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INDICATING NOZZLE

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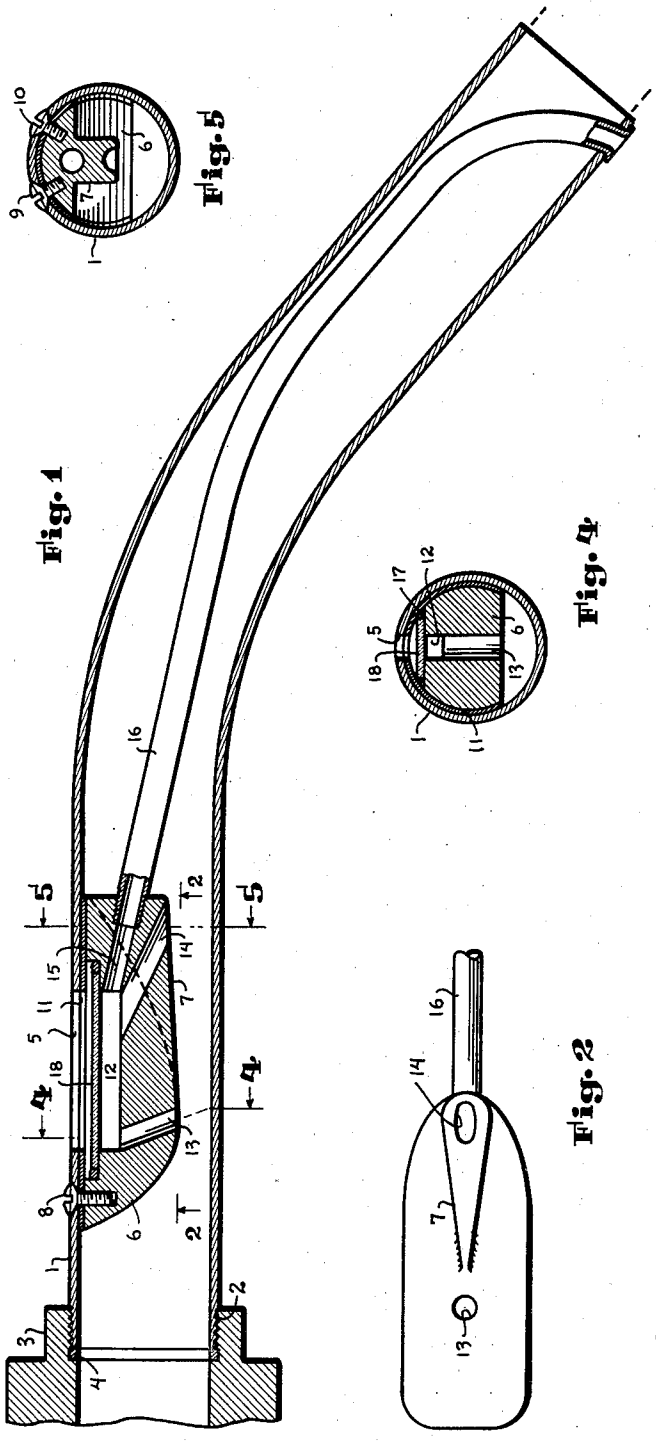


Fig. 1

Fig. 5

Fig. 4

Fig. 2

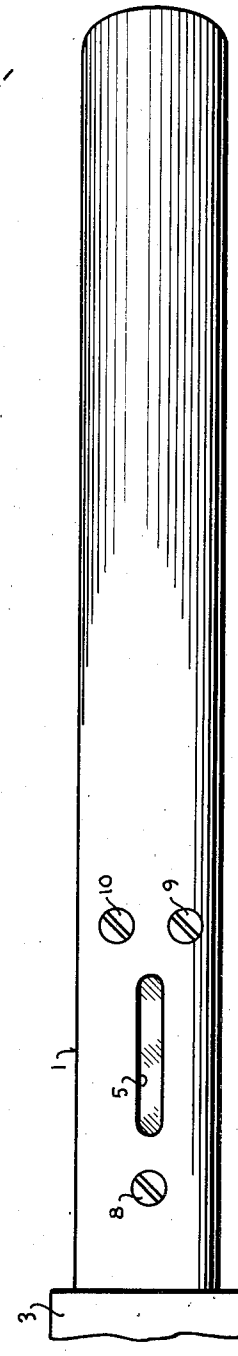


Fig. 3

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INDICATING NOZZLE

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19 Claims. (Cl. 226—66)

This invention relates in general to tank or container filling devices and is particularly concerned with devices of this type which give a visual signal when the container is filled to the desired level.

