Jan. 31, 1967 G. D. JONES 3,300,846

APPARATUS FOR ASSEMBLING DISPENSING VALVE ASSEMBLIES WITH CONTAINERS

Filed March 8, 1965 5 Sheets-Sheet 1

Fig. 1.

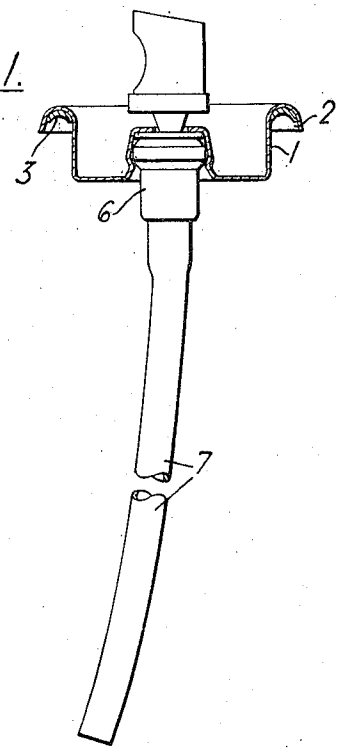
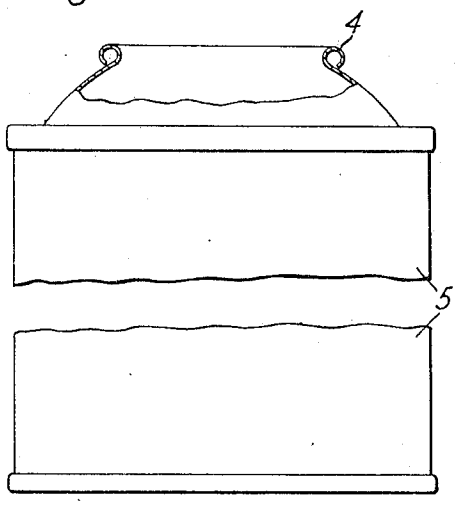


Fig. 2.



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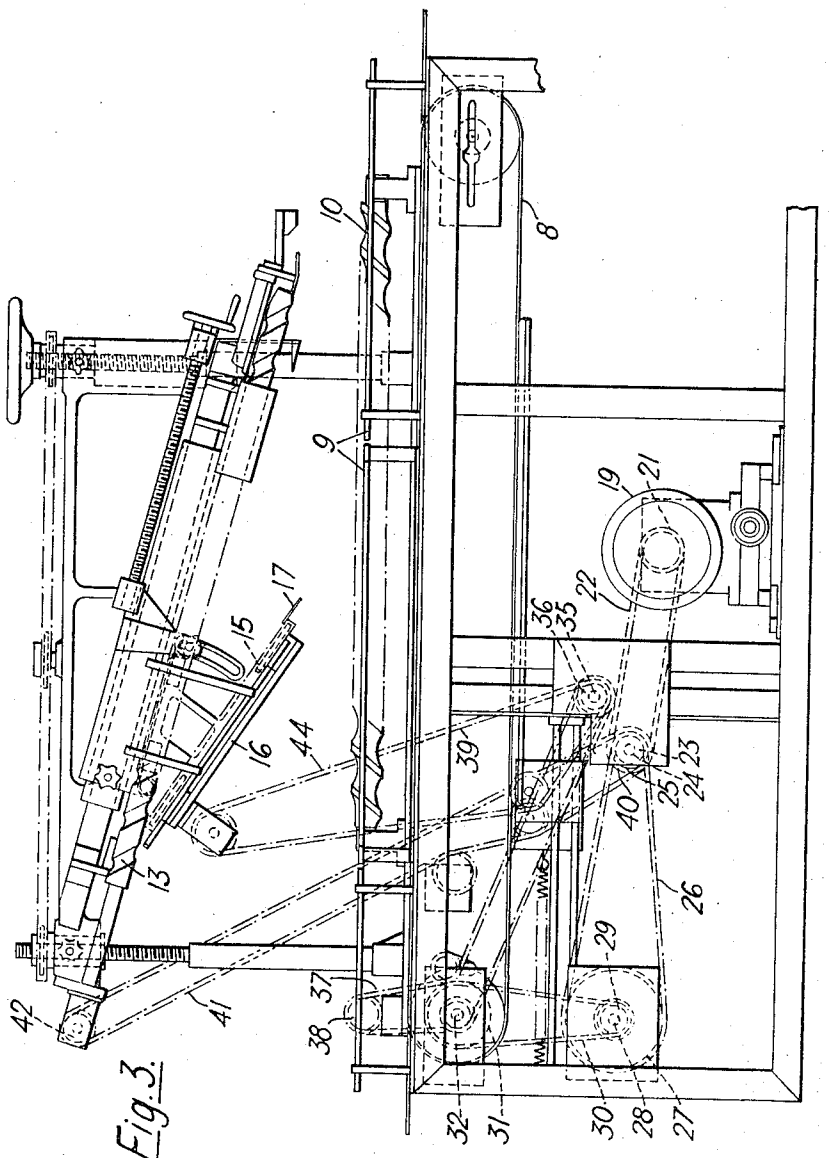


