J. M. FALLS & L. P. WILLIAMS.

BOTTLE FILLING MACHINE.

APPLICATION FILED AUG. 26, 1908.

940,138.

Patented Nov. 16, 1909.

Fig. 1

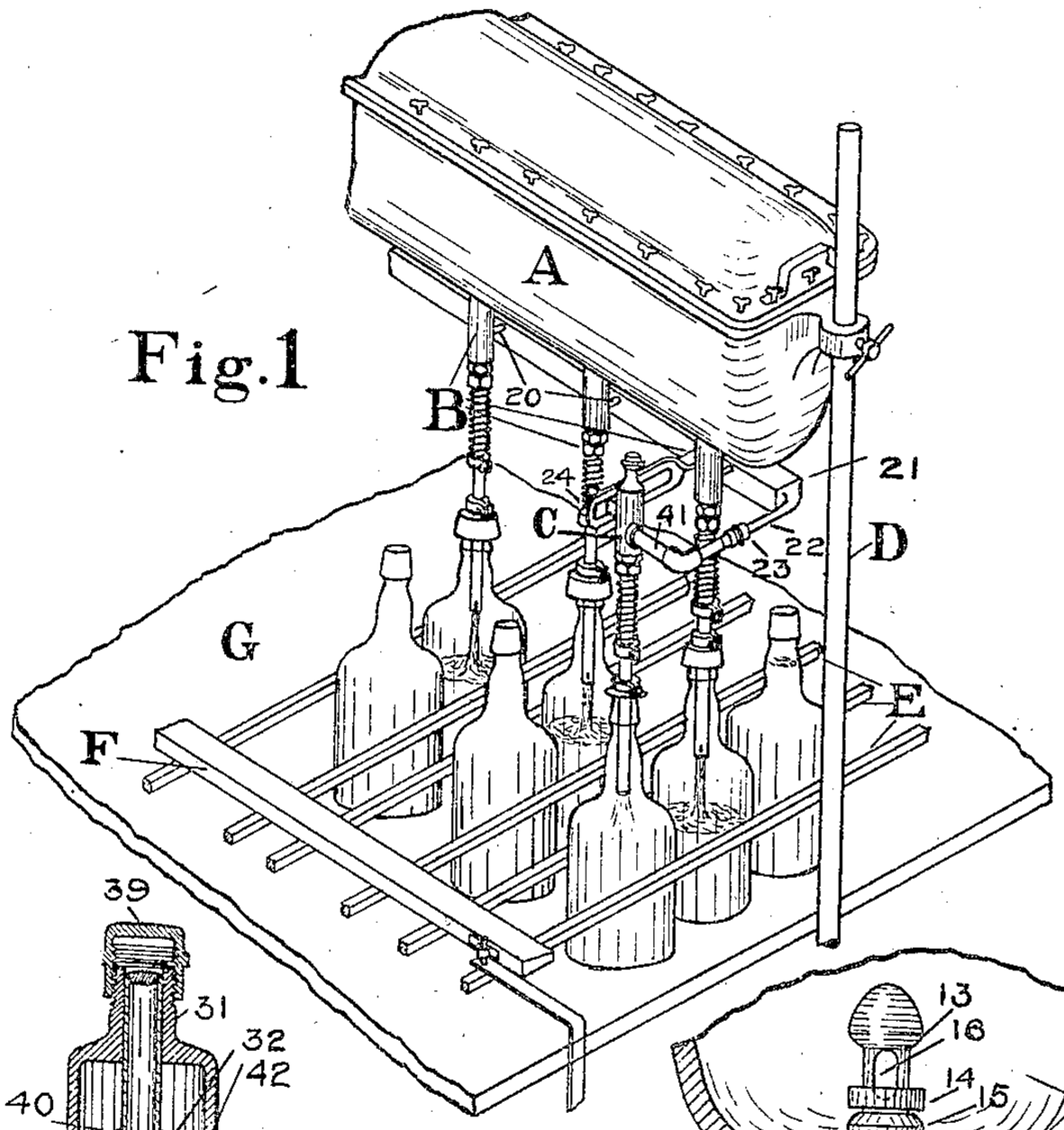


Fig. 2




Fig. 3

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## BOTTLE-FILLING MACHINE.

