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NOZZLE STRUCTURE WITH LEVER ADJUSTING INSERT

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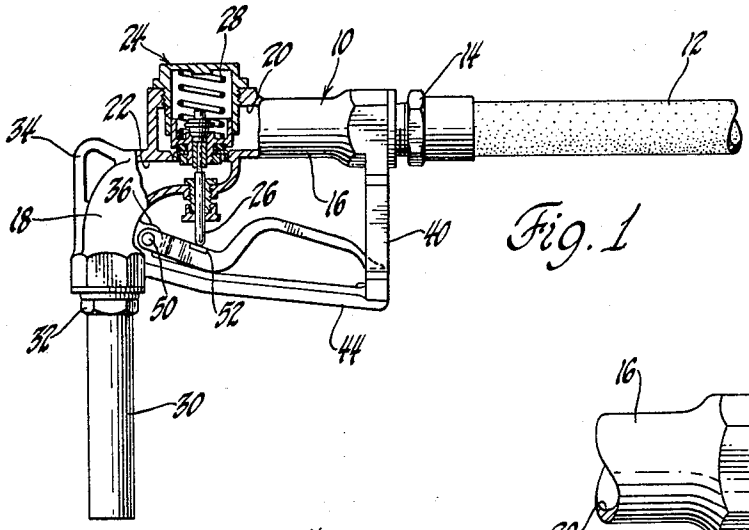


Fig. 1

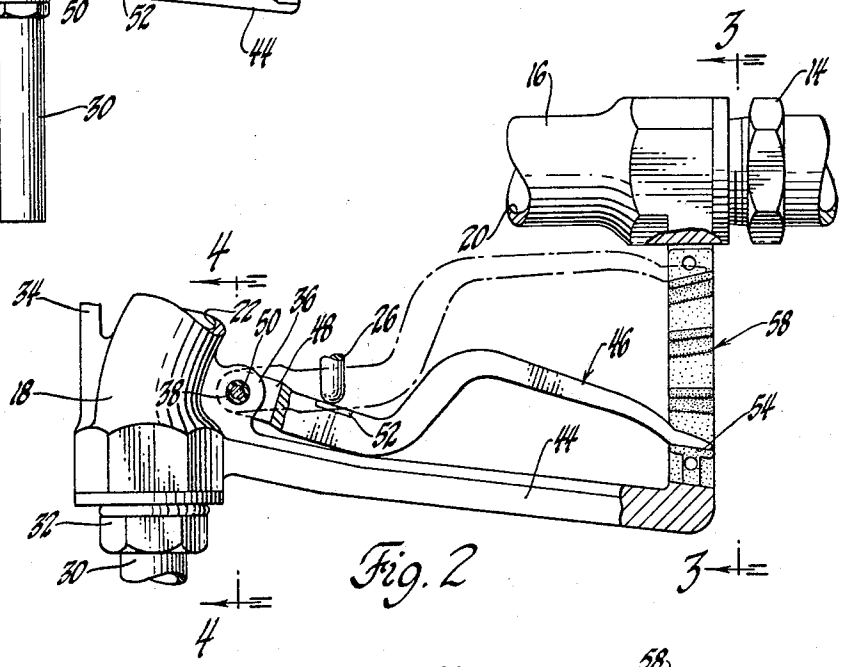


Fig. 2

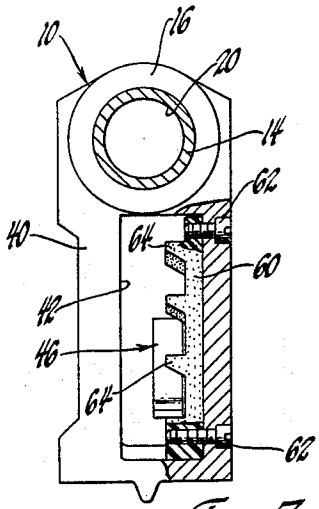


Fig. 3

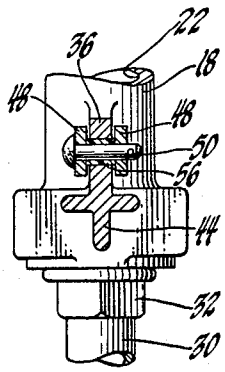


Fig. 4

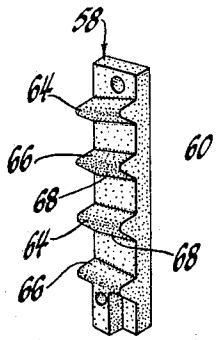


Fig. 5

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NOZZLE STRUCTURE WITH LEVER ADJUSTING INSERT

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This invention relates to nozzle structures, and more particularly to the type of nozzle structure having a flow passage formed therethrough, valve means disposed in the flow passage to open or close the passage, and a lever pivotally secured on the nozzle structure and engaging and operating the valve means.