Fig. 3.

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APPARATUS FOR ASSEMBLING DISPENSING VALVE ASSEMBLIES WITH CONTAINERS

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Fig. 4.

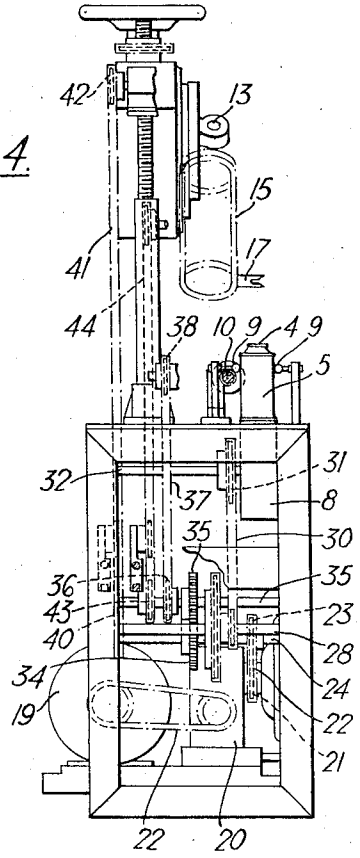
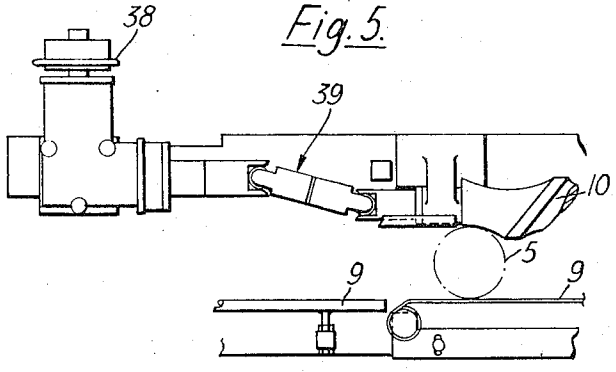


Fig. 5.



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Fig. 6.

