

**April 4, 1939.**

C. O. DAILEY ET AL

SPRAYING MACHINE

Filed March 14, 1936

**2,153,240**

2 Sheets-Sheet 1

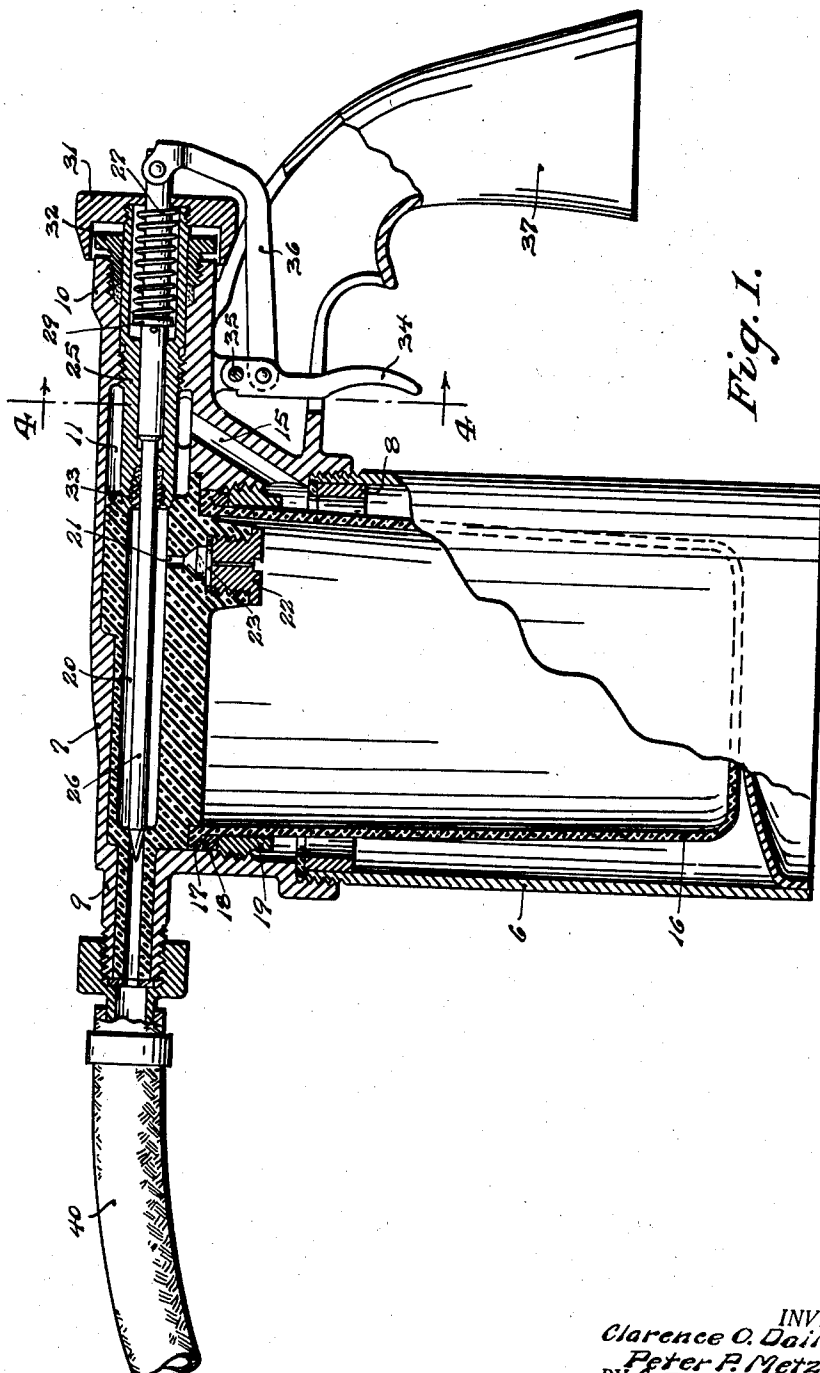


*Fig. 1.*

INVENTORS:  
Clarence O. Dailey  
Peter F. Metz  
BY *Edward E. Parsons*  
ATTORNEYS.

