

Oct. 20, 1931.

M. J. HAMMERS

1,828,463

MEANS FOR RESTRICTING ATOMIZED FLUID DISCHARGE

Filed Dec. 6, 1929

3 Sheets-Sheet 1

Fig. 1.

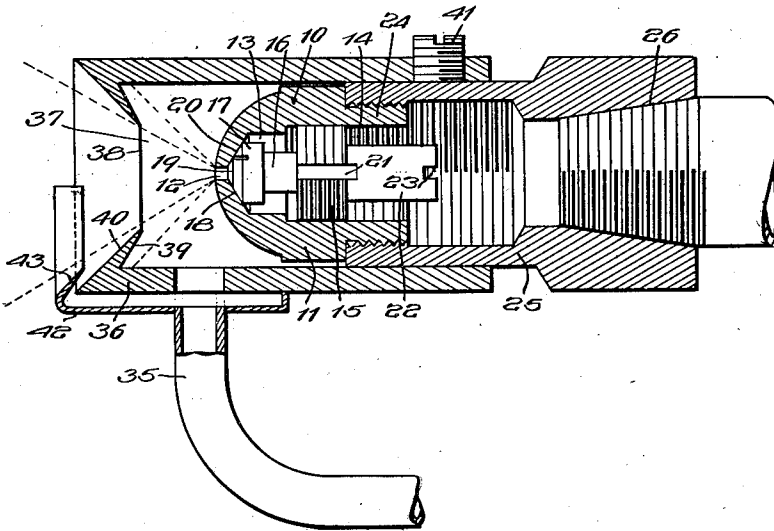


Fig. 2.

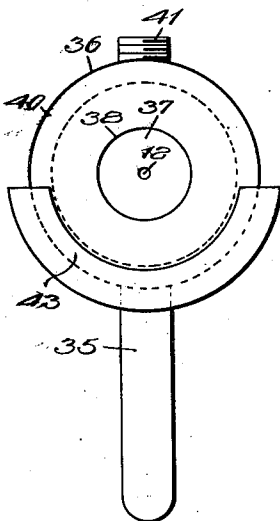
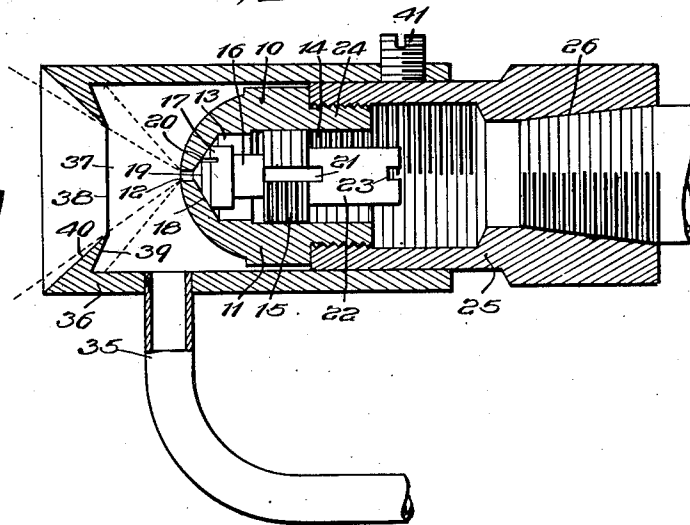


Fig. 3.