In the filling station business, considerable difficulty has been experienced in the filling of automobile gasoline tanks without allowing gasoline to overflow. This is due primarily to the design of the later model automobiles in which the streamlined body extends over the gasoline tank thus requiring a relatively long filler tube which runs from the tank to the outer wall of the body. With this arrangement, when a gasoline tank is being filled, it cannot be ascertained that it is full until gasoline appears at the top of the filler tube. These filler tubes are of only a few inches in diameter so that when a filling nozzle is in a filling tube, the interior of the tube is quite dark and the gasoline cannot be seen until its level is within an inch or two of the top. This is too late to shut off the flow of gasoline as the volume of the nozzle will usually be greater than the unfilled portion of the filler tube and thus even when the gasoline flow is shut off, the gasoline in the nozzle will continue to flow into the filler tube with overflowing almost inevitable. This difficulty requires the attendant to be very slow and cautious about filling a gasoline tank and in the majority of cases the exercise of the highest degree of caution will still not avert overflowing.

The primary object of this invention is the provision of a tank or container filling device which provides an instantaneous visual signal when the level in the tank or container being filled reaches a predetermined height.

A further object of this invention is the provision of a device of this character which is simple and rugged in construction and which may be inexpensively produced.

Other and more specific objects of this invention will appear from the following detailed description and from the appended claims.

For a full disclosure of this invention, reference is made to the following description and the accompanying drawing in which:

Figure 1 is a sectional elevation of a preferred form of the indicating nozzle;

Figure 2 is a view of the flow area restrictor taken on line 2—2 of Figure 1;

Figure 3 is a top view of the nozzle showing the indicating portion;

Figure 4 is a section taken on line 4—4 of Figure 1; and

Figure 5 is a section taken on line 5—5 of Figure 1.

Referring now to Figures 1 and 2, reference character 1 indicates a tank filling nozzle which is especially adapted for filling station equipment, this nozzle being formed of a curved tubular member preferably brass which is screw threaded at 2 for attachment to the usual control valve, a portion of which is indicated at 3. A yieldable gasket 4 formed of any suitable material such as soft metal is provided for preventing leakage and also for permitting screwing of the nozzle so as to permit a slot 5 in this nozzle to be face uppermost when the nozzle is screwed tightly into the valve. The slot 5 is preferably elongated and extends longitudinally of the nozzle as shown.

Located within the nozzle or tubular member 1 is a flow area restrictor member 6. This restrictor member is formed partially tear drop in shape so as to cause a minimum pressure drop of the liquid flowing through the nozzle. This restrictor member is also provided with a tail portion 7. This member covers the opening 5 and is secured to the nozzle or tubular member 1 by means of screws 8, 9, and 10, a gasket 11 being provided for preventing leakage of the liquid through the slot 5. Formed within the restrictor member 6 and coinciding with the slot 5 is a sight passage 12, this passage communicating with a suction passage 13 which leads to the interior of the nozzle at a point wherein the flow area is most restricted by the member 6. This passage 13 is preferably inclined in the direction of flow of the stream of liquid so that liquid will not enter the passage 12 through this passage 13. The sight passage 12 also communicates with a liquid inlet passage 14 which extends towards the outlet of the nozzle through the tail portion 7, and opens into the interior of the nozzle at a point near the center of the nozzle and where the flow area is only slightly restricted as shown in Figure 5. The sight passage also communicates with a pilot passage 15 which extends through the tail portion 7 and to which is attached a tube 16 which extends longitudinally of the nozzle to a point adjacent the outlet thereof, then passing through the nozzle wall so as to open to atmosphere.

The outer portion of restrictor member 6 is recessed at 17 as more clearly shown in Figure 4, for receiving a sight glass 18. This glass may be sealed in a leak-proof manner to member 6 by any suitable cement, or if desired a gasket between member 6 and this sight glass may be provided, the entire assembly being held to-

gether by the screws 8, 9, and 10 which hold the restrictor member against the nozzle wall portion. It will be noted that sight glass 18 is flat, this causing a space to exist between the nozzle wall portion and the glass adjacent the slot 5. This arrangement fully protects the sight glass 18, rendering accidental breakage thereof almost impossible. While the arrangement disclosed in the drawing is considered preferable, if desired, the sight glass may be located on the outer surface of the nozzle wall and held in place by a slotted cover plate. In such case however the sight glass must be curved and would not be as well protected against breakage.