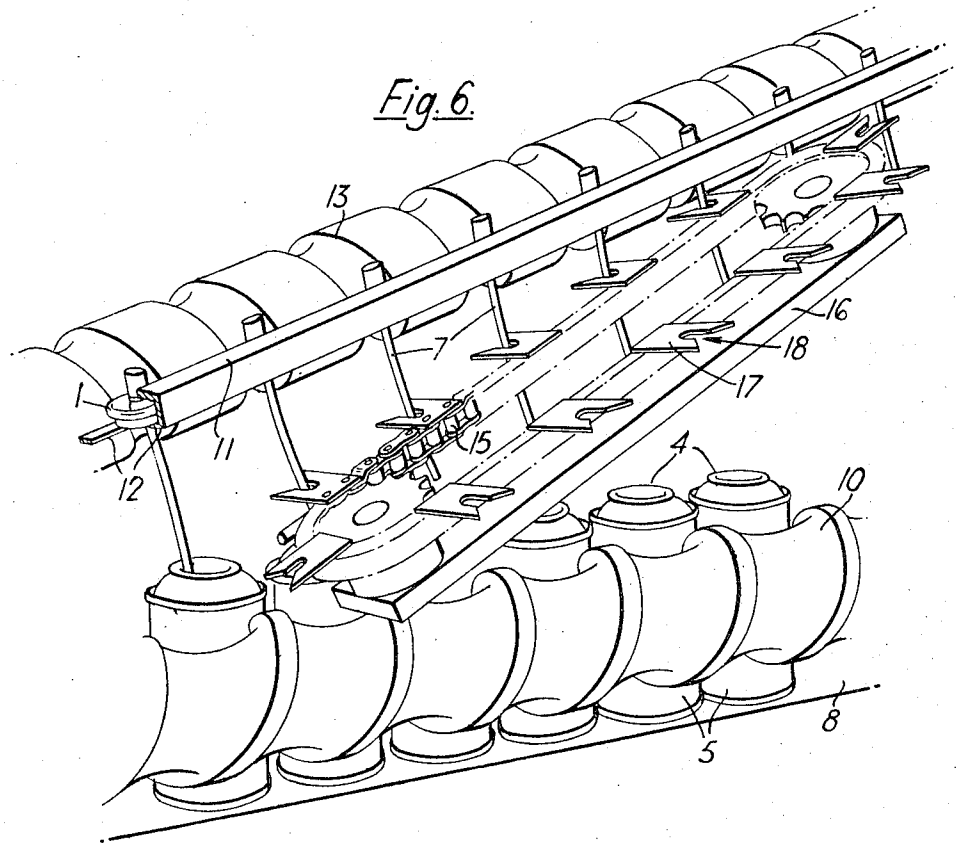
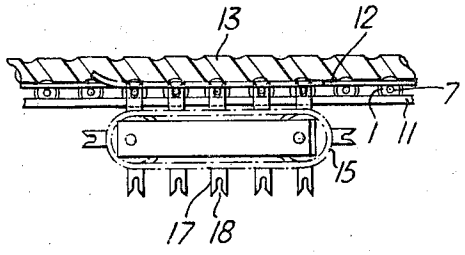


Fig. 7.



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APPARATUS FOR ASSEMBLING DISPENSING VALVE ASSEMBLIES WITH CONTAINERS

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Fig. 8.

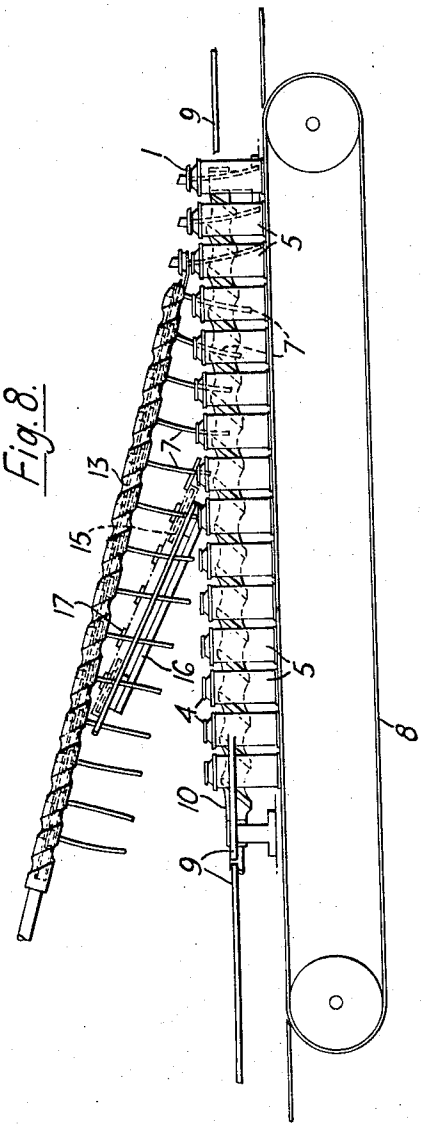
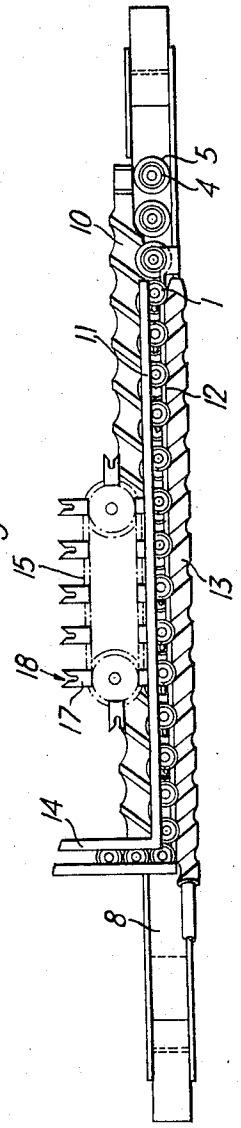