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Fig. 4

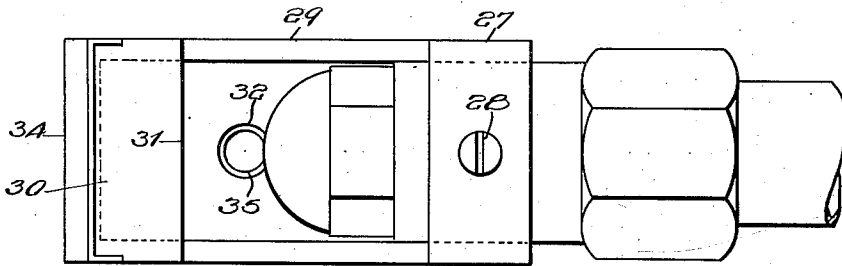


Fig. 6

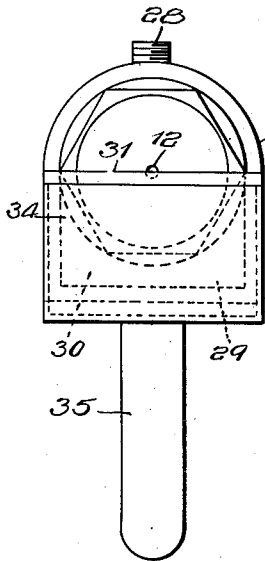
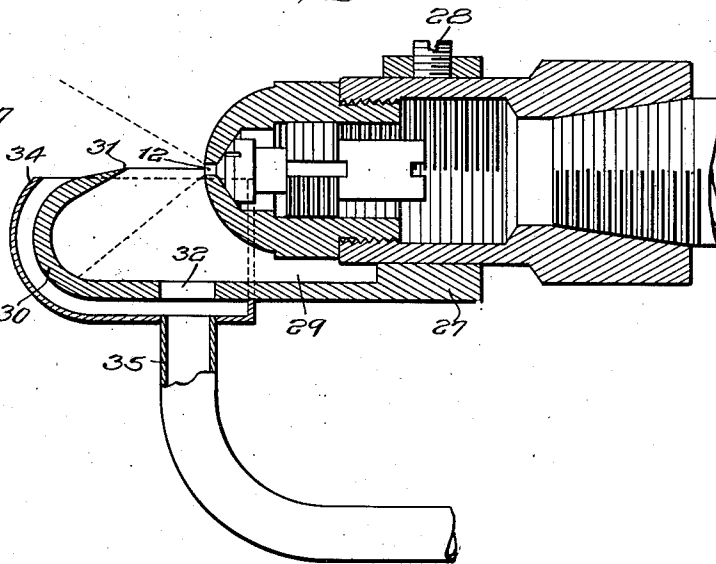


Fig. 5



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3 Sheets-Sheet 3

Fig. 8.

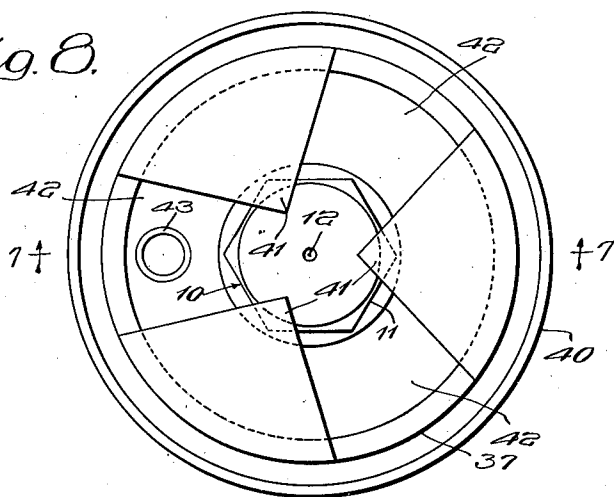
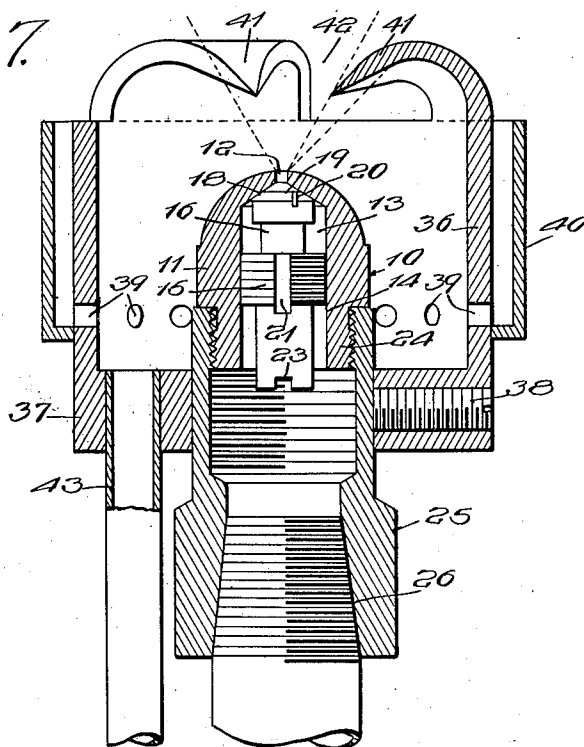


Fig. 7.



