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 388. (Inquired), 390, 392

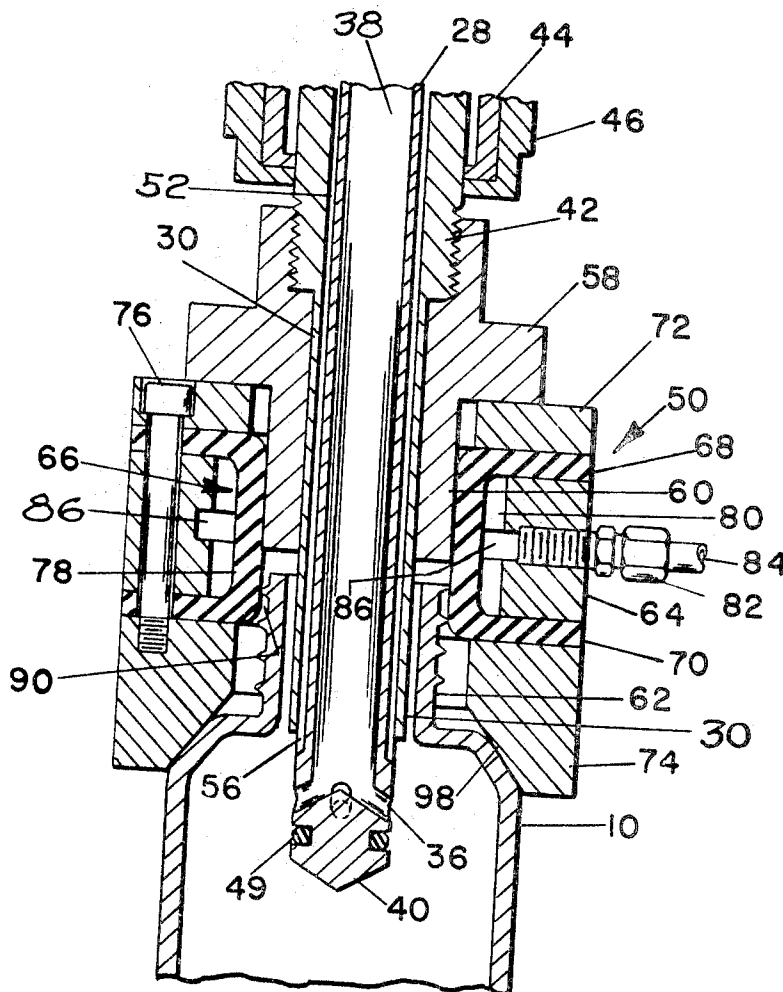
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Primary Examiner—Houston S. Bell, Jr.

[54] **FILLING MACHINE**
 1 Claim, 3 Drawing Figs.

[52] U.S. Cl. 141/392,
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 B67c 3/00

ABSTRACT: A resilient pneumatically operated seal between the neck of a container to be filled and a portion of the filling nozzle to provide an airtight seal during the filling operation.



