

June 24, 1930.

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1,765,398

SPRAYER

Filed Dec. 31, 1926

2 Sheets-Sheet 1

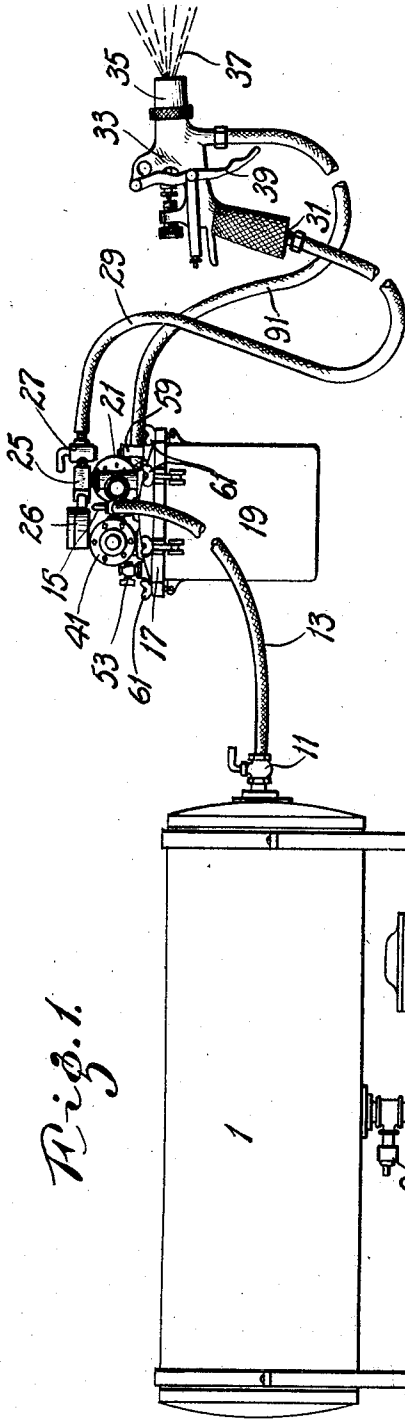


Fig. 1.

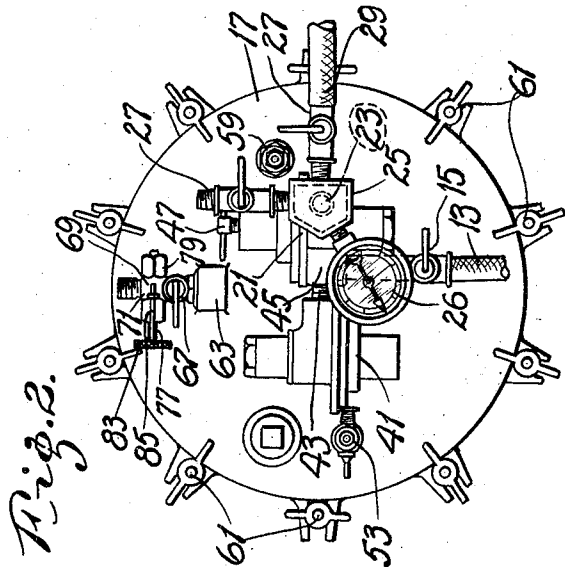


Fig. 2.