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UNITED STATES PATENT OFFICE

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MEANS FOR RESTRICTING ATOMIZED FLUID DISCHARGE

Application filed December 6, 1929. Serial No. 412,104.

This invention relates to means for restricting atomized fluid discharge.

In the use of spray nozzles, designed to deliver a relatively small volume of liquid during a unit of time and at the pressure required to thoroughly atomize the liquid, great difficulty has heretofore been experienced in designing a nozzle of sufficiently limited capacity to prevent an excessive discharge, by reason of the fact that a reduction in the size of the ports or passages through the nozzle, commensurate with the limited volume of discharge, results in the provision of such fine or minute passages that clogging is inevitable, by reason of the physical limitations of the apparatus employed.

The present invention relates to a restrictor adapted to be applied to a nozzle of standard type, which is designed to discharge an excess of liquid over and above that required, and the object and purpose of the restrictor is to intercept a portion of the atomized liquid, after its discharge from the nozzle, and to return it to the source of supply for redisch-

charge. The restrictor of the present invention permits the employment of nozzles provided with sufficiently large ducts or ports to prevent clogging; permits the liquid to be discharged under normal pressures; conserves the excess of liquid discharged through the nozzle, and at the same time permits a nozzle of standard construction to be employed in conjunction with variously proportioned restrictors, so the volume of liquid ultimately delivered can be reduced to any degree desired.

Although the restrictor of the present invention has been evolved for use primarily in connection with oil burners, it is not the intention to confine its use to the discharge of fuel oil, since it may be advantageously employed in numerous ways for the discharge of various liquids under similar conditions.

In the drawings illustrating the invention,—

Figure 1 is a sectional elevation of a nozzle of standard type, having fitted thereto one form of the restrictor of the present invention having a supplemental guard;

Fig. 2 is a front elevation of the same;

Fig. 3 is a view partially in section of the restrictor of Figs. 1 and 2, with the supplemental guard omitted;

Fig. 4 is a top view of a modified form of restrictor;

Fig. 5 is a sectional elevation of the same;

Fig. 6 is a front elevation of the same;

Fig. 7 is a sectional view of a second modified form of the restrictor; and

Fig. 8 is an end elevation of the same.

The restrictor, in either of the forms shown, is applied to a nozzle 10, which is of any conventional type adapted to deliver liquid in finely atomized condition, and preferably in the form of a conical jet of the character ordinarily delivered by nozzles of this type.

The nozzle shown by way of exemplification consists of a body 11 provided in its forward end with a minute discharge orifice 12 which communicates with an enlarged inner chamber 13 having threads 14 which engage with the threads 15 of a plug 16. The plug is provided in its forward end with an enlarged head 17 which seats against the conical end wall 18 of the chamber 13.

The rear end of the plug is in the form of a stem 22 provided with a slot 23 for the reception of a screw driver, which permits removal of the plug as occasion may require.

The body 11 of the nozzle terminates in a reduced neck 24 which is threaded into the forward end of a nipple 25 provided at its rear end with interior screw threads 26 adapted to be screwed onto or coupled with the liquid supply pipe.

The foregoing description applies to nozzles of a type in common use at the present time, and to such a nozzle, or any other nozzle designed for a like purpose, is fitted the restrictor of the present invention.

The restrictor in the form shown in Figure 3 comprises a cylindrical shell 36, provided with a circular orifice 37, having a knife edged lip 38 formed by the convergence of the inner and outer wall surfaces 39 and 40, the latter of which defines a throat which flares at a greater angle than that represented by the surface of the reduced spray

cone defined by the edge of the circular lip 38.

Figure 3 shows in dotted lines the relation between the divergence of the spray cone initially discharged from the nozzle, and the reduced spray cone which ultimately emerges through the restrictor.

The liquid intercepted by the action of the restrictor accumulates in the bottom of the shell and is drawn away and returned for recirculation through a pipe or tube 35. The shell of the restrictor is held in adjusted position by a set screw 41 which permits the restrictor as a whole to be adjusted back and forth with respect to the discharge orifice 12, so that the line of restriction may be varied with respect to its distance from the apex of the spray cone, thereby regulating the restrictive effect and determining the amount of atomized liquid ultimately delivered.