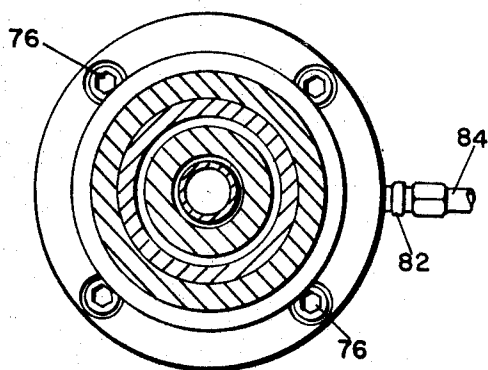


Fig. 3

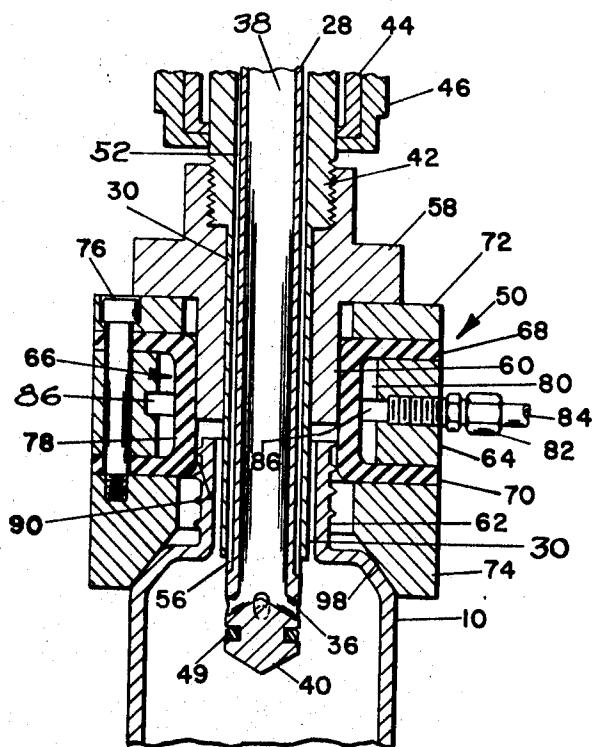


Fig. 2

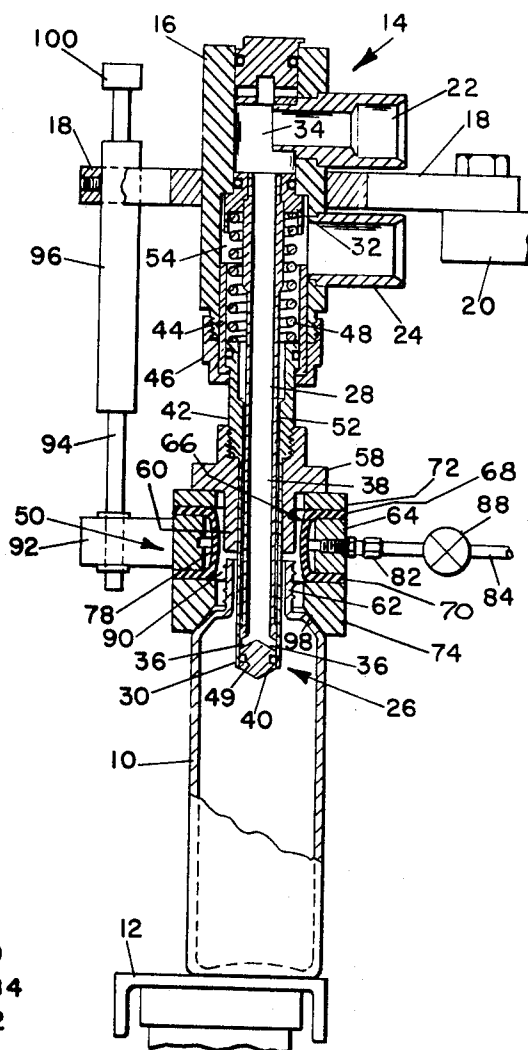


Fig. 1

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FILLING MACHINE

This application is a continuation of U.S. Pat. No. application Ser. No. 614,475, filed Feb. 7, 1967, which is now abandoned.

The invention has for an object to provide a novel and improved container filling machine having novel means for providing an airtight seal between the filling nozzle and the container during the filling operation.

The invention has for a further object to provide a novel and improved container filling machine of the character specified wherein the sealing means is particularly adapted to provide a seal between a filling nozzle and a semirigid container in a manner such as to avoid distortion of the container during the filling operation.

With these general objects in view and such others as may hereinafter appear, the invention consists in the filling machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a cross-sectional view of a portion of a filling machine showing a filling head embodying the present invention;

FIG. 2 is an enlarged cross-sectional view of a portion of the filling head shown in FIG. 1 and showing the parts in a different position of operation; and

FIG. 3 is a cross-sectional plan view of the filling head portion shown in FIG. 2.