940,138. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed August 26, 1908. Serial No. 450,346.

*To all whom it may concer .:*

Be it known that we, JAMES M. FALLS and LEONARD P. WILLIAMS, of the city of Louisville, county of Jefferson, and State of Kentucky, have invented new and useful Improvements in Bottle-Filling Machines and that the following is a full, clear, and exact description of same.

Our invention relates to that class of bottle filling machines in which the liquid is introduced into the bottles through tubes, the bottles being tightly stopped, and the air displaced by the incoming liquid is permitted to escape through a passage provided for that purpose, either within or without the filling-tube. In such machines, if a bottle becomes full to the level of the air-outlet, and the supply of liquid is not at once cut off, the liquid will be forced through the air-tube.

The objects of the presence invention are first: to provide for the automatic disposition of the said overflow from the air tubes in such a way as to avoid undue exposure of the liquid to the air or containing vessels likely to alter it, and second: to provide an effective and positive method of sealing the said air tubes and passages while bottles are being changed, thus avoiding drippage from either end of same.

Reference is made to the accompanying drawings, in which similar letters and figures indicate similar parts.

Figure 1 is a perspective view of one end of the filling tank of a bottle filling machine, together with one of the two standards which support it; showing also part of the bed with bottles thereon, several of the filling tubes depending therefrom and the overflow conduit and overflow delivery-tube connected with same. Fig. 2 shows a vertical front section, of the overflow delivery-tube, being a detail drawing of the tube marked C in Fig. 1. Fig. 3 shows a side view of one form of filling tube, being a detailed drawing of the tubes marked B in Fig. 1; with a part of the upper portion cut away to show the interior.

As shown in these specifications, the improvements have been applied to that class of bottle filling machines in which the filling tank carries filling tubes depending therefrom. and is firmly attached to vertically reciprocating standards. Variations from this type do not affect the usefulness or applicability of our invention but for clearness one mode of its application is described in detail.

A is a tank into which is led, preferably under pressure, the liquid to be introduced into the bottles. This tank is supported by two standards like that at D, one at either end, to which standards it is attached by clamps permitting its adjustment at various heights depending on the height of the bottles to be filled. From the lower part of the filling tank A depend filling tubes like that shown at B, designed to enter the necks of bottles standing beneath. The standards, tank and tubes are, in the form of the mechanism shown, designed to have a vertically reciprocating motion, the downward thrust introducing the tips of the tubes B into the mouths of empty bottles and at the same time admitting liquid from the filling tank through the tubes into the bottles; the upward motion withdrawing the tips from the bottles and shutting off the liquid supply.

G is the bed of the machine, supported on a suitable frame not shown in the figures. Guide rods shown at E, supported at a convenient distance above the bed, govern the progress of bottles as they advance to a filling position, and a rod F, by suitable mechanism not shown in the figure, is propelled the width of a bottle toward the row of filling tubes, during the last part of the up stroke of the tubes and tank; and moved rearwardly during the down stroke to its former position, leaving a space for the insertion of bottles while others are filling. The guides E the rod F, with a means for producing a vertically reciprocating motion of the tubes and tank and of producing the motion of the rod F are fully described in United States Letters Patent No. 892,483, granted July 7, 1908 to the applicants herein.

The filling tubes employed here, which are shown at B in Fig. 1 and also illustrated in Fig. 3, are fully described in the application for Letters Patent of the United States filed November 9th, 1907, Serial Number 401,449, by James M. Falls, and their invention claimed therein. No particular form of filling tubes is essential to use of the present invention provided the bottle to be filled is closed during filling except for

the tube through which liquid enters and except for a second outlet for the escape of the contained air. The Falls tube is adopted in this description only for clearness and concreteness. The said filling tubes here employed consist essentially (see Fig. 3) of a perforated cylinder 10 screwed into the lower wall of the filling tank A, a closed collar or jacket 11 surrounding the perforated cylinder 10 so as to make an air tight chamber, and a movable filling tube proper 12 closed at the top, sliding through said chamber and into the filling tank, further provided with an annular projection 13 at the top within said filling tank which projection is designed when the tube 12 slides downward, to form an air tight connection by means of the seat ring 14 and the fixed seat 15. Perforations in the walls of the sliding tube immediately below the annular projection 13 form a free communication between the bore of the tube and the filling tank, when the tube 12 is in a raised position so as to unseat the valve 13, 14, 15, which communication is destroyed when said valve is closed.