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2 Sheets-Sheet 2

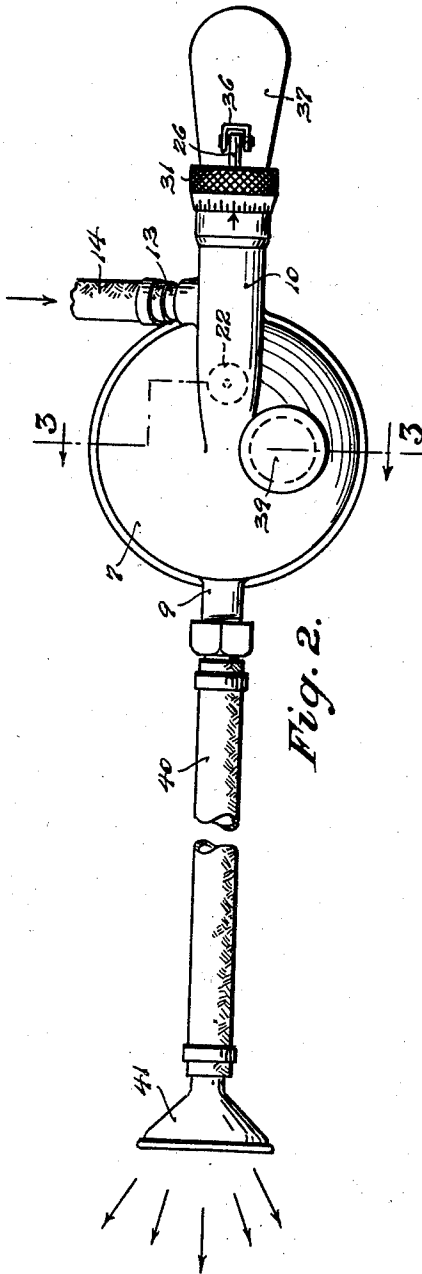


Fig. 2.

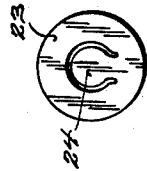


Fig. 5.

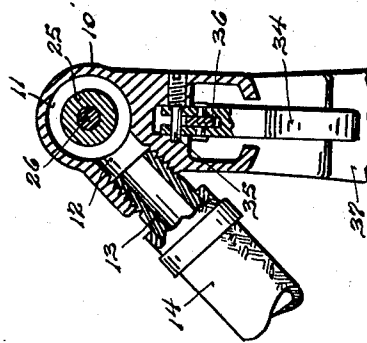


Fig. 4.

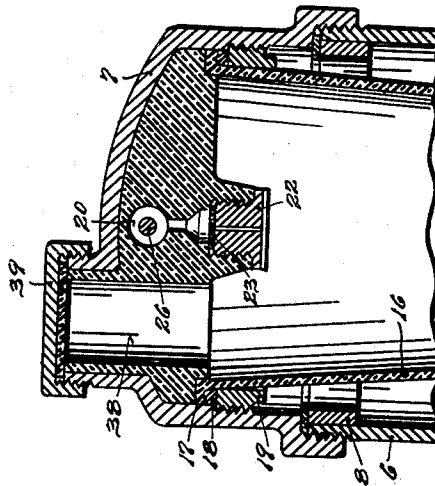


Fig. 3.

INVENTORS:  
Clarence O. Dailey  
Peter F. Metz  
BY  
Edward E. Lawrence  
ATTORNEYS.

## UNITED STATES PATENT OFFICE

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## SPRAYING MACHINE

Clarence O. Dailey and Peter P. Metz,  
Seattle, Wash.

Application March 14, 1936, Serial No. 68,816

12 Claims. (Cl. 299—85)

This invention relates to spraying machines of that general character illustrated and described in our pending application for Letters Patent of the United States, Serial No. 39,117, filed September 4, 1935; the object being to provide a highly advantageous design which, through a modified and perfected application of the operating principles set forth in said pending application, acts to simplify the construction and render the machine particularly applicable for use in the performance of small spraying operations in which portability is of paramount importance.

More particular objects and advantages will, together with the foregoing general object, appear in the course of the following detailed description and claims, the invention consisting in the novel construction, adaptation, and combination of parts illustrated in the accompanying drawings, hereinafter described with reference thereto, and finally set forth in the appended claims.