With the device as described above, when a tank is to be filled, the nozzle is inserted well down into the tank filler tube, for instance, four or five inches. The flow of liquid through the nozzle past the restrictor member 6 will create a zone of low pressure at this point, and due to the flow area at passage 13 being substantially more restricted than at the passage 14, the pressure at passage 13 will be considerably lower than at passage 14. This will tend to cause a flow of liquid through the inlet passage 14, the sight passage 12 and the outlet passage 13. However, as long as the liquid level in the filler tube does not cover the end of the pilot tube 16, instead of this action occurring, air will flow through this tube and the passage 15 into the sight passage 12 thereby breaking the vacuum tending to be created in passage 13. This will prevent drawing of liquid through inlet passage 14 into the sight passage 12. In other words, at this time, the resistance to flow of air through the tube 16 will be much smaller than the pressure differential required to force liquid through inlet passage 14 and consequently no liquid will flow through this passage. In fact, due to the inlet of this passage 14 being located at a point in the nozzle where the flow area is restricted, the pressure at the inlet of this passage will actually be slightly below atmospheric, this passage now acting as an aspirator and causing air to flow from the sight passage 12 through this passage, thus positively preventing any liquid from flowing upwardly through this passage.

When the liquid level in the filler tube rises to within four or five inches of the top of the filler tube, it will now cover the end of the pilot tube 16 due to the nozzle being inserted this distance into the filler tube. Covering of the end of pilot tube 16 by the liquid will prevent further flow of air through this tube and thus render the outlet or aspirator passage 13 effective to draw the liquid through passage 14 into the sight passage 12. This liquid contains a large number of small air bubbles and thus may be readily seen. In the case of gasoline which is invariably colored, the color aids considerably in viewing the liquid, especially when the side walls of the sight passage 12 are provided with a white finish. It will be noted that due to the inlet passage 14 being relatively short, the liquid must be lifted only a short distance before it is visible in the sight passage 12. This requires only a very slight drop in pressure within the sight passage and consequently, it is not necessary for the pilot tube 16 to become filled before liquid appears in the sight passage. In fact, due to the resistance to flow of the liquid through tube 16, a partial vacuum sufficient for causing flow of liquid through passage 14 is created without appreciable rise of liquid in tube 16. Therefore, inasmuch as it is not necessary for liquid to flow through tube 16, the flow of liquid through passage 13 into the sight passage will occur at the instant that the liquid in the filler tube rises to cover the end of tube 16, thereby notifying the attendant of this fact in time to shut off the flow before overflowing occurs.

It will be noted that the pilot passage 15 and the suction passage 14 are separate and lead directly to the sight passage 12, and that when the nozzle is in working position, the pilot passage is disposed above the inlet passage. This arrangement prevents the pilot passage from intercepting flow of liquid through the inlet passage, thereby causing the liquid to appear in the sight passage the instant it starts flowing through the inlet passage. It will also be noted that the sight passage 12 and the pilot passage 15 are in alignment so that the interior of the sight passage and the sight glass may be readily cleaned without disassembling the device, merely by inserting a flexible cleaning tool through the pilot tube 16.

From the foregoing description, it will be apparent that this invention provides a simple, rugged, and practical device for giving instantaneously a visual signal when the liquid level in a container being filled rises to a predetermined level. While this invention is of particular utility in the filling station business, it is not limited thereto and will provide satisfactory results with a large variety of liquids. Also, while the preferred embodiment has been shown and described, this is for illustrative purposes only. Inasmuch as various changes may be made without departing from the spirit and scope of the invention, it is desired to be limited only by the scope of the appended claims.

I claim as my invention:

1. In a device for filling containers with liquid, in combination, a liquid discharge passage having an inlet and an outlet, means for creating a region of relatively low pressure, a second passage communicating with said low pressure region creating means, said passage also communicating with a portion of said liquid discharge passage wherein the liquid pressure is higher than at said region of low pressure and having a transparent wall portion whereby liquid is withdrawn from the stream of liquid flowing through the liquid discharge passage and passed adjacent said transparent wall portion where it may be viewed, and means for preventing flow of liquid through said second passage until the liquid level in the container being filled rises to a predetermined height.

2. In a device for filling containers with liquid, in combination, a liquid discharge passage having an inlet and an outlet, means for creating a region of relatively low pressure, a second passage communicating with said low pressure region creating means, said passage also communicating with a portion of said liquid discharge passage wherein the liquid pressure is higher than at said region of low pressure and having a transparent wall portion whereby liquid is withdrawn from the stream of liquid flowing through the liquid discharge passage and passed adjacent said transparent wall portion where it may be viewed, and a third passage communicating with said second passage and extending towards the outlet of said liquid discharge passage, said third passage opening to atmosphere, whereby air flow through said third passage prevents said low pressure creating means from being effective to

draw liquid through said second passage until liquid in the container being filled prevents flow of air through said third passage.