Within the sliding tube 12 is sealed a smaller tube opening below at $12^a$ in the wall of the tube 12 near its end and above at $12^b$ in the wall of the said tube at such point that when the said tube is pushed upward the inner tube opens into the chamber formed by the cylinder 10 and the jacket 11 but when the tube is pulled downward so that the valve 13, 14, 15 is closed, the said upper opening of the inner tube is closed by coming opposite the bearing through which the tube 12 slides in the lower wall of the chamber. A cap 17 containing a cushion of rubber or other elastic material is firmly attached to the lower portion of the sliding tube and adapted, when the tank and tubes are lowered so that the said cushion rests firmly on the bottle mouth, hermetically to close same. A compression spring 18 bearing against the fixed clamp 19 and the lower portion of the fixed portion tends to keep the tube 12 pulled downward and the valve at 13, 14, 15 closed at all times except when the reaction of the bottle mouth upon the cap 17 forces the tube up and the valve open. The passage 20 forms an outlet from the interior of the chamber formed by the cylinder 10 and the jacket 11 and leads to the conduit 21.

The conduit 21, best seen in Fig. 1, also shown in section in Fig. 3, is closed at one end (not shown in the drawing) and at the other terminates in a tube 22 with which the tube 41 is slidably connected through a slide joint 23. The various filling tubes are provided with tubes as before described connecting the air chamber of each with the conduit 21.

Fastened to the under side of the tank A is a brace or support 24 pierced with a slot 25 in which slides a projection $25^a$ on the upper portion of the overflow delivery tube C described in detail hereinafter. The said delivery tube is capable of fixed adjustment at varying distances from the filling tank by means of a thumb screw 26.

In the overflow delivery tube C above mentioned a cylindrical head piece contracted top and bottom and provided externally with the projection $25^a$ adapted to slide in slot 25 is bored within so as to form a chamber and is pierced by an opening terminating in a tube 41 which leads through the slip joint 23 into the tube 22. In the lower contracted portion of the bore of the cylindrical head piece and forming a portion of the floor of the above mentioned chamber is screwed a gland 27. Axially through the cylindrical head piece slides the delivery tube proper 30, which is closed above the point 33. At its upper end it slides through and is guided by an opening 31 in the said head piece just large enough to permit easy sliding and below it slides through the gland 27 and the packing nut 29. At a part of the said sliding tube within the chamber is integrally attached an annular projection 32 the under surface of which is ground to a slight convex curve and designed with a seat ring 42, concavely curved both above and below, to rest when the tube is depressed on a convexly curved seat 28 screwed into the gland 27, the whole forming a perfect seal.

Below the annular projection 32 two openings 33 pierce the walls of the filling tube 30, said openings so long as the tube 30 is raised forming a communication between said tube and the chamber. When the tube 30 is depressed so that the valve 28, 32 is closed, this communication is interrupted both by the said valve and by the openings 33 passing into the bearing at 28.

The clamp 35 adjustably attached to the free portion of the tube proper 30 supports a compression spring 36 which tends to keep the tube 30 pulled down and the valve 28, 32 closed. A second and lower adjustable clamp 37 is loosely attached by a single screw to a bearing plate 38 which is corrugated on its under side and perforated.

The cap 39 at the top of the head piece protects the bearing from dust.

The operation of the apparatus is briefly as follows:—A row of bottles being beneath the filling tube B, a second row of empty bottles in place in front of them and the tube C being adjusted at such a distance from the filling tank as to enter a bottle of the second row, the tank and tube are depressed by proper mechanism and the rod F simultaneously moves back, leaving a space between itself and the second row of bottles for placing a third row while the first is filling.