In general, the present invention contemplates a container filling machine of the type wherein it is required to seal the filling nozzle in airtight relation to the container during the filling operation. Prior to the present invention it has been the practice to form such a seal by providing the filling nozzle with a resilient sealing element which would engage the top or mouth of the container when the nozzle was extended into the container. While this expedient is in common use in filling machines for filling rigid containers such as glass, metal or other rigid containers, it was found in practice that when semirigid containers such as plastic bottles were to be filled, the pressure of the resilient seal against the mouth of the semirigid bottle would tend to distort and deflect the plastic material downwardly to an extent such that a uniform filling height could not be maintained in successive containers being filled.

In accordance with the present invention provision is made for sealing the neck of a semirigid container such as a plastic bottle to a portion of the nozzle to provide an airtight seal during the filling operation. In the illustrated embodiment of the invention, the sealing element comprises an annular member of resilient rubberlike material which is of an internal diameter such as to admit the neck of the bottle and a portion of the nozzle and which is arranged to be contracted radially inwardly into engagement with the neck and the nozzle portion to provide an airtight seal. By this expedient it will be seen that lateral pressure around the neck of the plastic bottle will not effect any deflection of the bottle downwardly, thus permitting uniform levels of filling heights in successive bottles. Provision is also made for pneumatically contracting the rubberlike annular sealing member into engagement with the neck of the bottle and the nozzle portion. The present sealing element is supported independently of the filling nozzle rather than being carried by the nozzle as will hereinafter appear.

Referring now to the drawings, the present invention is shown as embodied in a bottle filling machine of the type wherein a bottle 10 to be filled is supported on a platform 12 arranged to be elevated to present the bottle into operative relation to a filling head indicated generally at 14. The filling head includes a hollow nozzle block 16 supported in a bracket 18 attached to the frame 20 of the machine. The nozzle block is provided with an inlet pipe 22 which may be connected to a source of supply of the liquid to be introduced into the bottle. An outlet pipe 24 is also provided in the nozzle block as shown.

The filling nozzle, indicated generally at 26, includes an inner tubular nozzle member 28 which is fixed in the nozzle block, and an outer tubular nozzle member 30 supported for movement vertically in the nozzle block. The upper end of the inner nozzle 28 is connected to an adapter 32 fixed in the nozzle block, and the central passageway 38 is in communication with the liquid chamber 34. The lower end of the inner nozzle 28 is provided with liquid escape openings 36 in communication with the central passageway 38. The lower end of the inner nozzle 28 is also provided with a valve member 40 for cooperation with the outer nozzle 30 which is arranged to close the liquid escape openings 36 when the bottle is in its lowered position, and when the bottle is elevated into filling position, the outer nozzle 30 is moved vertically to expose the liquid escape openings 36, as shown in FIG. 2, and start the filling operation. The upper end 42 of the outer nozzle 30 is slidably engaged with a bushing 44 fitted within the lower end of the nozzle block and held therein by a threaded retainer 46. A spring 48 disposed within the block and coiled about the upper end of the inner nozzle 28 is interposed between the adapter 32 and the upper end 42 of the outer nozzle 30.

The valve end 40 of the inner nozzle 28 fits snugly within the inside diameter of the outer nozzle, and is engaged in airtight relation therewith by an O-ring 49. However, it will be observed that the portion of the inner nozzle above the valve end is reduced in diameter and forms with the outer nozzle an annular passageway 52 in communication with a chamber 54 and the outlet pipe 24. The lower end of the annular passageway 52 is opened to the interior of the bottle as indicated at 56 when the outer nozzle is elevated to start the filling operation as described. A flanged member 58 surrounding the outer nozzle and threadedly engaged with the portion 42 thereof is provided with a depending tubular portion 60 as shown.

Provision is made for forming an airtight seal between the neck 62 of the bottle 10, and the depending tubular portion 60 of the filling nozzle. As herein shown, the sealing device indicated generally at 50 includes an intermediate ring 64; an annular spool-shaped elastic member 66 whose upper and lower flanges 68, 70 embrace the intermediate ring 64; an upper collar 72 engaging the upper flange 68; and a lower collar defining a nozzle guide 74 which bears against the lower flange 70, the parts being held together in assembled relation by bolts 76. In practice, the depending tubular portion 60 of the nozzle assembly is made of a diameter substantially equal to the diameter of the neck 62 of the bottle.

