March 24, 1936. S. HAYES 2,034,867

SPRAY GUN

Filed March 12, 1934 2 Sheets-Sheet 1

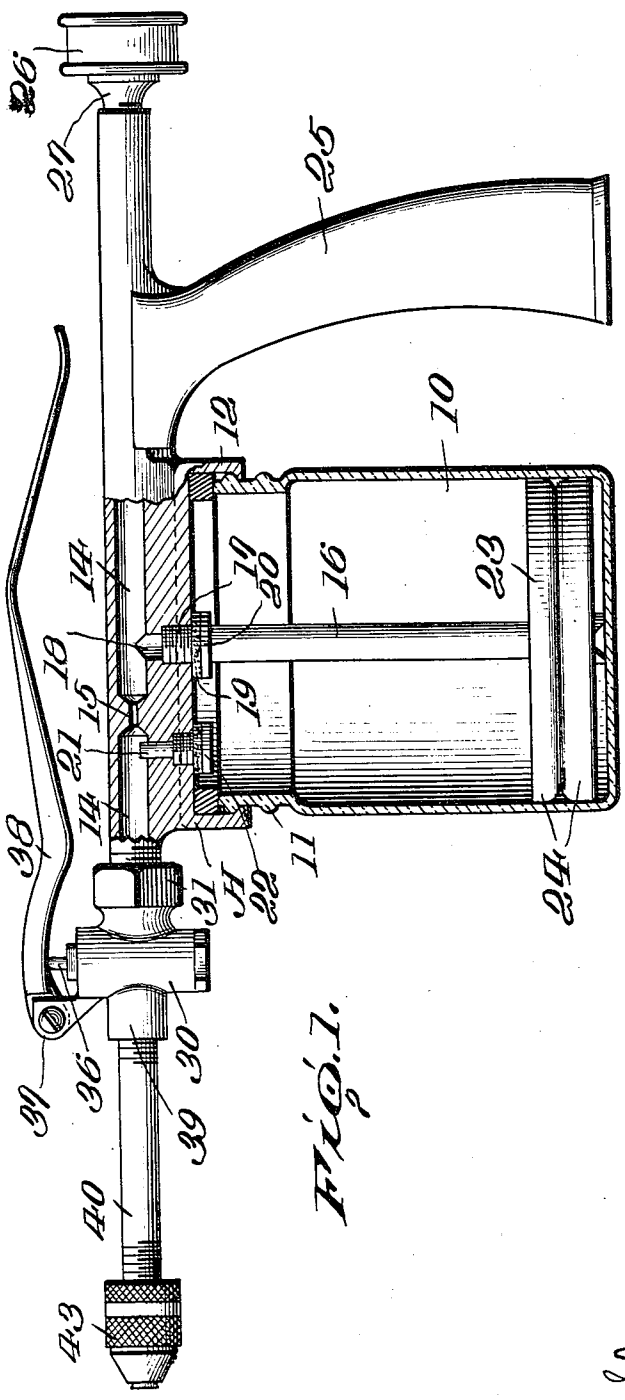


FIG. 1.

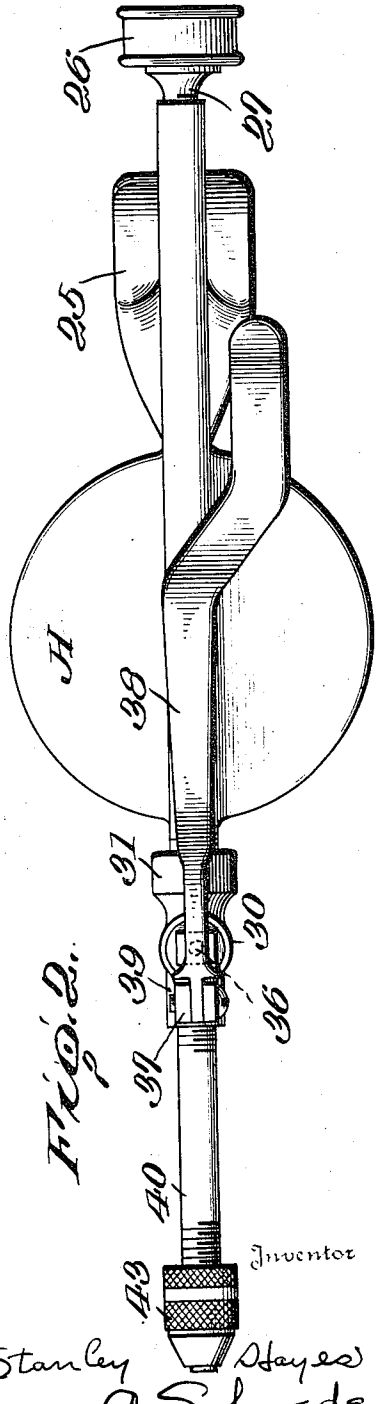


FIG. 2.