When the contact plate 38 of the delivery tube C strikes the mouth of the empty bottle of the second row for which it has been adjusted, the delivery tube proper 30 within same is pushed upward, compressing the spring 36 and opening a free passage through the perforations 33 for the escape of the contents of the chamber 40. At approximately the same time the pad within the cap 17 of each of the filling tubes B strikes the top of the bottle underneath it, and the tube 12 is pushed upward, compressing the spring 18 and opening the valve 14, 15, 16 so that liquid flows from the filling tank A through the filling tube proper 20 into the bottles. As the bottles fill, the contained air entering the inner air tube at $12^a$ passes up into the chamber 10, 11 out through the tube 20, the conduit 21, the tubes 22 and 41, and the delivery tube C. When the bottle is so full as to cover the lower opening $12^a$ of the air vent, the liquid ceases to rise in the neck of the bottle, but during the interval until the operator raises the tank and tube, the said liquid is forced through the air tube $12^a$, $12^b$ to the chamber 40, and following the same course as the contained air, discharges eventually through the delivery tube C into an empty bottle of the second row.

When the operator raises the tank A and the attached tubes B, the filling tube valves corresponding to 14, 15, 16 are drawn into place by the spring 18 and the upper air tube openings $12^b$ are partially sealed in each air tube by passing down into the bearings through which the tubes slide. At the same time the overflow delivery tube C closes, the spring 36 bringing the valve 28, 32 to a perfect seal.

As before stated, at the latter part of the upward motion of the tank and tubes the rod F is propelled forward and places in line a new row of bottles to be filled. The fact that one bottle of this row already has a certain amount of overflow liquid therein causes no difficulty inasmuch as the liquid can rise no higher in any bottle than the air vent $12^a$, even though the bottles should reach that point at different times.

Before the present method of sealing all the air tubes at once by a positive valve in a separate delivery tube, the imperfect sealing of the separate air tubes at their upper openings shown at $12^b$ resulted in a certain amount of leaking from the lower opening $12^a$, when no bottles were filling. The device herein described, besides providing for the overflow through the air tubes, avoids absolutely the difficulty above set out by effecting a hermetic and positive closure of the entire air passage by means of the valve 28, 32, capillary attraction being sufficient to retain in the tubes all the liquid therein contained.

We claim as new and desire to protect by Letters Patent the following:—

1. In a bottle-filling machine, an improved delivery apparatus for air and overflow liquids from the bottles while filling, being the combination of a sliding perforated tube closed above the perforation, a valve integrally attached to the sliding tube, means for providing a tight contact between the said valve and the corresponding surface below same in such manner as to seal the sliding tube, a headpiece inclosing a chamber through which the upper portion of said tube slides, and which bears the fixed valve seat, a spring operating to seat said valve, and means for arresting said tube as it enters a bottle beneath, with the air and overflow outlets from a multiplicity of bottles in a different row, and means for conducting the air and overflow liquids into the aforesaid chamber.

2. In a bottle filling machine, the head piece inclosing a cylindrical chamber into which leads an inflow tube, means for firmly holding said head piece at a variable distance in front of a line of filling tubes, a tube closed at the top and designed to slide upward and downward through said chamber, said tube being perforated so that when raised the perforations drain said chamber, and two corresponding valve seats, one integral with the floor of the chamber, the other fixed to the sliding tube, the two being so placed that when the tube slides to its lowest position the chamber is completely sealed with the exception of the inflow tube.

3. In a bottle filling machine, air tubes for the escape of air and overflow liquid from bottles while liquid is entering same and a device for triplicate sealing of the said air and overflow tubes, consisting of an air tube sealed in each of several movable filling tubes, chambers into which said air tubes discharge while the filling tube is discharging but whose walls close the opening of said air tubes when the filling tube is depressed; a conduit leading from said chambers and terminating in a second chamber, a sliding delivery tube in said second chamber perforated so that the perforations drain the chamber when the sliding tube is pushed upward but are closed by the bearing in which the tube slides, when said tube is depressed, and a spring-operated valve concentric with the sliding tube, seating when the tube is depressed and adapted to seal the outflow passage from the chamber.