As thus assembled, it will be seen that the vertical wall 78 of the elastic member forms with the intermediate ring 64 an annular chamber 80 which is connected to a source of compressed air by a pipe nipple 82 and supply pipe 84. The inside diameter of the intermediate ring 64 is grooved at 86 to provide an initial path for the compressed air. It will be understood that the compressed air line 82 is provided with a suitable control valve diagrammatically indicated at 88. It will be seen that when the elastic ring 66 is in its deflated condition, as shown in FIG. 1, ample clearance is provided for the neck 62 of the bottle to extend into one end of the opening 90 defined by the elastic ring 66, and the opening also provides ample clearance at the other end for receiving the depending tubular portion 60 of the nozzle.

The sealing device 50 is independently supported as indicated in FIG. 1 wherein an extension 92 from the intermediate ring 64 is connected by a slide rod 94 supported by and movable vertically in a slide bearing 96 which may be clamped to the bracket 18. In operation, when a bottle 10 placed on the platform 12 is elevated, it engages the nozzle guide 74 which is provided with a flared opening 98 arranged to receive the neck of the bottle and to engage the shoulders of the bottle to align it with its filling nozzle. As the bottle moves upwardly, the rod 94 slides up in its bearing, and when the platform is subsequently lowered, the nozzle guide with the sealing device 50 moves downwardly. The upper end of the rod is provided with a collar 100 which engages the upper

surface of the bearing member 96 to limit the downward movement of the sealing unit.

From the description thus far it will be seen that in operation the nozzle guide 74 with its sealing unit 50 serves to align the bottle with its nozzle 26 which is extended into the bottle and to present the neck 62 of the bottle within the opening 90 of the resilient and inflatable ring 66 during the initial elevating movement. Upon continued upward movement the sealing unit 50 is elevated with the bottle to extend the depending portion 60 of the flange 58 within the upper end of the opening 90 and to engage the plate 72 with the underside of the flange 58. Further upward movement will lift the outer nozzle 30 against the tension of the spring 48 to expose the openings 36 and to expose the lower end 56 of the annular passageway 52. During such upward movement the valve 88 is opened to admit air into the chamber 80 to thus inflate the resilient ring 66 into sealing engagement with the neck 62 of the bottle and with the depending portion 60 of the flange 58 carried by and movable with the nozzle as shown in FIG. 2.

During the filling operation, the liquid entering the pipe 22 from the supply will flow through chamber 34, central passageway 38 and communicating openings 36 into the bottle and the air displaced by the liquid will pass upwardly through the annular passageway 52, chamber 54 and pipe 24 to the atmosphere. In practice, the liquid may be supplied to the nozzle by gravity or from a source under pressure, and when the bottle has been filled to a predetermined height, the elevating platform 12 is caused to be lowered to permit lowering of the outer nozzle 30 to cover the openings 36 and to cooperate with the valve 40. The valve 88 is then operated to permit deflation of the contractible ring 66. The present sealing device may also be used with advantage in a vacuum type

filling machine wherein the outlet pipe 24 may be connected to a source of vacuum. In operation, the container may be evacuated after being elevated into filling position, and the liquid withdrawn from the supply into the container. When the liquid reaches the end 56 of the annular passageway, the surplus liquid is drawn off by the vacuum to be returned to the supply.

From the above description it will be seen that the present invention provides a novel and improved filling machine having novel sealing means comprising a contractible ring for sealing the mouth of a container to the filling nozzle during the filling operation, and which is particularly adapted for sealing the mouth of a semirigid container such as a plastic bottle to the filling nozzle in a manner such as to substantially eliminate any downward sealing pressure which might distort the semirigid container.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

We claim:

1. In a filling machine, in combination, a filling head having a nozzle extendible into the open mouth of a semirigid container having a neck portion, a resilient ring contractible radially inwardly about said neck portion at a point below the mouth of the container and simultaneously about a portion of said nozzle spaced upwardly from the mouth whereby to provide an airtight seal between the container and the filling nozzle while avoiding any vertical downward sealing pressure against the top of the container which might effect distortion of the semirigid container and variation in the filling level.

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