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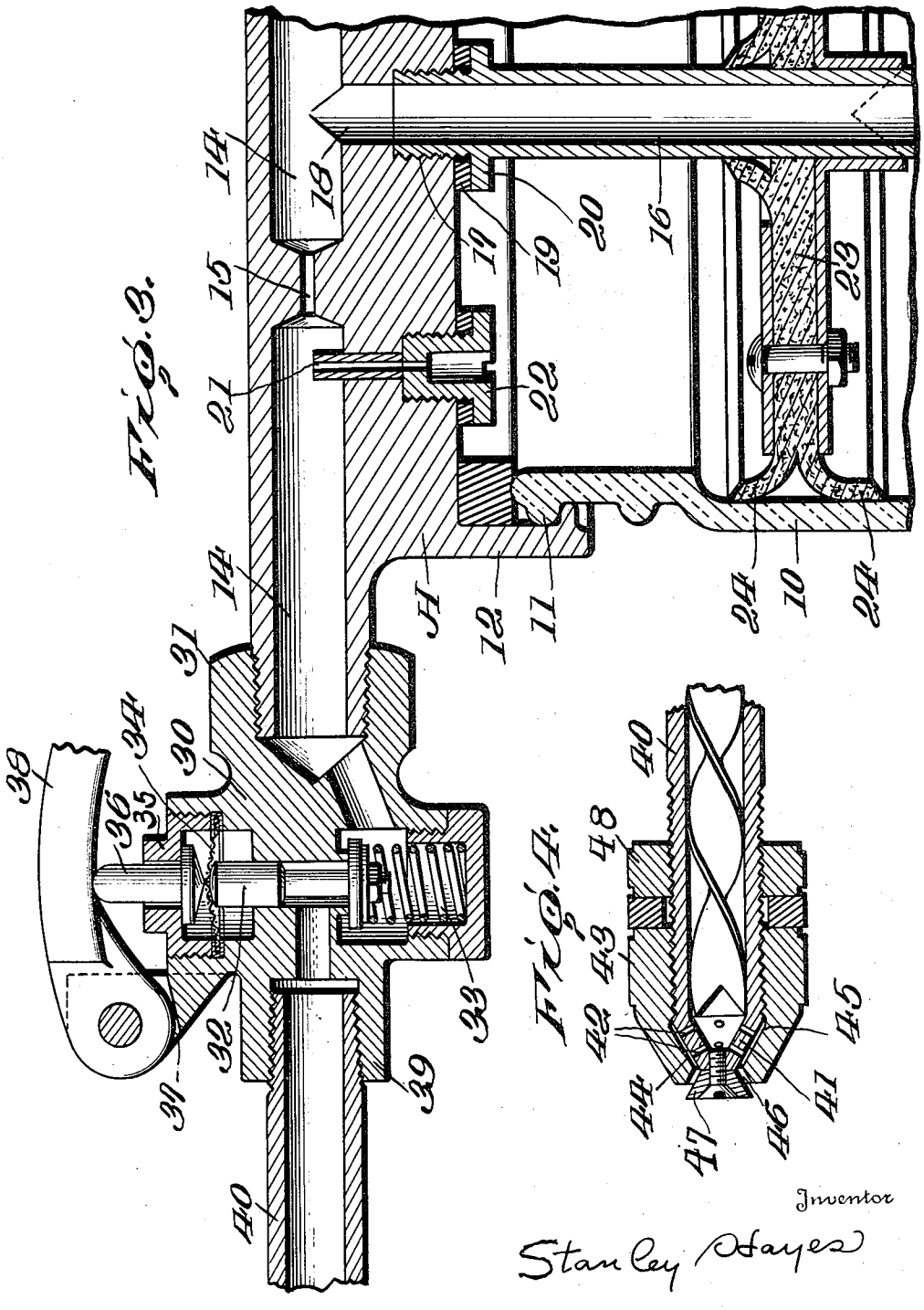
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SPRAY GUN

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SPRAY GUN

Stanley Hayes, Berkeley, Calif.