In some cases it may be found desirable to provide the restrictor with an exterior guard to drain away any liquid which may accumulate in the exterior flaring throat of the restrictor upon the conical wall 40. Such a guard is shown in Fig. 1, and, as shown, consists of a semi-cylindrical shell 42, which partially surrounds the body of the restrictor and stands in spaced relation thereto, and terminates at its forward end in a curving intumed flange 43 constituting a lip, which stands in spaced relation to the surface 40 and in position to catch any drainings therefrom and return them to the pipe 35, which in this instance terminates in the guard shell immediately below the discharge orifice from the body of the restrictor.

The form of restrictor illustrated in Figs. 4, 5, and 6 comprises a collar 27, which surrounds the nozzle and is held in place by a set screw 28. The collar is formed integrally with a forwardly extending trough-shaped body portion 29, which, as shown, is of square or boxlike formation, with its forward end 30 rounded and recurved and terminating in a straight knife edge 31, which, as shown, lies in the horizontal plane passing through the discharge port 12 of the nozzle, although the knife edge might be located at any other level, depending upon the proportion of the spray discharge which it is desired to intercept.

The restrictor is provided in its floor with a return port 32 which communicates with an outer shell 33 which stands in spaced relation to the restrictor and constitutes an outer guard which supplements the action of the restrictor, which guard is provided with a recurved upper lip 34 located slightly below the level of the knife edge 30 of the restrictor and parallel therewith, so that any oil or other liquid thus deposited upon the outside of the restrictor, and which would otherwise escape, is caught by the shell 33. All of the oil or other liquid which passes

through the return port 32, as well as any which may be caught within the shell itself, is returned through a pipe 35 and recirculated and again discharged through the nozzle.

In the form of restrictor illustrated in Figs. 7 and 8, the nozzle is arranged vertically, and the restrictor comprises a cylindrical shell 36, which is provided with an inner end wall 37, which surrounds the body of the nozzle and is held in place by a set screw 38.

Near the inner wall, a plurality of ports 39 communicate with the interior of a cup-shaped guard 40 which surrounds the shell of the restrictor. The outer end of the shell, beyond the discharge port of the nozzle, is recurved to furnish a plurality of intumed segmental shaped lips 41 terminating in apices, which, as shown, are equally spaced from the axis of the nozzle, and between the recurved lips the metal is cut away back to the main wall of the restrictor to furnish equally spaced gaps 42, through which portions of the spray cone, in undiminished diameter, may escape. A return pipe 43 is entered through the inner end wall of the restrictor for the return of liquid intercepted by the incurved lips, and also liquid which may be caught in the cup-shaped guard surrounding the restrictor.

As shown, three lips are provided with intervening gaps or spaces, but obviously a greater or less number might be provided. In this instance, the interception of the liquid is confined to that portion of the spray cone which impinges against the recurved lips, which for purposes of exemplification are shown as segmental in shape, although obviously they might be otherwise configured without departing from the spirit of the invention. In this form of construction, an adjustment of the restrictor toward or from the discharge aperture of the nozzle will regulate the proportionate amount of the spray discharge, which is intercepted and returned.

The restrictor of any one of the constructions shown is of a form and character which permits it to be quickly applied to any nozzle of standard type which is designed to discharge atomized liquid in the form of a spray cone, and by designing the restrictor to the proper dimensions, or by merely adjusting it toward or from the discharge port, as in Fig. 3, the total volume of the spray cone of atomized liquid which is initially discharged may be intercepted to any degree desired to reduce the ultimate discharge of liquid to the required volume per unit of time. This permits the use of nozzles of a size and character perfectly adapted to discharge the intended liquid, and at the same time permits the ultimate volume of discharge to be regulated independently of the discharge passing through the nozzle.

Furthermore, if it is desired to retain the conical character of the spray jet ultimately delivered, the nozzle of Fig. 3 will attain this result by reason of the fact that the interception of the liquid occurs uniformly around the entire spray cone, so that the conical formation will be retained, as indicated by the inner dotted lines in Fig. 3.

In the restrictor of Figs. 4, 5 and 6, with the knife edge 31 located in exact alignment with the center of the discharge port 12, the back and forth adjustment of the restrictor will not vary the volume of liquid ultimately delivered, but if it is desired to vary such volume by adjustment, the restrictor can be configured to bring the knife edge 31 out of coincidence with the axial line, in which case variations in position will effect corresponding variations in the amount of liquid intercepted.