In said drawings:

Figure 1 is a longitudinal vertical section, parts being broken away and portions thereof shown in side elevation, representing the now preferred embodiment of the invention.

Fig. 2 is a top plan view thereof, taken to a reduced scale and with the supply and delivery hoses being shown fragmentarily.

Fig. 3 is a transverse vertical section to the scale of Fig. 1 and with the section taken on broken line 3—3 of Fig. 2.

Fig. 4 is a transverse vertical section taken on line 4—4 of Fig. 1; and

Fig. 5 is a plan view, enlarged, of the rubber check valve which we employ in the machine to prevent dilution of the concentrate chemical following closure of the spray-control valve.

Referring thereto, the numeral 6 designates a pressure tank exteriorly threaded and receiving a chambered head 7, the threaded end being interiorly reinforced by a welded band 8. Indicated as of metal construction, said head is configured to provide a nipple 9 and a boss 10 axially aligned with one another and disposed at diametrically opposite sides of the head chamber. Cored in said boss is a water-admission chamber 11 and leading to the latter is a port 12 threaded for the reception of the nipple 13 of a supply hose 14. 15 indicates a supply passage leading diagonally from the admission chamber to communicatively connect the same with the interior of the tank.

According to our preferred construction, a block of hard rubber or other suitable non-corrodible

material is molded within the chamber of the head 7 to extend through the nipple 9 and into the forward end of the admission chamber, said molded block being formed about its lower surface with a marginal channel acting to receive the peripheral flange 17 of a non-porous flexible sack which is secured through the medium of a washer 18 engaged by a ring 19 threaded in the head above the outlet opening from the passage 15. Said sack preferably is of rubber composition and constitutes the receptacle for liquid chemical concentrates.

Reverting to said molded block, the same is drilled or otherwise suitably configured to form a flow passage 20 acting as the mixing chamber of the machine and extending transversely of the same to connect the admission chamber 11 with the outlet nipple, said mixing chamber being of enlarged diameter as respects the nipple and of reduced diameter as respects the admission chamber whereby to accommodate a bevelling at each end thereof acting as valve seats. Leading to the mixing chamber is a vertical feed duct 21 which, at its lower end, provides a threaded recess communicatively disposed to the interior of the chemical sack and received in said recess is a metering plug 22. Said plug is formed from a suitable non-corrodible material, preferably hard rubber, and above the same we introduce a check valve comprised of a soft rubber disc 23 formed centrally with a flexible flap 24 acting to normally seat over the outlet end of the metering duct and elevated therefrom under operating conditions responsive to sack compression under the pressure influence of water delivered to the tank.

More especially as respects said water-admission chamber, an axially-bored water-control valve 25 is threadably received therein to seat over the bevelled opening connecting the admission and mixing chambers. Independently movable as respects said valve and slidably fitting the bore thereof to project through the mixing chamber is a spring-closing spray-control needle valve 26 arranged to seat over the bevelled outlet opening from the mixing chamber, said needle valve being desirably treated to resist chemical corrosion. The spring for said valve 26, indicated at 27, is suitably received in a counterbore of the valve 25 to engage a collar 29 carried by the stem of the valve 26. Packing glands for the valves are represented at 32 and 33.

Operatively engaging the valve 25 is a cap 31 which desirably is knurled to facilitate finger engagement, the surface of said cap providing suitably graduated markings (Fig. 2) for setting the

valve relative to a zero mark cut into the face of the boss. Operating mechanism for the needle valve comprises a trigger 34 pivotally suspended from a pin 35 and actuating the valve through a link 36. The machine head, as represented, desirably is provided with a hand-gripping portion 37 conformed similar to a gun butt.

The chemical which is to be water-diluted for spraying purposes is supplied to the interior of the sack through the rubber-lined filler opening 38, a sealing cap 39 being provided therefor. A hose 40 fitted with a suitable nozzle 41 is threaded over the nipple 9 and the hose 14 is attached to a faucet or the like from a pressure source of water supply.

