Feb. 19, 1957 F. C. JENNINGS 2,781,576

APPARATUS FOR ASSEMBLING THE ELEMENTS OF LIQUID-DISPENSING CONTAINERS

Filed Jan. 23, 1951

FIG. 1

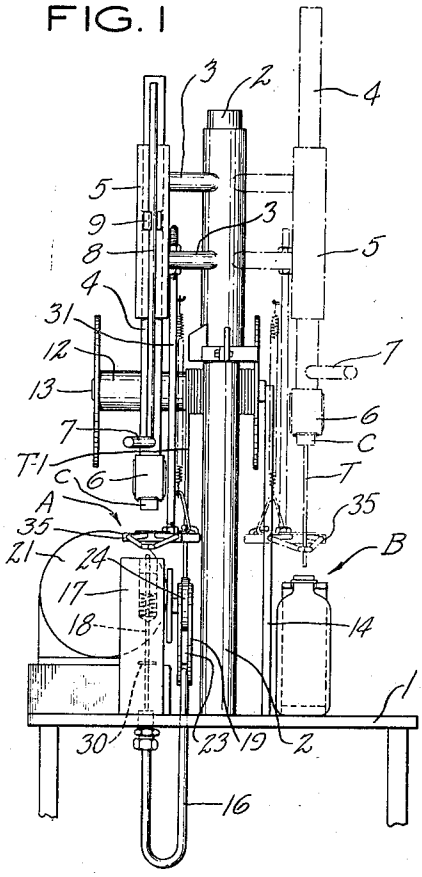


FIG. 2

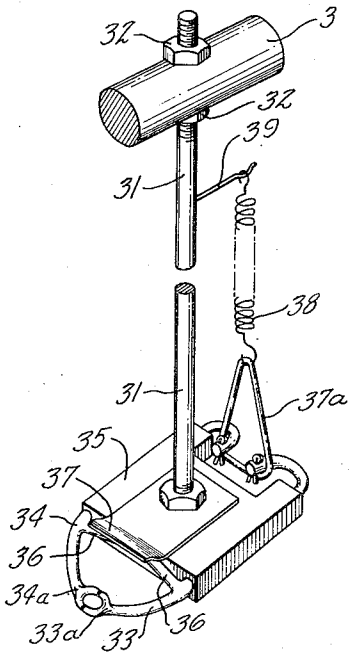


FIG. 3

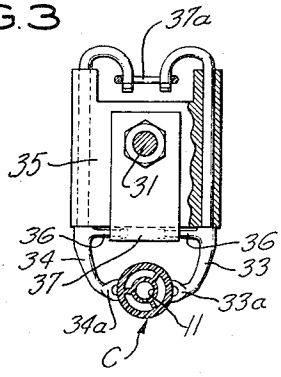


FIG. 4

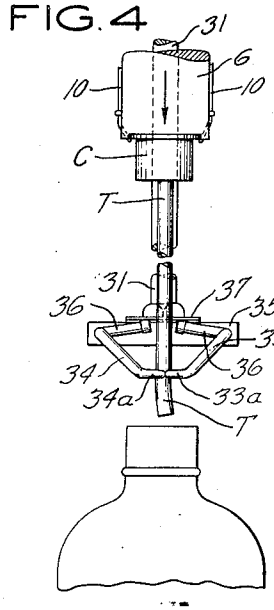
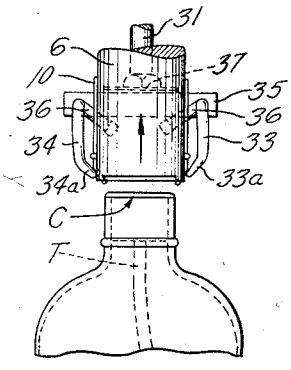


FIG. 5



INVENTOR
FRANK C. JENNINGS
By Parham & Bates
ATTORNEYS

United States Patent Office 2,781,576 Patented Feb. 19, 1957

2,781,576

APPARATUS FOR ASSEMBLING THE ELEMENTS OF LIQUID-DISPENSING CONTAINERS

Frank C. Jennings, Westboro, Mass., assignor to Emhart Manufacturing Company, a corporation of Delaware

Application January 23, 1951, Serial No. 207,414

4 Claims. (Cl. 29—235)

The present invention relates to apparatus for assembling the elements of containers for dispensing liquids of various kinds in the form of a spray or jet and more particularly to such containers of the squeezable type which employ tubes of flexible plastic material in connection with a discharge opening in a closure for the container.

The present invention is an improvement of the apparatus of my copending application, Serial No. 110,926, filed August 18, 1949, now Patent No. 2,706,847, issued April 26, 1955, and comprises novel combinations of apparatus disclosed in that application with cooperating means for supporting and guiding the free or leading end of the flexible tube depending from a closure with which it is assembled, to maintain the tube against flexure and to assure its alignment with and entry into a container during assembly of the tube, closure and container.