Fig. 9.



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3,300,846

APPARATUS FOR ASSEMBLING DISPENSING VALVE ASSEMBLIES WITH CONTAINERS

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Claims priority, application Great Britain, Mar. 13, 1964, 10,799/64
9 Claims. (Cl. 29—208)

This invention relates to apparatus for assembling dispensing valve assemblies with containers and in particular to apparatus for assembling dispensing valve assemblies each of which includes a closure member adapted for connection with the mouth-defining portion of a container and which carries a valve mechanism fitted with a dip tube. Such valve assemblies and containers are commonly used for the dispensing of aerosols.

Heretofore there has been difficulty in assembling the valve assemblies with the containers and machines for securing the valve assemblies to the containers have been unable to maintain the desired rates of production without the employment of a large number of operators manually to fit the valve assemblies to the containers. It is a main object of the present invention to provide an apparatus for assembling the valve assemblies with the containers at an economical rate thereby considerably to reduce the number of manual operators required.

According to the invention there is provided apparatus for assembling with containers dispensing valve assemblies each of which includes a closure member adapted for connecting with the mouth-defining portion of a container and carries a valve mechanism fitted with a dip tube, comprising container conveyor means arranged to move containers mouths uppermost in succession and in predetermined spaced relation, dispensing valve assembly conveyor means disposed above the path of the containers and arranged to move dispensing valve assemblies in succession in timed relation with the movement of the containers and with the dip tubes directed downwards towards the containers, said dispensing assembly conveyor means moving the dispensing valve assemblies in the direction of movement of the containers and converging towards the path of the containers to effect the insertion of the dip tubes into the containers, an endless conveyor supported to be divergent from the plane of the dispensing valve assembly conveyor means and convergent towards the plane of said container conveyor means in the direction of movement thereof, and dip tube engaging elements carried by the endless conveyor and arranged first to engage a dip tube at a position in the vicinity thereof at which it is attached to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof thereby to guide the free ends of the dip tubes into the containers.

The container conveyor means may comprise an endless belt movable in the direction of movement of the containers and by which the containers are supported with the mouths thereof uppermost, and a rotatable scrolled roller extending lengthwise of the belt and operable to engage containers supported by the belt and to retain them in said determined spaced relation thereof.

The dispensing valve assembly conveyor means may comprise stationary members operable to support the closure members for movement lengthwise of said members and a rotatable scrolled roller extending lengthwise of said members and operable to engage closure members supported by the stationary members and to effect said movement of the dispensing valve assemblies towards the containers.