Application March 12, 1934, Serial No. 715,152

9 Claims. (Cl. 299—85)

This invention is a device for discharging liquids from a small container in the form of a fine spray.

One of the objects of the invention is to provide a simple form of spraying device which may be operated by means of a stream of water which acts as a vehicle for conveying the material to be sprayed. A further object is to provide a container equipped with spraying apparatus and having means therein for maintaining a pressure upon the liquid to be sprayed irrespective of the level of said liquid in the container. A further object is to provide a spraying device of the character described in which the pressure means is maintained by means of a piston having frictional engagement with the interior of the container, and means for insuring free movement of said float as the spraying material is withdrawn from the receptacle. A further object is to provide a spraying device in which the spray nozzle, control valve and coupling for connection with a water supply are conveniently mounted in separable relation and provided with means by which the device may be supported in the hand of the operator and flow of spraying material be controlled at will.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—

Figure 1 is a side elevation, partly in section illustrating a spray device constructed in accordance with the invention. Figure 2 is a top plan view. Figure 3 is an enlarged vertical sectional view. Figure 4 is a detail sectional view illustrating the spray nozzle.

Referring to the drawings, 10 designates a receptacle which is preferably in the form of a cylindrical glass jar provided with an open mouth surrounded by screw threads 11. Removably engaging the threaded end of the container 10 is a head or cover H, provided with a flange 12 which is suitably threaded to engage the threads 11. Said head is provided with a conduit portion 14 which extends transversely or diametrically across the head, and is provided with a flow restricting means which may be a portion of reduced diameter as indicated at 15. Depending from the head H is a pipe 16, the upper end of which is threaded as indicated at 17 and engages a correspondingly threaded opening 18 which communicates with the conduit 14 between the reduced portion 15 and the inlet end of the conduit. A packing washer 19 is interposed between the head H and a flange 20 formed on the pipe 16.

The conduit 14, between the flow restricting means 15 and the outlet is provided with a passage or jet opening 21. This is accomplished by means of a screw member 22 provided with a bore leading from the interior of the container 10 to the conduit 14.

Slidably mounted upon the outlet pipe 16 is a piston member 23 which is provided with a central opening which closely fits said pipe. The peripheral edge of said piston is provided with a packing washer 24 which frictionally engages the inner surface of the container wall. Preferably the piston is provided with wings extending above and below the body of the piston. In this manner a substantial frictional engagement between the piston and the container is maintained so that as liquid is withdrawn from the container above the piston, the said piston will maintain a constant pressure upon said liquid which passes or is displaced through the jet opening 21. In this way the pressure of the water on the bottom of the piston will cause the piston to move upwardly and yet the liquids above and below the piston will not intermingle.

The head H is provided with a handle or grip 25 and the inlet end of the conduit 14 is located back of the grip and is provided with a coupling member 26 of the type commonly employed in hose couplings for connecting a hose with a source of water supply. The coupling is rotatably mounted upon a stem 27 which has a threaded engagement with the inlet end of the conduit 14, said stem having a bore communicating with said conduit. The coupling member 26 is rotatable upon the stem 27, this being conventional construction to permit ready attachment of the gun to a hose without the necessity of rotating the entire gun to effect the attachment.

At the forward end of the conduit 14 is located a valve casing 30 which is provided with a threaded boss 31 engaging a complemental threaded portion on said conduit. Said casing contains a valve 32 controlling the flow of fluid through the casing, said valve being normally maintained in closed position by means of a suitable spring 33. The valve chamber 32 is covered by a diaphragm 34, held in place by a threaded plug 35 removably mounted in the upper end of the valve casing 30. Said plug is provided with a central opening to accommodate an operating member 36 which projects therethrough and is provided with a head which rests upon the diaphragm 34. The casing 30 is provided with a bracket 37 to which is pivotally connected the operating arm 38 which extends over the ends of the operating member 36 and rearwardly and laterally to a position ad-

jacent the grip 25 where it may be conveniently reached by the thumb of the operator.