3. In a device for filling containers with liquid, in combination, a liquid discharge passage through which a stream of liquid flows to the container being filled, means in said liquid discharge passage and actuated by the flow of liquid for creating a region of relatively low pressure, a second passage extending longitudinally of said liquid discharge passage and communicating with said low pressure creating means, said second passage communicating with the liquid discharge passage downstream of said low pressure creating means and having a transparent wall portion whereby liquid is withdrawn from said stream and passed adjacent said transparent wall portion where it may be viewed, and means for preventing flow of liquid through said second passage until the liquid level in the container being filled rises to a predetermined height.

4. In a device for filling containers with liquid, in combination, a liquid discharge passage through which a stream of liquid flows to the container being filled, means in said liquid discharge passage and actuated by the flow of liquid for creating a partial vacuum, a second passage extending longitudinally of said liquid discharge passage and communicating with said vacuum creating means, said second passage communicating with the liquid discharge passage downstream of said vacuum creating means and having a transparent wall portion whereby liquid is withdrawn from said stream and passed adjacent said transparent wall portion where it may be viewed, and a third passage extending from said second passage towards the outlet end of said liquid discharge passage, said third passage opening to atmosphere whereby air flow through said third passage prevents said vacuum creating means from being effective to draw liquid through said second passage until liquid in the container being filled prevents flow of air through said third passage.

5. A device for filling containers with liquid as recited in claim 4 wherein the second and third passages join at a point adjacent the transparent wall portion.

6. A device for filling containers with liquid as recited in claim 4 wherein the second and third passages join at a point adjacent the transparent wall portion and in which the third passage at the point of joining is above the second passage when the device is in operating position.

7. In a device for filling containers with liquid, in combination, a tubular portion having an inlet and an outlet, said tubular portion forming a nozzle, an opening in the wall of said tubular portion at a point spaced from the outlet thereof, an elongated flow area restrictor member located within said tubular portion and covering said opening, said restrictor member cooperating to form a passage adjacent said opening, a transparent member covering said passage, a second passage in said flow restrictor member extending transversely of said first passage and communicating said first passage with the interior of said tubular portion at a point where the flow area is substantially restricted, and a third passage extending from said first passage through said restrictor member and the interior of said tubular portion, said third passage extending through the side wall of said tubular portion at a point downstream of said restrictor member.

8. In a device for filling containers with liquid, in combination, a tubular portion having an inlet and an outlet, said tubular portion forming a nozzle, an opening in the wall of said tubular portion at a point spaced from the outlet thereof, an elongated flow area restrictor member located within said tubular portion and covering said opening, said restrictor member cooperating to form a passage adjacent said opening, a transparent member covering said passage, a second passage in said flow restrictor member extending transversely of said first passage and communicating said first passage with the interior of said tubular portion at a point where the flow area is substantially restricted, a third passage extending from said first passage through said restrictor member and the interior of said tubular portion, said third passage extending through the side wall of said tubular portion at a point downstream of said restrictor member, and a fourth passage extending through said restrictor member from said first passage, said fourth passage opening into the interior of said tubular portion at a point wherein the flow area is less restricted than at said second passage.

9. A device for filling containers with liquid as recited in claim 8 wherein the third and fourth passages join said first passage adjacent the transparent member.

10. A device for filling containers with liquid as recited in claim 8 wherein the first and third passages are in alignment so that said first passage and said transparent member may be cleaned by inserting a cleaning member through said third passage.

11. In a device for filling containers with liquid, in combination, a generally tubular shaped conduit having an inlet, an outlet, and side wall means, said side wall means having an outer surface which is generally circular and even in cross-section, said side wall means also including a thickened portion at a substantial distance from said outlet, said thickened portion extending into the interior of said conduit for reducing the flow area for the liquid adjacent said thickened portion for thereby providing an aspirator, a sight passage formed in the thickened portion of said side wall means, said sight passage communicating at one end with the interior of said conduit adjacent said thickened portion, said sight passage also having a transparent wall portion adjacent the outer surface of said side wall means, and a passage communicating with said sight passage and extending within and longitudinally of said conduit, said last recited passage extending through said side wall means at a point near said outlet.