Each dip tube engaging element may comprise a plate

secured to the endless conveyor and have a slot in which the dip tube is located while being guided by the plate.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 illustrates, partly in section, a dispensing valve assembly to be assembled with a container,

FIG. 2 illustrates, partly in section, a container with which the valve assembly of FIGURE 1 is to be assembled,

FIG. 3 is a side elevation of apparatus for assembling the valve assembly of FIGURE 1 with the container of FIGURE 2,

FIG. 4 is an end elevation, partly in section, of FIGURE 3,

FIG. 5 is a plan of a part of the apparatus shown in FIGURE 3,

FIG. 6 is a pictorial view illustrating the mode of operation of the apparatus,

FIG. 7 illustrates the underside of a dispensing valve assembly conveyor and dip tube guide means embodied in this apparatus,

FIG. 8 is a side elevation illustrating the mode of operation of the apparatus, and

FIG. 9 is a top plan of FIGURE 8.

Referring to FIGURES 1 and 2, a dispensing valve assembly comprises a closure member **1** which includes an annular hook portion **2**, housing sealing compound **3**, by which the valve assembly is connected with the mouth-defining portion **4**, FIGURE 2, of a container **5**. The closure member **1** carries a valve mechanism **6** fitted with a dip tube **7**. The dip tube **7** is curved at the free end thereof so that the free end is displaced relative to the axis of the valve mechanism **6** and closure member **1**.

Referring to FIGURES 3 to 9, containers **5** are moved mouths uppermost in succession by container conveyor means which comprise an endless belt **8** by which the containers are supported in an upright position, horizontal guides **9** which engage opposite sides of the conveyors near the upper ends thereof, and a rotatable scrolled roller **10** which extends lengthwise of the belt **8**, which is rotatable about a horizontal axis, and which is operable, as shown in FIGURES 8 and 9, to retain the containers in predetermined spaced relation for the reception of dispensing valve assemblies to be assembled therewith.

Dispensing valve assembly conveyor means are disposed above the path of the containers on the belt **8** and are arranged to move dispensing valve assemblies in succession in timed relation with the movement of the containers by belt **8** and roller **10** and with the dip tubes **7** directed downwards towards the containers, see FIGURES 6 and 8. The dispensing valve assembly conveyor means comprises oppositely disposed stationary members **11**, **12** between which the closure member **1** is supported for free movement lengthwise of the members **11**, **12** by a second rotatable scrolled roller **13** which retains the dispensing valve assemblies in spaced relation and aligned one with each of the containers on the belt **8**, the edges of the closure members **1** protruding from the edge of the guide member **12** for engagement by the scroll of the roller **13**.

As can be seen from FIGURE 6, the stationary members are arranged to support the closure members **1** from opposite sides of the dip tubes **7** and consist of a flat bar **12** arranged to guide only the undersides of the closure members and a U-shaped channel member **11** arranged to guide both the undersides and the upper sides of the closure members.

The dispensing valve assemblies are delivered gravitationally to the guide members **11**, **12** by a chute **14**, FIGURE 9, which receives the dispensing valve assemblies from unscrambling and orienting devices not shown. The

guide members **11**, **12** and the roller **13** move the valve assemblies in the direction of movement of the containers by the belt **8** and converge towards the path of the containers to permit the insertion of the dip tubes **7** into the containers as illustrated in FIGURES 6 and 9.

Guide means are engageable with the dip tubes **7** during movement of the dispensing valve assemblies by the dispensing valve assembly conveyor means **11**, **12**, **13** and are arranged to guide the free ends of the dip tubes into the containers. These guide means are provided primarily because of the curved shape of the free ends of the dip tubes and to ensure that the free ends of the dip tubes enter the mouths of the containers and do not foul the tops of the containers. The guide means, as illustrated in the drawings, comprise an endless chain conveyor **15** which is supported by a frame **16** to be divergent from the plane of the dispensing valve assembly conveyor and convergent towards the plane of the container conveyor, see FIGURES 3 and 6. The chain conveyor carries dip tube engaging elements arranged first to engage a dip tube at a position in the vicinity thereof at which it attaches to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof, see FIGURES 6 and 8. The dip tube engaging elements each consist of a plate **17** secured to the chain conveyor **15** and provided with a slot **18** in which the dip tube is located while being guided by the plate, see FIGURE 6.