Projecting from a second boss 39 of the valve casing 30 is a spray stem 40 which is threaded at one end to engage the boss 39 and provided with an internal helical member. Said stem is tapered at its other end as indicated at 41, said tapered end being closed but provided with a plurality of radially disposed perforations 42. A spray nozzle 43 is provided with a threaded engagement with the spray stem 40, said spray nozzle having a tapered portion 44 complemental to the tapered closed end of said stem so that by adjustment of the nozzle 43 more or less of the openings 42 are uncovered, and by reason of a space between the tapered portion 41 of the spray stem 40 and the tapered portion 44 of the nozzle 43 the material to be sprayed is permitted to enter the spray chamber 45 and to discharge outwardly through an opening 46 in the spray head. The size of the opening 46 is controlled by a spreader 47 which is supported by the closed end 41 of the stem 40.

In operation, the head H is removed from the container 10, and said container is filled to the desired level with the material which it is desired to mix and force out with a stream of water for spraying purposes, the piston 23 having first been installed in the bottom of the container, the container is then filled with material to be sprayed. The piston is then engaged with the pipe 16 at a position on the bottom of the spray material and the head H is engaged with the container in such manner as to close it. The coupling 26 is connected with any suitable source of water supply, preferably by means of a flexible hose so that the device may be conveniently manipulated. The spray nozzle 43 is adjusted to produce the desired volume of spray and then is locked in position by the lock nut 48 as shown. The operator then holds the device by means of a grip 25, and by depressing the handle 38 opens the control valve 32 more or less to permit the desired volume of liquid to flow through the conduit. As water enters the conduit 14 and flows toward the nozzle 43, it must pass the reduced portion 15. The increased speed required to allow the water to pass through the restricted portion 15 creates a back pressure in the pipe 16 and forces the piston 23 on the bottom of the spray material to compress said spray material, so that there is a differential in pressure between that of the spray material and the water at the point of injection of said spray material through the jet in head H into the conduit 14 on the opposite side of said reduced portion 15 and mixes it with water as it flows through the helical baffle in the conduit. As the water travels through the conduit 14 and comes in contact with the restricted portion 15, a certain portion thereof will by-pass through the pipe 16 to the bottom of said container 10 under the piston 23 forcing said piston upwardly equalizing the pressure of said spray material in the container 10 with that of the water on the coupling 26 end of conduit 14. As the water travels through the restricted portion 15 it creates a pressure drop on the other end of said restricted portion 15 where it enters conduit 14. The spray material is injected at this point through the jet 21 in head H into the conduit 14 where it mixes with the water. The spray mixture passes through the valve casing 30 into the stem 40 through the helical baffle and then outwardly through the perforations 42, chamber 45 and opening 46 in an obvious manner. It will be readily understood that the spray head 43 may be adjusted at any time to suit varying conditions.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, it will be observed that a very simple form of spraying device is provided by means of which a stream of water not only acts as the vehicle for the material to be sprayed, but also functions to effect an intimate intermixture of the spraying material and the water. A further advantage is that the piston maintains a pressure upon the spray material as the level thereof lowers by reason of withdrawal of material, so that the spray material will be delivered in constant volume as long as there is any of said material remaining within the container 10. It will also be seen that the device is constructed of few parts and may be readily assembled and disassembled as occasion may require, and may be conveniently manipulated while in operation.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed:

1. A spraying device comprising a receptacle, a head connected with said receptacle and having a conduit extending therethrough, said conduit having an inlet end, a discharge end and a jet communicating with the interior of said receptacle, a pipe depending from said head into the receptacle and communicating with said conduit, said conduit being reduced in diameter at a position between said jet and said depending pipe, a piston located within said receptacle and slidably engaging said pipe and the inner surface of the receptacle, and so positioned as to be forced upwardly by pressure from said pipe, a spray nozzle at the discharge end of said conduit, and means controlling the flow of the mixture to said nozzle.