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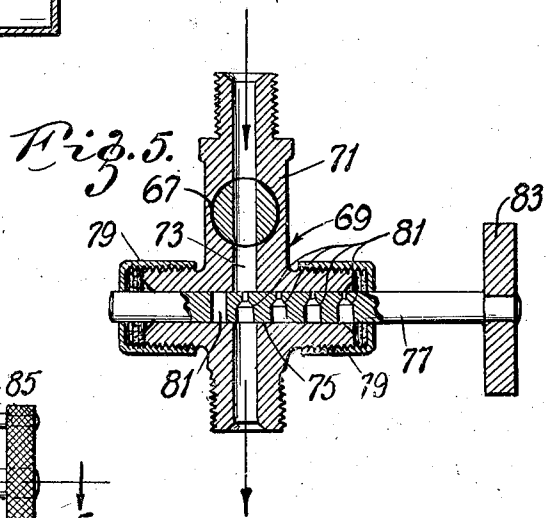
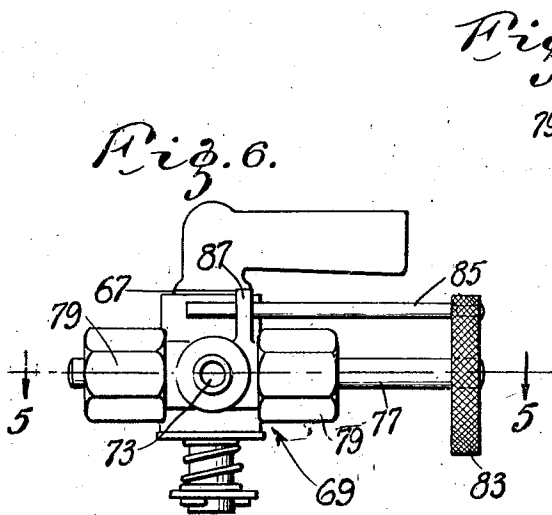
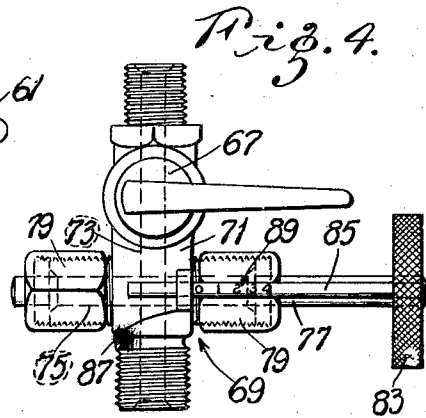
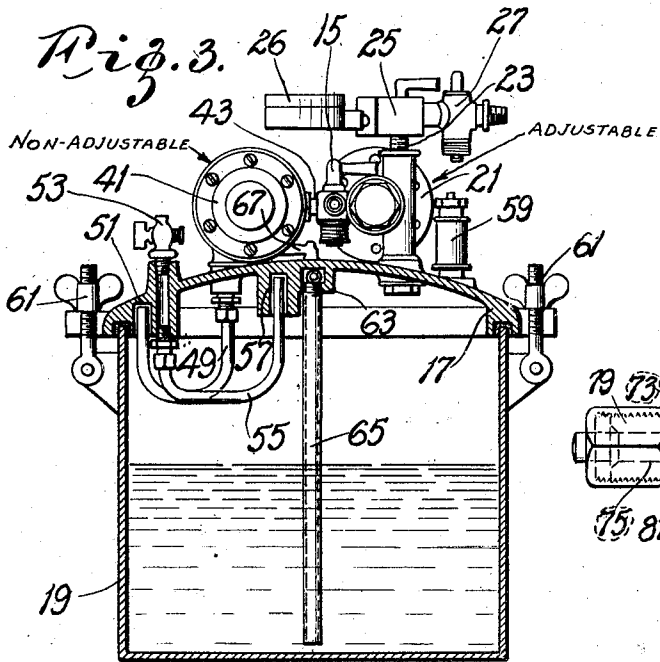
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2 Sheets-Sheet 2



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SPRAYER

Application filed December 31, 1926. Serial No. 153,189.

This invention relates to painting equipment; and, with regard to certain more specific features, to paint spraying equipment actuated by a compressed gas such as

5 air.

Among the several objects of the invention may be noted the provision of means for bringing together streams of painting material and air, both under pressure, whereby the former is projected as a spray by the latter; the provision of means of the class described in which certain air, taken from a main air supply may have its pressure adjustably regulated for purposes of atomization of painting material; the provision of said means in which the material supply is under a constant pressure obtained from said main air supply; the provision of means whereby said material supply may have its volume of flow varied and controlled without substantially affecting the pressure of said material supply, which pressure is maintained constant, as described; the provision of a device of the class described which is compact in construction and readily operable without the necessity for involved or intricate adjustments, and the provision of a device of the class described which is subject to less disastrous accidental discharges at the nozzle thereof. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combination of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention.