The restrictor of the present invention is peculiarly adapted for use in connection with nozzles provided for the spraying of oil in oil burners, for use with nozzles intended for orchard spraying, or in any other connection in which it is desired to ultimately deliver a lesser volume of liquid per unit of time than can be safely handled without clogging by a nozzle especially designed to restrict the spray discharge to the desired degree.

Although the invention has been described with particularity as to detail, it is not the intention to limit the same to the precise forms shown and described, since modifications thereof may be made without departing from the spirit of the invention.

I claim:

1. In combination with a nozzle adapted to deliver a spray jet of liquid, a restrictor provided with an intercepting edge located in advance of the point of discharge from the nozzle, and in position to intercept a portion of the spray discharged therefrom, and having means for directing the back flow of the liquid so intercepted, the restrictor being adjustable longitudinally with respect to the point of discharge from the nozzle.

2. In combination with a nozzle for delivering a spray jet of liquid, a restrictor having a chambered body portion for intercepted liquid surrounding the forward end of the nozzle and having an intercepting edge in advance of the point of discharge from the nozzle, and positioned to intercept a portion of the jet of liquid discharged therefrom and divert it into the body portion, and a guard located outside of and partially surrounding the body portion and in spaced relation thereto, and having its edge in adjacent spaced exterior relation to the intercepting edge of the restrictor.

3. In combination with a nozzle for delivering a spray jet of liquid, a restrictor secured to the nozzle and configured to furnish a chambered body portion for intercepted

liquid, said body portion having a reversely extending forward end portion terminating in an intercepting edge in advance of the point of discharge of the nozzle and positioned to intercept a portion of the liquid discharged therefrom, and divert it into the body portion, the restrictor being longitudinally adjustable with respect to the nozzle to vary the distance between the point of nozzle discharge and the intercepting edge.

4. In combination with a nozzle adapted to deliver a spray jet of liquid, a restrictor consisting of a body portion terminating in a forward end portion having its walls converging inwardly to define a central orifice, the surrounding marginal lip thereof being knife edged to intercept the outer portion of the spray jet, and such edge being located in advance of the point of discharge for the nozzle, and a tube for withdrawing intercepted liquid accumulating within the body portion, the restrictor being adjustable longitudinally of the nozzle to vary the distance between the intercepting edge of the orifice and the point of discharge for the nozzle.

5. In combination with a nozzle for delivering a spray jet of liquid, a restrictor having a trough-shaped body for intercepted liquid surrounding the forward end of the nozzle and having an intercepting horizontally extending edge in advance of the point of discharge from the nozzle and positioned to intercept a portion of the jet of liquid discharged therefrom and divert it into the body portion, and a guard located outside of and partially surrounding the body portion and in spaced relation thereto, and having its edge in adjacent spaced exterior parallel relation to the intercepting edge of the restrictor.

6. In combination with a nozzle for delivering a spray jet of liquid, a restrictor having a chambered body portion for intercepted liquid, surrounding the forward end of the nozzle and having an intercepting edge in the form of recurved separated segments standing in spaced relation to provide gaps for the escape of liquid and having their apices in proximate relation to the nozzle and in position to intercept a portion of the liquid delivered therefrom in advance of the point of discharge from the nozzle and divert it into the body portion.

7. In combination with a nozzle for delivering a spray jet of liquid, a cylindrical restrictor having a chambered body portion for intercepted liquid, surrounding the forward end of the nozzle and having an intercepting edge portion inturned from the body portion and having conical inner and outer walls converging to define a centrally disposed knife-edged circular aperture in advance of the point of discharge from the nozzle and in concentric relation thereto, and positioned to intercept a portion of the jet of liquid dis-

charged from the nozzle and divert it into the
body portion, and a guard located outside of
and partially surrounding the body portion
and in spaced relation thereto, and having an
5 intumed flaring edge in spaced relation to
the conical outer wall of the apertured end
of the restrictor and following the curvature
thereof, the body of the restrictor and the
body of the guard being in communication
10 with one another, and a duct for returning oil
accumulating within the body of the restric-
tor and within the body of the guard.

In witness that I claim the foregoing I
have hereunto subscribed my name this 27th
15 day of November, 1929.

MORGAN J. HAMMERS.

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