In the transfer of a fluid, fuel oil or the like, from a bulk tank or other receptacle to a second tank or receptacle, it is common to use a lengthy hose attached at one end to the bulk tank, the hose having a nozzle structure at the other end. The nozzle is placed in the receiving tank and is lever operated for controlling a valve to open and close the flow passage through the nozzle. It is common to have such a nozzle structure formed with the lever pivotally mounted on the nozzle frame and engaging a valve operating rod or the like, to actuate the valve upon pivotal movement of the lever by the operator. It is also usual to provide some sort of stop means for the lever to maintain the valve in an open position during delivery so that the operator need not hold the lever in its open position during the entire transfer period. Such stop means normally include a series of lugs or steps extending outwardly from the nozzle frame and adapted to be engaged by the end of the lever remote from the pivot attachment. The operator may selectively place the end of the lever in engagement with one of the lugs or stops, depending upon the desired flow through the nozzle structure. In this way, the nozzle structure may be mounted in the receiving tank, the lever suitably rotated about its pivot to open the valve the desired amount and the lever engaged on its suitable stop. The operator may then leave the nozzle until the desired amount of fluid has been transferred.

In the past, such nozzle structures have been manufactured of aluminum, or like material, to provide as light a structure as possible for the ease and facility of the operator. The pivot connection between the lever and the nozzle frame is formed by a member extending outwardly from the frame to receive a pin passing through the lever and through the member. At the opposite end of the lever, the nozzle frame is provided with an elongated slot and integrally formed steps extend into the slot. The steps are adapted to be engaged by the adjacent end of the lever. The lever engaging surfaces of the several steps are normally formed in parallel relation, for ease in casting the nozzle frame during manufacture thereof, and the end of the lever has a generally planar surface. When the lever end engages the steps, the engagement is thus line contact with an edge of the particular step, leading to rapid wear of the steps. The pivotal connection formed with the nozzle frame also wears quite rapidly with use. Thus, scrapping of the entire nozzle structure is necessary when these parts are worn to a degree making the lever movement inefficient or inoperable. However, the remainder of the nozzle structure is usually in good operating condition since there are few other moving parts. Thus, the resultant replacement of the entire nozzle structure is an expensive and inefficient condition of operation for bulk fuel or fluid delivery.

The nozzle structure in which this invention is embodied comprises, generally, a nozzle frame having a through-flow passage with suitable valve means disposed therein and a valve operating lever pivotally mounted on

the frame and engageable with suitable stops at the rear end of the lever. The pivot connection between the lever and the nozzle frame includes a bushing of a material having low wear characteristics so as not to wear out the material of which the nozzle frame is manufactured. At the rearward end of the lever member is an insert, also formed of a material having low wear characteristics, the insert being formed with a plurality of steps extending into the opening at the end of the nozzle frame and being selectively engageable by the end of the lever member. The end of the lever opposite the pivot connection is provided with a generally planar surface, and each of the steps with which the lever end engages is provided with a planar surface substantially parallel to such planar surface on the end of the lever when the lever is in the step engaging position for that particular step. Another surface on the insert step is formed angularly outwardly toward the upper planar surface to provide a cam surface so that the lever may be cammed outwardly away from the insert as it is raised for proper engagement with the lever engaging surface.

The bushing and the insert may be formed of an organic plastic material such as Delrin (an acetal resin derived by polymerization of formaldehyde, produced by the E. I. du Pont de Nemours and Co., Inc., of Wilmington, Delaware), or of a metallic alloy such as manganese-bronze. Whatever material is used must be extremely wear resistant and capable of easy formation into the structures of the bushing and the insert, but is unbendable thereafter.

A nozzle structure constructed in this manner reduces to a considerable extent, the wear problems and the expense resulting therefrom. The bushing and stepped insert may be easily formed in quantity and are easily replaced in the nozzle frame when worn to an inoperable degree. This eliminates the need for scrapping the entire nozzle structure when wear occurs, the inserts being extremely inexpensive to manufacture, produce and replace. The orientation of the lever engaging surfaces on the rearward insert further reduces the wear at these points and provides a more positive engagement between the lever and the steps.

These and other advantages will become more apparent from the following description and drawing in which:

FIGURE 1 is an elevational view with parts broken away and in section of a nozzle structure of the general type described and embodying the invention.