Fig. 1 is a diagrammatic side elevation of the improved construction, shown assembled and ready for use;

Fig. 2 is a top plan view of a paint pot;

Fig. 3 is a vertical section of said pot;

Fig. 4 is a plan view of a volume control valve;

Fig. 5 is an enlarged horizontal section taken along line 5—5 of Fig. 6 and shows certain cut-off ports adapted to control the volume of material; and,

Fig. 6 is a front end view of Fig. 4.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1 there is illustrated at numeral 1 a conventional air supply tank which, in the present embodiment, carries a substantially constant pressure of air, of the order of one hundred or so pounds per square inch, gage.

The pressure in the above supply tank 1 is maintained by means of a compressor 3 driven from a motor 5 by a drive 7. A conventional unloader 9 is used to maintain the pressure in the tank practically constant. The outlet of the tank 1 is equipped with a stop-cock 11 from which leads a main air supply hose 13.

The main air supply hose 13 leads to a second stop cock 15, located on the lid 17 of a paint pot 19. The cock 15 is in communication with a regulator valve 21, also located on said lid 17; but the regulator valve 21 does not communicate with the interior of the pot 19. Rather, the outlet 23 of the regulator 21 communicates with a manifold 25 which in turn has outlet stop cocks 27, to at least one of which, is connected an air hose 29 which leads to an air inlet nipple 31 of a spray gun 33.

The gun 33 is of the general type illustrated and described in my patent application for spray gun, Serial No. 135,113, filed September 13, 1926, now Patent No. 1,729,759 of Oct. 1, 1929, wherein a stream of painting material and air meet at a nozzle 35 to form an atomized spray 37. A flow of both air and paint through the gun 33 may be controlled from a trigger 39. Inasmuch as the gun per se does not constitute the present invention, a further description of it will not be given. It is to be noted that the manifold 25 carries a pressure sight gage 26 whereby the result of any adjustment at the regulator 21 may be visually noted. The purpose of the plurality of

cocks 27 is to accommodate more than one gun to a pot, if desired.

Referring again to Figs. 2 and 3, it is evident that the cock 15 is also in communication with a non-adjustable pressure reducing valve 41. This communication is made by way of pipes 43 and a small manifold 45. It is to be understood that the reducing valve 41 receives its air supply directly from the stop cock 15, without substantial loss of pressure, and not by way of the regulator 21 after said regulator has reduced the air pressure. In other words, the main air supply coming through the stop cock 15 branches into two directions, in one direction through the regulator or adjustable pressure reducer 21 and in the other through the non-adjustable pressure reducer 41. The regulator 21 is provided with a manually operable adjusting screw 47, whereby the amount of pressure reduction through the valve may be regulated to suit the needs of an operator. The regulator 21 is of the class in which a substantially constant pressure reduction is had after the screw 47 is set to a predetermined position, provided a substantially constant pressure is had in the tank 1.

The non-adjustable reducing valve 41 is in communication with the interior of the pot 19 by way of a line 49 which leads to a blind-hole 51 adapted to prevent painting material from getting into the valve. The purpose and description of the type of blind-hole construction is given more particularly in my patent application for painting apparatus, Serial No. 744,335, filed October 18, 1924, now Patent No. 1,691,374 of Nov. 13, 1928. It does not comprise the present invention per se and will therefore not be further detailed here.

It is evident from the above, that the non-adjustable reducing valve 41 is adapted to maintain a substantially constant pressure within the pot 19, in so far as a fairly constant pressure is maintained within the main air supply tank. No means is provided for regulating the reduction of pressure at the non-adjustable valve 41. The result is that the liquid painting material which is carried in the pot 19 is kept at a constant pressure, say thirty pounds per square inch gage.

A conventional outlet cock 53 communicates with the interior of the pot 19 by means of another line 55 leading to another blind hole 57. A conventional safety valve 59 is also provided on said pot. The lid 17 is removably sealed to the pot 19 by thumb screws 61.