12. In a device for filling containers with liquid, in combination, a conduit having an inlet, an outlet, and side wall means, said side wall means for the major portion of the length of said conduit providing a passage of generally uniform cross-section, but at a point spaced from the outlet of the conduit having a portion extending inwardly from one side of said passage toward the other for thereby restricting said passage, the portion of the side wall means opposite said inwardly extending portion conforming substantially in cross-section with the remainder of the side wall means for thereby causing said inwardly extending portion to provide substantially all of the restriction of said passage adjacent said inwardly extending portion, a sight passage formed in said inwardly extending portion of said side wall means, said sight passage communicating at one end with the interior of the conduit

adjacent said inwardly extending portion, said sight passage also having a transparent wall portion adjacent the outer surface of said side wall means, and a passage communicating with said sight passage and extending within and longitudinally of said conduit, said last mentioned passage extending through said side wall means at a point near said outlet.

13. In a device for filling containers with liquid, in combination, a conduit having an inlet, an outlet, and side wall means, said side wall means for the major portion of the length of said conduit providing a passage of generally uniform cross-section, but at a point spaced from the outlet of the conduit having a portion extending inwardly from one side of said passage toward the other for thereby restricting said passage, the portion of the side wall means opposite said inwardly extending portion conforming substantially in cross-section with the remainder of the side wall means for thereby causing said inwardly extending portion to provide substantially all of the restriction of said passage adjacent said inwardly extending portion, an indicator chamber formed within said inwardly extending portion of said side wall means, means associated with said indicator chamber for providing a visual signal, and a passage extending from said indicator chamber within and longitudinally of said conduit, said last mentioned passage extending through said side wall means at a point near said outlet.

14. In a device for filling containers with liquid, in combination, a liquid discharge passage having an inlet and an outlet, means for creating a region of relatively low pressure, a second passage communicating with said low pressure region creating means, said second passage also communicating with a portion of said liquid discharge passage wherein the liquid pressure is higher than at said region of low pressure and having a transparent wall portion whereby liquid is withdrawn from the stream of liquid flowing through the liquid discharge passage and passed adjacent said transparent wall portion where it may be viewed, and means controlled by the level of liquid in the container being filled for controlling the flow of liquid through said sight passage.

15. In a device for filling containers with liquid, in combination, a conduit having an inlet and an outlet for the liquid, means providing an indicator chamber having means associated therewith for providing a visual signal exterior of the device, means for passing liquid flowing through said conduit from said conduit through said indicator chamber and back through said conduit, and means responsive to the level of the liquid in the container being filled by said device for controlling the flow of liquid through said indicator chamber.

16. In a device for filling containers with liquid, in combination, a conduit having an inlet and an outlet for the liquid, means providing a chamber, means for passing liquid flowing through said conduit from said conduit through said chamber, and means responsive to the level of the liquid in the container being filled by said device for initiating flow of liquid through said chamber when the level rises to a predetermined height.

17. In a device for filling containers with liquid, in combination, a conduit having an inlet and an outlet for the liquid, means providing an indicator chamber having means associated therewith for providing a visual signal exterior of the device, means for passing liquid flowing through said conduit from said conduit through said indicator chamber and back through said conduit, and means responsive to the level of the liquid in the container being filled by said device for initiating flow of liquid through said indicator chamber when the liquid level rises to a predetermined height.

18. In a device for filling containers with liquid, in combination, a conduit having an inlet and outlet for the liquid, means providing a chamber, means for passing liquid flowing through said conduit from said conduit through said chamber and back to said conduit, and means responsive to the level of the liquid in the container being filled by said device for controlling the flow of liquid through said chamber in a manner to initiate such flow when the level rises to a predetermined height.

19. In a device for filling containers with liquid, in combination, a conduit having an inlet, an outlet, and side wall means, said side wall means for the major portion of the length of said conduit being substantially annular in cross-section providing a passage of generally uniform cross-section, but at a point spaced from the outlet of the conduit having a portion extending inwardly from one side of said passage toward the other for thereby restricting said passage, the portion of the side wall means opposite said inwardly extending portion conforming substantially in cross-section with the remainder of the side wall means as compared with said inwardly extending portion for thereby causing said inwardly extending portion to provide the majority of the restriction of said passage adjacent said inwardly extending portion, a sight passage formed in said inwardly extending portion of said side wall means, said sight passage communicating at one end with the interior of the conduit adjacent said inwardly extending portion, said sight passage also having a transparent wall portion adjacent the outer surface of said side wall means, and a passage communicating with said sight passage and extending within and longitudinally of said conduit, said last mentioned passage extending through said side wall means at a point near said outlet.

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