FIGURE 2 is an enlarged view of the nozzle structure illustrated in FIGURE 1 with parts broken away and in section to illustrate the position of the various parts.

FIGURE 3 is an end view of the nozzle structure illustrated in FIGURES 1 and 2, taken substantially along the line 3—3 of FIGURE 2 and looking in the direction of the arrows.

FIGURE 4 is an enlarged cross-sectional view of the nozzle structure illustrated in FIGURES 1 and 2 taken substantially along the line 4—4 of FIGURE 2 and looking in the direction of the arrows.

FIGURE 5 is a perspective view of the insert member having the lever engaging steps extending therefrom.

Referring more particularly to the drawing, FIGURE 1 best illustrates the overall nozzle structure. The nozzle, indicated generally by the numeral **10**, is attached to a hose or the like, **12** which in turn extends to the bulk tank or other fluid source, not shown. A suitable coupling **14** mounted on the end of hose **12** is threaded to be received in the end of nozzle structure **10**. Nozzle structure **10** includes a frame having an inlet portion **16** and an outlet portion **18**, the former being provided with an inlet passage **20**, and the latter with an outlet passage **22**. Disposed within the nozzle structure **10** is a valve assembly, illustrated generally by the numeral **24**, which is

operable to open or close communication between the inlet passage **20** and the outlet passage **22**. Any suitable valve structure **24** may be provided, so long as the valve itself is operated by a downwardly extending pin or operating member **26** and which is spring-biased into its closed position by a suitable spring **28**. Extending from the end of outlet portion **18** of the nozzle structure **10** may be a pipe or the like **30**, secured in the nozzle structure **10** by a suitable coupling device **32**. Pipe **30** is so formed as to be readily received in the receiving tank for the fluid. Also formed on the nozzle frame **10** is a hook receiving member **34** to permit mounting the nozzle structure **10** in some suitable manner when not in use.

Extending outwardly from the outlet portion **18** of the nozzle frame is an ear **36** having an aperture **38** formed therethrough. At the opposite end of the nozzle frame, and depending downwardly from the inlet end **16**, is a frame portion **40** having an elongated, rectangular opening **42** formed therein. Frame portion **40** and the outlet end of portion **18** are connected by a rib **44** of suitable cross-sectional shape to provide the desired strengthening for the entire structure.

So much of the nozzle structure **10** above-described may be easily formed of aluminum or other suitable material and being sufficiently light in weight for convenient handling by the operator. Valve structure **24** may be conveniently formed as a separate unit, suitably receivable and securable in the nozzle structure **10**, and which may be readily removable and replaceable for cleaning and repair.

Disposed within the confines of the nozzle structure **10** and frame portions **40** and **44** is a lever, illustrated generally by the numeral **46**. Lever **46** is bifurcated at its forward end to provide spaced ears **48** straddling the ear **36** formed on the nozzle frame. A pivot pin **50** is received through the ears **48** and the aperture **38** in the ear **36** to permit lever **46** to pivot thereabout as the nozzle structure is operated. Intermediate the ends of the lever **46** is an enlarged pad **52** which engages the valve operating pin **26** so that when the lever **46** is pivoted upwardly and downwardly about the ear **36** the pin **26** moves vertically to open or close the valve means **26** and the flow passage **20–22**. The end of lever **46** remote from the ears **48** extends into the elongated opening **42** in the frame portion **40** and is provided with a generally planar surface **54** for purposes to become hereinafter more apparent.

Disposed within the aperture **38** in the pivot ear **36** is a bushing **56**, surrounding the pivot pin **50**. Bushing **56** is formed of a material having low wear characteristics for extended life and at the same time is of a form, size and shape that permits relatively easy replacement thereof should the wear of the bushing **56** hamper the operation of the lever **46**. Bushing **56** may be conveniently formed of Delrin, manganese-bronze, or some similar material. Bushing **56** extends between the ears **48** of the lever **46** and the pivot pin **50** may rotate within the bushing **56** as the lever **46** is pivoted.

Disposed within the elongated opening **42** in the frame portion **40** of the nozzle structure **10** is an insert member, illustrated generally by the numeral **58**. Insert **58** includes a flat body portion **60** which is received against the side wall of the opening **42** and which is secured in the frame portion **40** by suitable screws or the like **62**. Extending outwardly from the body portion **60** are a plurality of steps **64**, vertically spaced from each other to provide lever engaging platforms for the end **54** of the lever **46**. The upper surface **66** of each of the steps **64** is disposed in a plane substantially parallel to the planar end surface **54** of the lever **46** when the lever surface **54** is in engagement with the particular step. For example, the lever surface **54** may be in a plane passing through the center of pivot pin **50**. Thus, the surfaces **66** of each of the steps **64** would also fall in planes extending through the center of pivot pin **50**. In this manner, there is substantial surface contact between the lever end surface **54** and the step surfaces **66**.

