

June 26, 1951

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2,558,238

NONSPASH DISCHARGE NOZZLE TIP

Filed Feb. 21, 1945

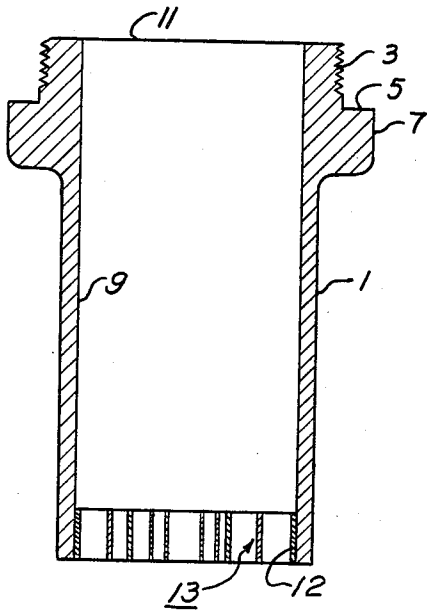


Fig. 1

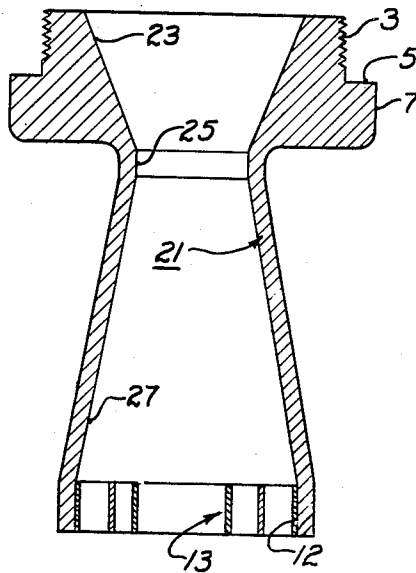


Fig. 3

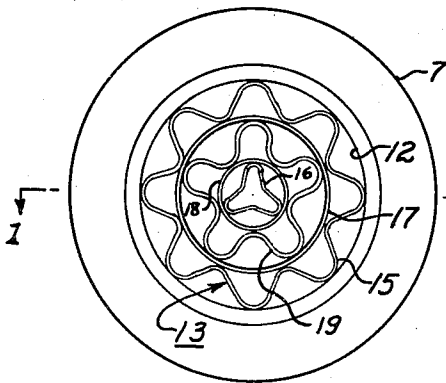


Fig. 2

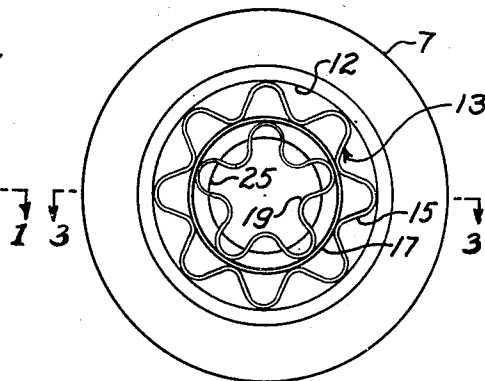


Fig. 4

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2,558,238

NONSPLASH DISCHARGE NOZZLE TIP

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Application February 21, 1945, Serial No. 579,002

1 Claim. (Cl. 299—113)

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This invention relates to a liquid discharge nozzle tip. More specifically, it relates to a nozzle tip which eliminates splashing of the liquid as it flows from the end of the tip.

In various filling operations, it is desirable to fill a series of containers on a conveyor rapidly. Difficulty has been experienced in filling at a high velocity without splashing the liquid, which would soil the exterior of the container. Soiling of the container exterior is undesirable from a sales and handling standpoint.

It is often customary to make up case lots of these containers in corrugated cartons and in this case such splashed liquid on the exterior of the container would soil the carton and an excessive amount would weaken it.

The other alternative is to wipe the exterior of such cans either by manual or automatic means, and such procedure adds an unnecessary operation and increases the production expense.

It is therefore an object of applicant's invention to provide a discharge nozzle tip which will prevent splashing.

It is another object of the invention to provide a discharge nozzle tip which shapes the stream of discharging liquid into a smoothly flowing stream.

It is still another object of the invention to provide a discharge nozzle which will straighten the flow of liquid prior to its discharge from the nozzle.

It is yet another object of the invention to provide a discharge nozzle which so shapes the discharge flow as to eliminate eddy currents.