The apparatus is driven by an electric motor **19**, FIGURE 4, through a gear box **20** which drives a sprocket wheel **21** connected by a chain **22** with a sprocket wheel **23** rotatable with a shaft **24**, FIGURE 3. Shaft **24** also carries a sprocket wheel **25** which, by a chain **26**, drives a sprocket wheel **27** on a shaft **28**. Shaft **28** carries a further sprocket wheel **29** which, through chain **30**, drives a sprocket wheel **31** on a shaft **32** by which the belt **8** is driven.

The shaft **24** also carries a gear wheel **33**, FIGURE 4, which meshes with a gear wheel **34** carried by a shaft **35**. A sprocket wheel **36** on shaft **35**, through a chain **37**, drives a sprocket wheel **38**, which, in turn, drives a universal coupling **39**, FIGURE 5, connected to the scrolled roller **10** to effect rotation thereof. Also carried by shaft **24** is a further sprocket wheel **40** which, through chain **41**, drives a sprocket wheel **42** connected with scrolled roller **13** to effect rotation thereof. A sprocket wheel **43**, FIGURE 4, on shaft **35**, through a chain **44**, drives the endless chain conveyor **15**.

When the apparatus is in operation containers are moved in succession by the belt **8** and roller **10** while dispensing valve assemblies are fed by the roller **13** and are aligned one with each container. As a valve assembly is located above a container the upper end of the dip tube is engaged in the slot **18** of a plate **17** and as the valve assembly is lowered towards the container the plate **17** moves towards the free end of the dip tube and centres the free end of the tube relative to the mouth of the container for insertion into the container, see FIGURES 6 and 8. When the free end of the dip tube has been introduced into the container the plate **17** is disengaged from the dip tube and the movement of the valve assembly towards the container is continued until the valve assembly leaves the guides **11**, **12** and drops on to the container. The container having the valve asembly assembled therewith is then moved to a clinching device, not shown, by which the hook portion **2** of the closure member **1** is clinched to the mouth-defining portion **4** of the container.

The apparatus described above is that which is preferred for carrying the invention into effect but it will be understood that if desired other components than those specifically described can be employed for carrying out the functions as described herein.

I claim:

1. Apparatus for assembling with containers dispensing valve assemblies each of which includes a closure member adapted for connection with the mout-defining portion of a container and carries a valve mechanism fitted with a dip tube, comprising container conveyer means arranged to move containers mouths uppermost in succession and in predetermined spaced relation, dispensing valve assembly conveyor means disposed above the path of the containers and arranged to move dispensing valve assemblies in succession in timed relation with the movement of the containers and with the dip tubes directed downwards towards the containers, said dispensing assembly conveyor means moving the dispensing valve assemblies in the direction of movement of the containers and converging towards the path of the containers to effect the insertion of the dip tubes into the containers, an endless conveyor supported to be divergent from the plane of said dispensing valve assembly conveyor means and convergent towards the plane of the container conveyor means in the direction of movement thereof, and dip tube engaging elements carried by the endless conveyor and arranged first to engage a dip tube at a position in the vicinity thereof at which it is attached to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof thereby to guide the free ends of the dip tubes into the containers.

2. Apparatus according to claim **1**, wherein each dip tube engaging element comprises a plate secured to the endless conveyor and having a slot in which the dip tube is located while being guided by the plate.