Steps **64** are so constructed as to have angularly outwardly directed cam surfaces **68** extending from the body portion **60** to the extremity of the upper surface **66**. Surfaces **68** thus provide a camming surface for the lever **46** so that as the lever **46** is raised, the lever will be directed laterally out of engagement with the body portion **60** and thus more easily engage the lever supporting surfaces **66**. The size of the elongated opening **42** is sufficient to permit such lateral movement of the lever **46**, and the pivot connection **48–50–36** is sufficient to permit such lateral movement.

Insert **58** is formed of a material having low wear characteristics so that continued movement of the lever member **46** therealong and the continued resting of the lever **46** on the individual steps **64** will not create the rapid wear situation. Should such wear occur, the insert member **58** is formed of a material which may be easily and inexpensively manufactured and easily replaced in the frame portion **40** of the nozzle structure **10**. Insert **58** may conveniently be formed of Delrin, manganese-bronze, or like material, as is the pivot bushing **56**.

It will now become apparent that in the operation of the nozzle structure **10**, and with the parts in the position illustrated in FIGURE 1, flow from the inlet passage **20** to the outlet passage **22** will be effectively blocked by the valve assembly **24**. When the lever **46** is raised about the pivot connection **50–48–36**, the valve rod **26** will be depressed against spring **28**, thus opening the valve passage and permitting flow from the inlet to the outlet of the nozzle structure **10**. The rearward end of lever **46** is engaged by the operator with one of the steps **64** so that it will be retained in place and permit the desired volume of flow through the nozzle structure. The spring bias of spring **28** on the valve rod **26** will also maintain the engagement of the lever **46** with the particular step **64**. should it be desired to increase flow through the nozzle structure **10**, the operator need only lift the lever **46** from one step to the next, the lever being cammed outwardly by the surfaces **68** on the steps. Suitable reengagement with another step is made and the nozzle structure may be left by the operator to continue the fluid transfer operation. When the fluid transfer is complete, the operator laterally shifts the lever **46** within the elongated opening **42** to disengage the lever from the steps **64** and drop the lever to its downmost position. This effectively closes the flow passage **20–22** by the spring actuated valve assembly **24**. Continued up and down movement of the lever **46** and engagement with the various steps **64** over a period of time, causes wear at both the pivot connection and the step engaging surfaces. However, with the pivot connection including a wear resistant bushing, and the insert being formed of a similar material, the wear problem is greatly diminished. Should wear occur in these parts sufficient to destroy the effectiveness of the nozzle structure, they may be easily replaced and it is not necessary to scrap the remainder of the nozzle frame.

It will now be apparent to those having skill in the art that numerous changes and modifications may be made to the structure hereinbefore illustrated and described. However, it is not intended to limit the scope of the invention by the foregoing, but by the scope of the appended claims in which:

I claim:

1. A nozzle structure comprising:

a frame having a flow passage formed therethrough;

valve means in said frame for opening and closing said passage;

a lever pivotally mounted at one end on said frame and operatively engaging said valve means;

and an insert formed of unbendable material having lower wear characteristics than the material of said lever and being secured in said frame adjacent the

other end of said lever, said insert having a plurality of steps extending outwardly therefrom;

said other end of said lever being selectively engageable with any one of said steps to maintain said valve means in a correspondingly open position.

2. The nozzle structure set forth in claim 1 wherein said other end of said lever is provided with a planar step engaging surface, and each of said steps is provided with a planar lever engaging surface parallel to said step engaging surface on said one end of said lever when said lever is pivoted into position to engage said step.

3. The nozzle structure set forth in claim 2 wherein said surface on said other end of said lever and said lever engaging surfaces on each of said steps are in planes passing through the center of the pivot connection between said one end of said lever and said frame.

4. The nozzle structure set forth in claim 2 wherein each of said steps is provided with another planar surface extending angularly from the outer extremity of said step to said insert to provide a cam surface for directing said other end of said lever outwardly.

5. The nozzle structure set forth in claim 1 and further including a bushing formed of a material having low wear characteristics disposed in said nozzle structure and receiving a pivot pin, said lever being mounted on said pin, and said lever and said pin being rotatable in said bushing.

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