It is a further object of the invention to provide a nozzle which has a series of straightener vanes mounted adjacent the discharge opening.

It is still another object of the invention to provide a nozzle tip having a series of straightener vanes adjacent the discharge end of the nozzle and a conduit of Venturi shape upstream of the vanes.

It is yet another object of the invention to provide a nozzle tip having a series of open ended cells disposed adjacent the discharge end of the nozzle.

It is another object of the invention to provide a series of straightener vanes adjacent the discharge end of the nozzle which vanes are parallel to the axis of the nozzle.

These and other objects of the invention will become apparent from a study of this specification and the drawings which are attached hereto and made a part hereof, and in which:

Figure 1 is a vertical section of the nozzle tip

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taken on the line 1—1 of Figure 2, showing the straightener vanes.

Figure 2 is an end view of Figure 1, showing the cellular construction of the vanes.

Figure 3 is a vertical section of a modified nozzle tip taken on the line 3—3 of Figure 4, showing a venturi and straightener vanes.

Figure 4 is an end view of the device of Figure 3.

Referring to the drawings, the numeral 1 designates the body of the nozzle tip. Threads 3 are formed on the inlet end of the body and the surface 5 on flange 7 is machined for attaching the tip in sealing relation to a nozzle not shown.

The bore 9, shown in Figures 1 and 2, extends the length of the body and has an inlet at 11 and a discharge at 12. A straightener assembly or grill work 13 is inserted in the discharge end 12 of the nozzle tip.

The straightener assembly comprises corrugated rings 15, 16 and 19, and supporting rings 17 and 18. These elements are soldered or joined together by any other suitable means. Like means are employed to retain the straightener assembly in the nozzle tip.

In the modification, shown in Figures 3 and 4, a true venturi, generally shown by the numeral 21, is provided upstream of the straightener assembly 13 which is substantially the same as that disclosed in Figure 1 except one each of the corrugated and supporting rings have been omitted. The venturi is comprised of an inlet 23, a throat 25, and an outlet 27, which terminates in the straightener 13 and the nozzle tip outlet 12.

Operation

The operation of the nozzle tip, as shown in Figures 1 and 2, is as follows:

Liquid entering the inlet 11 may be very turbulent. This turbulence will be evident at the discharge end of a nozzle and is conducive to splashing as the liquid leaves the nozzle tip and as it strikes the sides and bottom of the container or the surface of the liquid in a container partially filled.

The straightener 13 in the discharge end of the nozzle tip divides the stream of liquid into a plurality of small streams, each of which conforms to the cross-section of the particular cell through which it flows.

After passing through the straightener, the small streams merge due to cohesion of the fluid, thus giving a directional flow of fluid slightly toward or converging toward the axis of the nozzle tip. This prevents the "breaking off" of drop-

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lets of fluid from the main column and prevents splashing.

Applicant has found from experiments that the stream issuing from the nozzle tip at a point about an inch below the tip, is constricted so that the cross-sectional area in a plane perpendicular to the axis of the tip is less than the cross-sectional area of the inside of the tip at the outlet. The difference in area has been found to be substantially equal to the cross-sectional area of the grill. This reduced or constricted nature of the stream permits a larger nozzle to be used when filling cans with small openings, because it allows the displaced air to leave the can at the point of maximum constriction.

In the modified form of Figures 3 and 4, the stream is preliminarily straightened by the venturi prior to its subdivision by the straighteners.

The Venturi section of the tip also reduces friction losses in the nozzle tip by reducing the turbulence of the stream as it passes through the portion of the tip which is above the straightener.

It has also been found that the straightener vanes reduce the tendency of the nozzle to drip after the flow of liquid has been stopped.

It is obvious that various changes may be made in the form, structure and arrangement of parts without departing from the spirit of the invention. Accordingly, applicant does not desire to be limited to the specific embodiment disclosed herein primarily for purposes of illustration, but instead, he desires protection falling fairly within the scope of the appended claim.

What I claim to be new and desire to protect by Letters Patent of the United States is:

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In a splash-preventing liquid discharge nozzle tip, adapted to form a stream, comprising a body having a longitudinal axis, an inlet and an outlet, a venturi extending axially substantially the length of said body for shaping said liquid stream, a grill work comprised of an exterior, thin-walled, corrugated ring, a thin-walled supporting ring, and an interior, thin-walled, corrugated ring extending into said discharge said grill being disposed with its walls parallel to said axis for straightening said liquid discharge.

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