The supporting and guiding means are of particular utility in the apparatus when, as disclosed in this and my prior application, lengths of tubing are cut from a coil or roll and there is therefore a substantial tendency to curl and thus throw the leading end out of alignment with the closure and the container opening.

In the drawings:

Figure 1 is a view in end elevation of apparatus embodying the present invention.

Figure 2 is a perspective view of the tube guiding and restraining tongs and their mounting on the frame 3 of Figure 1.

Figure 3 is a view partially in section and partially in plan showing the tongs in the position occupied by them when cammed apart by the closure.

Figure 4 is a view of parts of the apparatus in the positions occupied at the time that the end of the tube is about to be inserted into the container.

Figure 5 shows the parts in the position occupied by them immediately after the assembled closure and tube have been driven home into container.

The apparatus of the present invention comprises a base 1 on which is mounted an upwardly extending post 2 for pivotally supporting a laterally extending frame 3. The frame 3 can be swung about the vertical axis of post 2, as illustrated in the full line and dotted line positions of Figure 1, for the purpose of bringing the work-carrying plunger 4 in vertical alignment in either a closure and tube assembling station A or a container-sealing station B.

The plunger 4 is vertically movable in a sleeve 5 provided by the frame 3, and the lower end of the plunger 4 terminates in a closure-receiving head 6. For purposes of illustration, the plunger 4 is shown as being movable up and down with respect to the frame sleeve 5 by means of a handle 7 connected to a rod 8 suitably connected to the ends of plunger 4, with the rod being movable in a guide 9 carried by the sleeve 5. Thus, the plunger 4 can be readily moved up and down by means of the handle 7 to bring the head 6 into position for cooperation with instrumentalities located at either station A or B, with the handle 7 also serving as a means for readily swinging the frame 3 about the post 2 to move the plunger 4 and its head 6 from one station to another.

The head 6 on the plunger 4 provides a pair of clamps 10, in the form of resilient fingers, that are adapted to receive and hold between them the upper portion of a closure C.

The closure C provides a central opening 11 for the purpose of receiving a tube T prior to the insertion of the assembled closure C and tube T in the container. As previously pointed out, the apparatus of the present invention provides separate stations A and B for performing the separate operations generally indicated in Fig. 1.

Individual tubes T are adapted to be delivered to the closure and tube assembly station A from a continuous supply of tubing T–1 wound on a suitable spool 12 that is turnable freely on a spindle 13 supported by a bracket 14 extending upwardly from the base 1. The tube T–1 is conducted into a conduit 16 that extends downwardly beneath the base and then curves upwardly so as to direct the tubing T–1 into a tube positioning and cutting block 17 which is located at station A. This block 17 extends upwardly from the base 1, with a central opening 18 therein having its axis in exact alignment with the center of the head 6 when the plunger 4 is swung into the full line position of Fig. 1 with the axes of the block opening 18 and plunger 4 in vertical alignment.

The tubing T–1 from the spool 12 is adapted to be fed into the opening 18 in block 17 by means of an automatically controlled feed mechanism which, as shown in Figure 1 consists of a roll 19 that is adapted to be rotatably driven from an electric motor 21, preferably at a relatively slow speed, in the neighborhood of 40 R. P. M., the speed of the roll 19 being determined by the desired lineal speed at which it is desired to feed tubing T–1 into the tube block 17.

The feed roll 19 provides a V-groove 23 into which the tubing T–1 is adapted to fit tightly so that the rotation of the roll 19 will cause the tubing to be positively fed into the conduit 16 and hence into the opening 18 of the block 17. The accurate feeding of the tubing during each operating cycle of the apparatus is insured by pressure roll 24 cooperating with the driven roll 19. A knife 30 is employed to sever individual lengths of the tubing T–1 to provide a separate tube for each closure. The construction of block 17 and its associated mechanism is such that a length of tubing T–1 will be severed to provide a separate tube of predetermined length which is held in position along its longitudinal axis while closure C is carried downwardly by the head 6 to cause insertion of the upper end of the tube T into the closure opening 11. The construction of these mechanisms is fully described in my copending application but is here omitted because it forms per se, no part of the present invention.

