 34 and the flattened lower end portion wound around the turn-key shank portion 35. The operator may then squeeze the lower parts 29' of the lever arms together to separate the jaws in the manner heretofore described, and thereafter insert the turn-key and tube longitudinally into spring portion 25 so that part of the tube will be arranged between jaws 26, 26. When so inserted, lever arms 29, 29 may be released to permit the jaws to engage and compressively flatten the part of the tube which is arranged therebetween.

In a slightly modified embodiment illustrated in FIG. 5, the biasing means of the device 20 further includes a U-shaped spring clip 43 having its longitudinally-extending horizontal leg portions 44 arranged to act on the concave outer surfaces of jaw portions 26, 26 to urge the jaws to move independently toward one another. It should be clearly noted that the external spring clip 43 may be provided to either supplement or replace the biasing effect of spring portion 25. When the spring clip is additionally provided to supplement spring portion 25, the biasing means may include both the clip and the spring portion. On the other hand, when only the spring clip is provided to bias the jaws together, as when the spring portion 25 is formed of a material too flexible to urge the jaws together, the spring clip will comprise the entire biasing means. It should be further noted that the present invention expressly contemplates that this external spring clip 43, if desired, may be provided in other shapes, sizes and

configurations adequate to urge the jaws to move independently toward one another for the purpose herein disclosed.

Except for the additional provision of spring clip 43, the embodiment illustrated in FIG. 5 operates in the manner heretofore described.

In the embodiment illustrated in FIGS. 6-9, a modified device 50 is shown as broadly including a modified body member 51 having its lever arms 52, 52 pivotally mounted thereon and adapted to be moved between an overhead upwardly divergent position (FIG. 7) and a lowered downwardly divergent position (FIG. 9), and the turn-key 22 previously described.

As best shown in FIG. 7, the body member 51 is an integrally formed horizontally-elongated tubular member having, in cross-section, a central upwardly-opening generally C-shaped spring portion 53, a pair of longitudinally-extending opposed jaw portions 54, 54 arranged at the upper opening of the spring portion, and a longitudinally-extending guide portion 55 continuing upwardly and outwardly from each jaw portion. However, longitudinally-spaced parts of the jaw portions 54 are bent arcuately outward to define with its jaw portion a plurality of longitudinally spaced aligned tubular sleeves 58 which are arranged to receive a longitudinally-insertable pivot pin 59.

In FIG. 7, each of lever arms 52 is shown as having a plurality of longitudinally-spaced aligned lowermost tubular sleeves 60 adapted to fit between body sleeves 58 and receive pivot pin 59 therethrough, and having a lower portion 61 provided with longitudinally-elongated rectangular inner and outer planar surfaces 62, 63, respectively, and an upper portion 64 continuing upwardly from lower portion 61 and having inner and outer surfaces 65, 66, respectively, and terminating in an uppermost edge 68. When viewed in elevation, these lever arms 52 appear to have a substantially parabolic outline or shape, the apex being proximate upper edge 68. Moreover, the upper portions 64 are slightly offset from the lower portions 61 so that when the arms are initially moved to the overhead position (FIG. 7) such that the lower portion inner surfaces 62 will abuttingly engage or contact the outer surfaces of guide portions 55, the upper portion inner surfaces 65 will be substantially coplanar with the inner surfaces 69 of the guide portions 55 for a purpose hereinafter explained.

When the lever arms 52 are moved to their overhead position (FIG. 7), the operator may grasp the upper outer surfaces 66, 66 of the lever arms and squeeze the lever arms together (FIG. 8) to express the contents from the tube. When the raised arms 52 are so squeezed together, the arms will pivot about pins 59 and also cause the relatively flexible guide portions 55 to be pivotally moved toward one another. Hence, these raised arms may be squeezed to flex or deform a relatively large portion of the tube to cause the contents thereof to be advanced ahead of jaws 54 toward opening 12. Since arm surface 62 is coplanar with guide portion surface 69, this squeezing action of arms 52, 52 will not cause a sharp bend in the tube which might otherwise produce a rupture of the tube.

As the tube is drawn down between the jaws, the jaws will flatten and wipe the tube to keep the contents above the jaws, the effect of which is to longitudinally advance the contents along the usable portion of the tube. Hence, when the raised arms are again squeezed together, contents of the tube which are disposed im-

mediately above the jaws will also be advanced toward tube opening 12. In this manner, the inventive device 50 serves to progressively advance a practical maximum quantity of the tube contents toward opening 12.