2. A spraying device comprising a receptacle, a head connected with said receptacle and having a conduit extending therethrough, said conduit having a receiving end, a delivery end and a jet communicating with the interior of said receptacle, a pipe depending from said head into the receptacle and communicating with said conduit, said conduit being reduced in diameter at a position between said jet and said depending pipe, a piston slidably engaging said pipe, the periphery of said piston being provided with flexible portions frictionally engaging the wall of said container, a spray nozzle at the delivery end of said conduit, and means controlling flow of mixture through said nozzle.

3. A spraying device comprising a receptacle, a head connected with said receptacle and having a conduit extending therethrough, said conduit having a receiving end, a delivery end and a jet communicating with the interior of said receptacle, a pipe depending from said head into the receptacle and communicating with said conduit, said conduit being reduced in diameter at a position between said jet and said depending pipe, a piston slidably engaging said pipe, flexible washers on the periphery of said piston, said washers extending above and below the piston and engaging the wall of said container, a spray nozzle at the delivery end of said conduit, and means controlling flow of mixture through said nozzle.

4. A spray device comprising a cylindrical con-

tainer, a head removably engaging said container, said head having a conduit therethrough and provided with a receiving end, a discharge end and a jet communicating with the interior of the container, pipe depending from said head into the container and connected with said conduit, said conduit being reduced in diameter at a position between said jet and said pipe, a piston slidably engaging said pipe and also having frictional engagement with the interior of said receptacle, a spray nozzle at the discharge end of said conduit, and means controlling flow of mixture to said nozzle.

5. A spray device comprising a cylindrical container, a head removably engaging said container, said head having a conduit therethrough and provided with an inlet end, a discharge end and a jet communicating with the interior of the container, a pipe depending from said head into the container and connected with said conduit, said conduit being reduced in diameter at a position between said jet and said pipe, a piston slidably engaging said pipe and also having frictional engagement with the interior of said receptacle, a spray nozzle at the discharge end of said conduit, a grip member attached to said head, a valve casing connected with said conduit, a control valve in said casing, and an operating arm positioned to engage and control said valve, said arm extending to a position adjacent said grip.

6. A spray device comprising a container, a head removably connected therewith and provided with a conduit having a jet opening therein, the delivery end of said conduit provided with perforations, a pipe depending from said head into the receptacle and communicating with said conduit, there being a reduced portion in the conduit at a position between said jet and said pipe, a piston located within and frictionally engaging said container, said piston being slidably mounted on said depending pipe, a spray nozzle adjustably mounted on and enclosing the perforated portion of the delivery end of said conduit, and means for varying the spread of sprayed mixture as it is delivered by said spray nozzle.

7. A spray device comprising a receptacle for liquid, a fluid-tight cover for said receptacle, a liquid conduit associated with said cover, flow restricting means in said conduit intermediate the inlet and outlet thereof, a pipe communicating with said conduit at a point between said flow restricting means and the conduit inlet, said pipe terminating in the lower portion of said receptacle, a passage in said cover connecting said receptacle and said conduit at a point between said flow restricting means and the conduit outlet, a fluid-tight piston located within said receptacle and slidably mounted on said depending pipe, and a spray nozzle on the outlet of said conduit.

8. A spray device comprising a receptacle for liquid, a cover for said receptacle, a conduit associated with said cover, flow restricting means in said conduit intermediate the inlet and outlet thereof, a pipe communicating with said conduit at a point between said flow restricting means and the conduit inlet, said pipe terminating in the lower portion of said receptacle, a passage in said cover connecting said receptacle and said conduit at a point between said flow restricting means and the conduit outlet, a piston located within said receptacle and slidably mounted on said depending pipe, a conduit having a spray nozzle on the outlet of said conduit, and a means in said conduit for controlling the flow of liquid to said nozzle.

9. A spraying device comprising a receptacle for liquid, a cover for said receptacle, a conduit associated with said cover, flow restricting means in said conduit intermediate the inlet and outlet thereof, a pipe communicating with said conduit at a point between said flow restricting means and the conduit inlet, said pipe terminating in the lower portion of said receptacle, a passage in said cover connecting said receptacle and said conduit at a point between said flow restricting means and the conduit outlet, a piston located within said receptacle and slidably mounted on said depending pipe, a conduit having a spray nozzle on the outlet of said conduit, and a means in said conduit for controlling the flow of liquid to said nozzle, and a helical baffle in said conduit adjacent said spray nozzle.

STANLEY HAYES.