As best seen in Figs. 1 and 2, a tong supporting and guiding mechanism is provided to maintain the tube against flexure and to guide it centrally into the container. The tong head is carried by a vertical rod 31 adjustably connected to the frame 3 as by the nuts 32 to assure the proper positioning of the tong with respect to the block 17 and the container. Since the tong is mounted on the frame 3, it is movable with the plunger 4 from station A to station B. The tongs themselves comprise a pair of bell crank levers 33—34 mounted in bearings in a frame 35 which is carried by the lower end of the rod 31. The tong fingers 33*a* and 34*a* forming part of the bell crank levers are shaped like crab claws and each is provided with an arm 36 extending inwardly and terminating in a boss designed to contact

a stop member 37 when the tongs are in their closed position. At their ends, the tong fingers are semi-circular and, when the tongs are in their closed position, provide an annular opening within which to receive and guide the tube T. The shape of the fingers is such as to provide upper cam surfaces which coact with the closure C and the head 6 of the plunger to open the tongs at the time and for the purposes hereinafter described. The rearward extensions of the levers 33—34 are curved inwardly and carry a yoke or ring member 37*a* to which is connected a light tension spring 38 which is attached at its opposite end to pin or extension 39 on the rod 31. By this arrangement, the tong fingers are normally biased to the closed position shown in Figs. 2 and 4 and are cammed open to permit passage of the closure between them to the extent desired.

The operation of the apparatus is as follows:

Assuming the parts to be in the position shown in full lines in Figure 1 at which time a closure is held on the head 6 by the fingers 10 and a suitable length of tubing T in the block 17, the operator grasped the handle 7 pulling down the plunger 4 thereby inserting and driving home the upper end of the tube T into the central opening of the closure. During this operation, the closure C, contacting the cam surfaces of the tong fingers 33*a* and 34*a*, spread the tongs apart as shown in Fig. 3 to permit the closure C to pass below the tong sufficiently to receive the upper end of the tube T. The operator then reverses the movement of the plunger 4 lifting the head with the assembled closure C and tube T and pulling the tube out of the passage 18 of the block 17. As soon as the plunger 4 rises sufficiently to lift the closure C above the normal closed position of the tong fingers, the fingers close around the tube and thereafter maintain the tube against flexure and hold the lower portion in alignment with the head 6. At the top of a stroke of the plunger 4, the lower end of the tube T is clear of the block 17.

The operator thereupon swings the frame 3 with the plunger 4 and the tong to the position shown in the dotted line in Fig. 1. He again moves the plunger 4 downwardly to insert the tube T guided by the closed tong fingers 33*a* and 34*a* centrally into the container to seal the tube and closure in the container. During this operation, the closure passes through and the tong fingers, which are again cammed apart, first by the closure and then by head 6. The spring fingers 10 release the closure after it is driven home into the opening of the container and the plunger 4 is again raised. The frame 3 is then returned to the full line position of Fig. 1 to bring the plunger 4 and the tons to the position at station A.

As set forth in detail in my copending application, the feeding and severing of the tube is done automatically in response to movements of the plunger 4 through electrical connections (not here shown) in order to provide a new section of the tubing T–1 into the block and cut off a new tube T for assembly with the next closure and container.

Having described my invention, I claim:

1. Apparatus for assembling the elements of a dispensing container comprising in combination means for supporting a flexible tube at one station and a container at a second station, means for holding a container closure with an opening therein in alignment with the axis of said tube, for moving the closure with respect to said tube support to cause insertion at one end of the tube in said opening in the closure and for thereafter moving said closure and tube as a unit to withdraw the tube from its supporting means, guiding means engaging the tube at a point spaced from the closure to maintain the engaged portion of the tube in substantial alignment with the closure holding means, and means for moving the closure holding and guiding means with the assembled tube and closure therein to said second station and directing said engaged portion of the tube and the closure into the container to complete the assembly of the elements.

2. An apparatus for assembling the elements of a dispensing container including a container, a flexible tube and a closure, comprising means for supporting a tube, a closure holder in alignment with the tube supporting means, means for moving the closure holder along the axis of the tube and closure to insert the tube into an opening in the closure and to withdraw the assembled tube and closure from the tube holder, a pair of tong fingers for guiding and supporting the withdrawn tube, said tong fingers having surfaces coacting with the closure to open the tongs during the assembling of the tube and closure and resilient means for closing the tongs about the tube to maintain it against flexure out of alignment with the closure holder.

3. In an apparatus for assembling a container, a closure and a flexible tube of a liquid dispensing unit, means for supporting a length of flexible tube at one station and a container at a second station, means for holding and moving a closure to insert the end of the tube in an opening in the closure, for withdrawing the tube from its support and thereafter for inserting the assembled tube and closure into a container at the second station, tongs for maintaining the tube against flexure while moving the assembled tube and closure to the second station and for guiding the tube into the container and means for opening and closing the tongs.

4. In an apparatus for assembling the element of a dispensing container in combination a movable holder for a closure having a length of flexible tube depending therefrom, means to position the holder to dispose said closure and tube assembly above and in line with a container to which said assembly is to be applied, means to move said holder relative to said container to apply the closure and tube assembly, and means for restraining longitudinal flexure of the tube and guiding it into the container during application of said closure and tube assembly.

References Cited in the file of this patent

UNITED STATES PATENTS

1,601,549	Wurtenberg	Sept. 28, 1926
1,681,829	Wesseler	Aug. 21, 1928
2,431,279	Remington et al.	Nov. 18, 1947