In the operation of the machine, the valve 25 is opened to a predetermined extent through rotary movement of the cap 31, following which water is allowed to flow from the source of supply through hose 14 to the admission chamber, the entering water flowing into the mixing chamber 20 and simultaneously, through the diagonally disposed duct 15, into the tank 6 to develop a static pressure upon the exterior of the chemical-reservoir sack 16. The balanced pressures which obtain in the tank and the mixing chamber co-act with the check-valve 24 to close the feed orifice for the chemical. Trigger-influenced opening of the needle valve acts to obtain a reduced dynamic pressure within the mixing chamber, valve 24 opening under the influence of the pressure differential obtaining with the chemical being delivered into the chamber 20 and mixing with the flowing body of water for delivery as a spray through the nozzle 41. In a manner believed obvious, the mixture is not disturbed as the result of variations in the trigger-controlled volumetric flow as the pressure differential rises and falls proportionately with the flow. Following depletion of the chemical supply, both valves are closed for re-filling the sack.

We are cognizant of the prior use of rubber sacks arranged in a manner whereby the contents are expelled under the influence of water pressure but are not aware of any anticipatory use of the same in the illustrated and described arrangement wherein the chemical is mixed with a body of water flowing from a source common to the compressing volume of water. It is this advance as well as in the particular construction and adaptation of the co-active parts which we consider as constituting our invention. It is our intention that the same be confined only by the limitations expressed in the following claims.

What we claim is:

1. In a machine for diluting liquid chemicals, a pressure tank, a compressible sack in said tank operating as a receptacle for the chemical concentrate, a water-supply chamber adapted for connection with a pressure source of water supply, connection between said chamber and the tank for compressing the sack under the static pressure of the water, a mixing chamber, a valved admission opening to said mixing chamber from the supply chamber and a valved delivery opening from the mixing chamber, a metering plug providing an opening of fixed dimensions connecting the interior of the sack with the mixing chamber, and a check valve in said last named connection acting to prevent admission of water from the mixing chamber to the chemical receptacle.

2. In a machine for diluting liquid chemicals, a pressure tank, a compressible sack in said tank operating as a receptacle for the chemical con-

centrate, a mixing chamber having connection with the interior of the chemical receptacle, means by which said mixing chamber and the pressure tank are each connected with a pressure source of water supply, a valved opening from the mixing chamber for delivering the water-diluted chemical mixed in the mixing chamber, and means by which the connection as between the chemical reservoir and the mixing chamber is closed simultaneously with a closing of the delivery opening from the mixing chamber.

3. A machine for diluting liquid-chemicals comprising the combination of a tank having a removable head formed with a flow passage and provided at one end with a hand grip by which to support the machine, said flow passage having openings to and from the same for the introduction of water from a pressure source of water supply and for the discharge of the chemical following its dilution by the water, a compressible sack detachably supported within the tank to form a chemical reservoir interiorly of the sack and a pressure chamber exteriorly of the sack, a conduit leading to said pressure chamber by which a body of water under the pressure influence of the supply source is delivered to the pressure chamber, a conduit leading from the chemical reservoir to the flow passage of the machine head to obtain a forced introduction of the chemical to said flow passage under the influence of said pressure body of water, a valve for regulating the flow capacity of the flow passage, a valve for controlling the discharge of the water-diluted chemical mixed in the flow passage, and a valve in the conduit which leads from the chemical reservoir to the flow passage operating to close the conduit simultaneously with the closing of said last-named valve for preventing admission of water from the flow passage to the chemical reservoir.

4. A machine for diluting liquid chemicals comprising the combination of a machine head bored longitudinally to provide a pair of co-axial communicating passages, said head at one end of the same being formed with a hand grip by which the machine is supported and the passage in said head which lies proximate to the hand grip constituting a water-supply chamber while the other passage operates as a mixing chamber, both the outlet end of said water-supply chamber through which communication is had with the mixing chamber and the outlet end of said mixing chamber from which the chemical, diluted with water, is delivered being formed to provide valve seats, a tank removably carried by the machine head, a compressible sack detachably supported within the tank to form a chemical reservoir interiorly of the sack and a pressure chamber exteriorly of the sack, connection as between the chemical reservoir and the mixing chamber and between the pressure chamber and the water-supply chamber, a center-bored valve threadably mounted in the machine head for seating engagement with the valve seat provided at the outlet end of the water-supply chamber, and an axially movable needle valve received through the bore of said first-named valve for seating engagement with the valve seat provided at the outlet end of the mixing chamber, said valves each being in axial alignment with the communicating passages of the machine head and acting, respectively, to control the flow capacity of the machine and to control the discharge of diluted chemical from the machine.