4. In a bottle filling machine, parts forming a closed passage for conducting the air and overflow liquid from bottles while filling into a bottle or bottles in one of the transverse rows not yet advanced to a filling position, and a spring-actuated valve hermetically closing said air and overflow passage so that no opening appears from end

to end, said valve being closed by a spring and opened by the upward pressure of a bottle-top.

5. In a bottle-filling machine, the combination of a multiplicity of filling tubes provided with air and overflow tubes, parts forming a single closed chamber into which all of said air and overflow tubes deliver without access of air, a slidable tube within said chamber, and a ring-seated valve concentric with said tube, operating when closed to seal the entire length of said air and overflow passage, as well as said slidable tube.

6. In a bottle-filling machine, means for directing air and overflow liquid from bottles while filling into a bottle of another row, embodying an air and overflow conduit, a headpiece inclosing a chamber into which said conduit delivers, said chamber being supported so as to be adjustable at varying distances from the line of filling tubes, a perforated tube slidable within said chamber, and a valve operating to drain said chamber through the tube when said valve is open, and to close the tube when seated, the said valve being operated by the pressure of the bottle into which the overflow is discharged.

7. In a bottle-filling machine employing tubes for the escape of air and overflow liquid from bottles while filling, means for preventing drippage from either end of same while bottles are not filling, embodying the combination of parts furnishing a continuous air-tight passage from each bottle through a common conduit to the place of discharge, and a valve preventing flow of air or liquid in either direction in said passage, while bottles are not filling.

8. In a bottle filling machine, a delivery tube and attachments for discharging air and overflow liquid from bottles in process of filling into an isolated bottle simultaneously with the filling of the bottles, the said device consisting of a top piece forming a chamber and a perforated valve-closed tube sliding therethrough, a lug attached to the top piece, a slotted bracket integrally fastened to the body of the machine, and designed to receive said lug, a thumb-screw designed to fasten said lug at any desired position in the slot, a conduit tube delivering into the chamber previously mentioned, and a slip-joint in said conduit tube to permit the adjustment of said delivery tube and attachments at varying distance from the line of filling tubes.

9. In a bottle-filling machine, air and overflow tubes from the bottles, means for delivering the air and overflow liquid from all bottles into one of a row of unfilled bottles, and a drip-preventing valve operated by the pressure of the bottle into which the overflow is discharged, and independent in its action of bottles which are being filled.

10. The combination with a multiplicity of filling tubes in a bottle filling machine, each provided with a tube for the escape of air from the bottles while filling, of an overflow conduit draining said air tubes, a spring-actuated delivery-tube placed so as to deliver overflow liquid from the aforesaid conduit into a bottle not yet in filling position, but in a row later to take such position, and a ring valve attached to said overflow delivery tube and adapted to close hermetically the overflow conduit.

11. In a bottle filling machine, parts forming a chamber for air and overflow liquid from bottles while filling, means for supporting same at a varying distance from the line of filling tubes, means for conducting air and overflow liquid from bottles while filling to said chamber, a perforated tube closed at the top and sliding through said chamber, an annular projection on said tube within the chamber, means for seating said projection so as to close the said tube, a clamp attachable to the sliding tube, a spring tending to draw the tube downward, a second clamp attached to the tube below the first-named clamp, a bearing plate attached thereto, and means thereon for preventing closure of the bottle by said bearing plate.

12. The combination in a bottle-filling machine of means for stoppering bottles while filling, except for a filling-tube and an air and overflow tube which penetrate the stopper, a common closed reservoir into which said air and overflow tubes deliver, the whole of said passage for air and overflow being air-tight except at the open ends of same, a spring-actuated perforated tube vertically slidable through said reservoir, and a valve in connection therewith permitting when open escape of air and overflow liquid through said tube, but when closed preventing by atmospheric pressure the escape of liquid at either end of said passage.

13. In a bottle filling machine, the combination with a multiplicity of filling tubes provided with valves regulating the flow into bottles, of an air and overflow discharge apparatus, consisting of a chamber into which the air and overflow liquid from bottles while filling is delivered, a continuous closed passage for said overflow, an outlet for air and liquid penetrating said chamber so as to drain same, a valve for regulating said outlet, and means for automatically opening and closing the said valve coincidently with the opening and closing of the valves regulating flow into the bottles.

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