As best shown in FIG. 9, arms 52 may also be pivotally moved to their lowered position wherein a portion of each lever arm outer surface 63 will abut an adjacent lateral part of spring portion 51. Thereafter, if the lowered ends 68 are further squeezed together, the arms 52 will pivot about spring portion 51 to separate or spread the jaws in the manner heretofore described with respect to arms 29. Moreover, the present invention further contemplates that means may be provided to releasably retain pivoted arms 52 in either the raised overhead or lowered position.

While the several embodiments herein disclosed have depicted and described the device as having an integrally-formed body member of spring steel or equivalent, the present invention contemplates that such body member may be formed of other materials, or be extruded, or molded of a suitable plastic.

While preferred embodiments of the invention have been shown and described, it will be understood by persons skilled in this art that various changes and modifications may be made without departing from the spirit of the invention which is defined by the following claims.

What is claimed is:

1. A device for progressively advancing the contents of a flexible tube longitudinally along a usable portion thereof toward an opening provided through a first end of said tube, and for winding a flattened spent portion of said tube which is arranged proximate a second end thereof, said device comprising:

a pair of opposed jaws arranged to move toward and away from one another and adapted to act transversely upon a part of said tube which is arranged between said jaws, said jaws separating said usable portion from said spent portion;

biasing means including a spring means arranged to engage each of said jaws to continuously urge each of said jaws to move toward the other of said jaws to compressively flatten the part of said tube which is arranged between said jaws; and

a rotatable turn-key having a shank portion provided with a longitudinal slot adapted to receive said second end of said tube, whereby when said turn-key is rotated said spent portion is wound around said shank portion, said usable portion is drawn between said jaws, and said contents are advanced longitudinally along said usable portion toward said opening.

2. The device according to claim 1 wherein said biasing means further includes a body member having a spring portion arranged to act on said jaws.

3. The device according to claim 2 wherein said spring portion has a substantially C-shaped cross section.

4. The device according to claim 1 and further comprising:

a guide portion extending away from each jaw to be arranged proximate said usage portion for directing said usable portion between said jaws when said key is rotated.

5. The device according to claim 4 wherein said guide portions are adapted to be moved toward one another

to act transversely on said usable portion and advance the contents thereof toward said first end.

6. A device for progressively advancing the contents of a flexible tube longitudinally along a usable portion thereof toward an opening provided through a first end of said tube, and for winding a flattened spent portion of said tube which is arranged proximate a second end thereof, said device comprising:

a pair of opposed jaws arranged to move toward and away from one another and adapted to act transversely upon a part of said tube which is arranged between said jaws, said jaws separating said usable portion from said spent portion;

biasing means operatively engaging said jaws to continuously urge each of said jaws to move toward the other of said jaws to compressively flatten the part of said tube which is arranged between said jaws, said biasing means including a body member engaging said jaws;

a rotatable turn-key having a shank portion provided with a longitudinal slot adapted to receive said second end of said tube so that when said turn-key is rotated said spent portion is wound around said shank portion, said usable portion is drawn between said jaws, and said contents are advanced longitudinally toward said opening; and

a lever arm operatively associated with each of said jaws and arranged laterally of said body member, said lever arm having upper parts arranged to move with their associated jaws, intermediate parts adapted to engage opposite lateral portions of said body member, and lower parts,

whereby when said lower parts are moved toward one another said intermediate parts may engage and pivot about said lateral portions to move said jaws away from one another and facilitate insertion and removal of said tube.

7. The device according to claim 6 wherein said body member has a spring portion arranged to act on said jaws.

8. The device according to claim 7 wherein said spring portion has a substantially C-shaped cross section.

9. The device according to claim 6 wherein said biasing means further includes a spring clip having leg portions arranged to act on said jaws.

10. The device according to claim 6 and further comprising:

a guide portion extending away from each jaw to be arranged proximate said usable portion for directing said usable portion between said jaws when said key is rotated.

11. The device according to claim 10 wherein said guide portions are adapted to be moved toward one another to act transversely on said usable portion and advance the contents thereof toward said first end.

12. The device according to claim 11 wherein said lever arm upper parts are pivotally connected to said jaws so that each of said arms may be moved in one angular direction to engage said body member, and may be moved in an opposite angular direction to engage said guide portions, whereby when said arms are moved to engage said guide portions said end parts may be further moved together to advance said contents longitudinally along said usable portion toward said first end of said tube.

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