5 The machine as defined in claim 4 wherein means comprised of a spring-closing finger-operated trigger having operative connection with the needle valve are provided for controlling the needle valve.

6. In a machine for diluting liquid chemicals, a pressure tank, a compressible sack in said tank operating as a receptacle for the chemical, a mixing chamber having connection with the interior of the chemical receptacle, means for connecting both the mixing chamber and the pressure tank with a pressure source of water supply, a valve for regulating the water flow to the mixing chamber, a valved opening leading from the mixing chamber, and means acting to close and open the connection between the chemical reservoir and the mixing chamber in unison with a closure and opening of the outlet from the mixing chamber.

7. In a machine for diluting liquid chemicals, a pressure tank, a compressible sack in said tank operating as a receptacle for the chemical concentrate, a water-supply opening to said pressure tank for compressing the sack under the static pressure of a source of water supply, a mixing chamber and means for connecting the same with a source of water supply under a pressure common to that applied to the sack, connection between the interior of the chemical receptacle and the mixing chamber, a valved opening from the mixing chamber for delivering water-diluted chemical, and means by which the connection as between the chemical reservoir and the mixing chamber is closed in unison with a closing of the opening from the mixing chamber to prevent communication between the mixing chamber and the interior of the chemical reservoir during periods at which a static pressure exists in the mixing chamber.

8. In a machine for diluting liquid chemicals, a mixing chamber, a compressible reservoir for the chemical having connection with the mixing chamber, valved openings to and from the mixing chamber for supplying a pressure body of a diluting agent to the mixing chamber and delivering the same from the mixing chamber following a mixing of the diluting agent and the chemical in the mixing chamber, and means by which the connection as between the chemical reservoir and the mixing chamber is closed relatively in unison with a closing of the delivery opening from the mixing chamber to prevent communication between the reservoir and the chamber during periods at which a static pressure exists in the mixing chamber.

9. In a machine for diluting liquid chemicals, a pressure tank, a compressible reservoir for the chemical received in said tank, means for com-

pressing said reservoir under static pressure from a source of pressure dynamically influencing a stream of a diluting agent, a mixing chamber having a connection of fixed-flow capacity leading thereto from the chemical reservoir, a conduit leading to the mixing chamber for supplying the dynamic stream of the diluting agent, a conduit leading from the mixing chamber for delivering the diluted chemical, a flow-governing valve in said supply conduit, and a graduated scale associated with said valve and predeterminedly related to the fixed-flow capacity of the chemical connection for setting the valve in positions obtaining a positive control of the degree of dilution of the chemical supplied to the mixing chamber.

10. The structure defined in claim 9 wherein the volumetric capacity of the mixing chamber appreciably exceeds that of the delivery conduit leading from the chamber.

11. In a machine for diluting liquid chemicals, a pressure tank, a compressible reservoir for the chemical received in said tank, means for compressing said reservoir under static pressure from a source of pressure dynamically influencing a stream of a diluting agent, a mixing chamber and a connecting duct leading thereto from the reservoir, a reducer of a predetermined fixed flow capacity received in said duct, a conduit leading to the mixing chamber for supplying the dynamic stream of the diluting agent, a valved conduit leading from the mixing chamber for delivering the diluted chemical, and means operating co-incident to a closing of the valve in said delivery conduit for isolating the chemical reservoir from the mixing chamber and thereby trapping the agent in the mixing chamber against admission to the chemical reservoir.

12. In a machine for diluting liquid chemicals, a pressure tank, a compressible reservoir for the chemical received in said tank, means for compressing said reservoir under static pressure from a source of pressure dynamically influencing a stream of a diluting agent, a mixing chamber and a connecting duct leading thereto from the reservoir, a conduit leading to the mixing chamber for supplying the dynamic stream of the diluting agent, a valved conduit leading from the mixing chamber for delivering the diluted chemical, and means operating co-incident to a closing of the valve in said delivery conduit for isolating the chemical reservoir from the mixing chamber and thereby trapping the agent in the mixing chamber against admission to the chemical reservoir.

CLARENCE O. DAILEY.  
PETER P. METZ.