3. Apparatus for assembling with containers dispensing valve assemblies each of which includes a closure member adapted for connection with the mouth-defining portion of a container and carries a valve mechanism fitted with a dip tube, comprising an endless belt conveyor by which the containers are supported with the mouths thereof uppermost, a rotatable scrolled roller extending lengthwise of the belt conveyor and operable to engage containers supported by the belt and to retain them in pre-determined spaced relation, dispensing valve assembly conveyor means disposed above the path of the containers and arranged to move dispensing valve assemblies in succession in timed relation with the movement of the containers and with the dip tubes directed downwards towards the containers, said dispensing assembly conveyor means moving the dispensing valve assemblies in the direction of movement of the containers and converging towards the path of the containers to effect the insertion of the dip tubes into the containers, an endless conveyor supported to be divergent from the plane of said dispensing valve assembly conveyor means and convergent towards the plane of the container conveyor means in the direction of movement thereof, and dip tube engaging elements carried by the endless conveyor and arranged first to engage a dip tube at a position in the vicinity thereof at which it is attached to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof thereby to guide the free ends of the dip tubes into the containers.

4. Apparatus according to claim **3**, wherein each dip tube engaging element comprises a plate secured to the endless conveyor and having a slot in which the dip tube is located while being guided by the plate.

5. Apparatus for assembling with containers dispensing valve assemblies each of which includes a closure member adapted for connection with the mouth-defining portion of a container and carries a valve mechanism fitted with a dip tube, comprising container conveyor means arranged to move containers mouths uppermost in succession and in pre-determined spaced relation, stationary members arranged to support the closure members from opposite sides of the dip tubes and consisting of a flat bar arranged to guide only the undersides of the closure members and a U-shaped channel member arranged to guide both the undersides and the upper sides of the closure members, a scrolled roller extending

lengthwise of said flat bar and U-shaped channel member and operable to engage closure members supported by the bar and U-shaped channel member and to effect movement of the dispensing valve assemblies towards containers supported by said conveyor means with the dip tubes directed downwards towards the containers, said bar and U-shaped channel member and scrolled roller converging towards the path of the containers to effect the insertion of the dip tubes into the containers, and guide means engageable with the dip tubes during movement of the dispensing valve assemblies by the dispensing valve assembly conveyor means and arranged to guide the free ends of the dip tubes into the containers.

6. Apparatus according to claim 5, wherein the guide means comprises an endless conveyor which is supported to be divergent from the plane of the dispensing valve assembly conveyor means and convergent towards the plane of the container conveyor means in the direction of movements thereof, and dip tube engaging elements carried b ythe endless conveyor and arranged first to engage a dip tube at a position in the vicinity thereof at which it is attached to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof.

7. Apparatus according to claim 6, wherein each dip tube engaging element comprises a plate secured to the endless conveyor and having a slot in which the dip tube is located while being guided by the plate.

8. Apparatus for assembling with containers dispensing valve assemblies each of which includes a closure member adapted for connection with the mouth-defining portion of a container and carries a valve mechanism fitted with a dip tube, comprising an endless belt conveyor by which the containers are supported with the mouths thereof uppermost, a first rotatable scrolled roller extending lengthwise of the belt conveyor and operable to engage containers supported by the belt and to retain them in pre-determined spaced relation, stationary members operable to support the closure members for movement lengthwise of said stationary members, a second scrolled roller extending lengthwise of said stationary members and operable to engage closure members supported by the stationary members and to effect movement of the dispensing valve assemblies towards containers supported by the belt conveyor with the dip tubes directed downwards towards the containers, said stationary members and second scrolled roller converging towards the path of the containers to effect the insertion of the dip tubes into the containers, an endless conveyor supported to be divergent from the plane of said dispensing valve assembly conveyor means and convergent towards the plane of the container conveyor means in the direction of movement thereof, and dip tube engaging elements carried by the endless conveyor and arranged first to engage a dip tube at a position in the vicinity thereof at which it is attached to the valve mechanism and thereafter to slide relative to the dip tube towards the free end thereof, during movement of the dispensing valve assemblies by the second scrolled roller to guide the free ends of the dip tubes into the containers.

9. Apparatus according to claim 8, wherein each dip tube engaging element comprises a plate secured to the endless conveyor and having a slot in which the dip tube is located while being guided by the plate.

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