Depending from an outlet manifold 63 in the lid 17 is an outlet line 65 reaching almost to the bottom of the pot 19. The manifold 63 is provided with an outlet cock 67 on the outside of said lid 17. It is evi-

dent that when pressure is applied to the interior of the pot 19 in the manner described, that there will be a tendency to force paint therefrom by way of the line 65, manifold 63 and cock 67. A plurality of cocks 67 may be used if a plurality of guns 33 are to be used, as in the case of the cocks 27.

The outlet side of said cock 67 is integrally formed with a volume control valve 69, illustrated more particularly in Figs. 4 to 6. The construction of the valve 69, taken in combination with its application, is a salient feature of this invention and will therefore be described in particular.

The volume control valve 69 comprises a body extension 71 from the cock 67 through which is formed a longitudinal opening or passage 73, said opening passing directly through the cock 67 and adapted to be opened and closed thereby.

A cross-passage 75 intersects the opening 73 and is adapted to slidably receive a valve stem 77, the said stem 77 and the passage 75 being packed against leakage at the ends thereof by means of stuffing glands 79.

Formed laterally across the stem 77 and longitudinally of the opening 73 are cut-off or volume control ports or orifices 81. Four of these ports 81 are smaller at one end than the other and the small end is set toward the cock 67, that is, against the flow of material. The purpose of this is to prevent flocculent material or other foreign matter from wedging and remaining in the ports. The fifth and largest port is a straight bore in the present embodiment made by a number forty drill. The large diameters of the other four ports are made by the same number forty drill, but the small effective diameters of said other four ports are made by drills numbered 58, 62, 65 and 68 respectively.

It is evident from the drawings that the five ports 81, are of variable effective diameters and will therefore be adapted to control the volume of paint passing from the pot 19, if a means is provided for placing the respective ports in line with the passage 73. This is done by providing a control piece 83 on the end of the stem 77, whereby the movement of the said stem 77 may be controlled. Extending from the piece 83 parallel to the stem 77 is an indicator rod 85 which rides slidably in an indicating guide 87. Indicia 89 are formed on the indicating rod 85; and when these indicia engage the ear 87, they indicate what size of volume control port is in position to permit a predetermined flow of material from the pot; provided the proper stop cocks are open.

From the outlet side of the volume control valve 69, the paint is led by means of a material hose 91 to the said gun 33.

The operation of the invention is as follows:

The predetermined pressure (say one hundred pounds per square inch), as governed by the unloader 9, is maintained in the tank 1 by the compressing system 3, 5, 7.

In order to provide painting material and atomizing air at the gun 33, the stop cocks 11 and 15 are opened. By this means, air at one hundred pounds pressure is supplied to the regulating valve 21 and to the non-adjustable reducing valve 41. The non-adjustable reducing valve 41 causes a predetermined pressure to be maintained on the material within the pot, this pressure depending upon the original manufactured characteristics of the valve and being thirty pounds in the present embodiment. This pressure cannot be changed by the operator.

On the other hand, that air which passes to the regulating valve 21 is reduced in pressure by said valve 21 an amount depending upon the setting of the adjusting screw 47 which is controllable by said operator. In other words, the pressure of the atomizing air is under control of the operator. The pressure is indicated at the gage 26. The adjusted or regulated air pressure is maintained in the manifold 25.

In order to bring air and material to the gun 33, the proper cocks 27 and 67 are opened. The operator sets the volume control valve 69, such that the desired port is in position to give the required paint flow adapted to maintain a given rate of work for the particular operator. The operator also adjusts the regulator 21 to get the desired aspirating effect on his air.

The only remaining operation is to pull the trigger 39 to put the gun 33 into operation.

One of the advantages of this invention comprises the ease with which control may be had. For each pressure on a supply of paint there is usually a definite atomizing air pressure required; or at least only a rather limited range of such atomizing-air pressures. In the systems previously used the control of the paint supply was had by changing the pressure on said paint supply, which necessitated a resetting of the valve 41 which was adapted to be adjusted by the operator; and it also necessitated a troublesome resetting of the valve 21 to meet the conditions of the new pressure on the material at the gun.

In the present invention the operator cannot change the pressure on the material supply, because the reducing valve 41 is not adjustable and the unloader 9 is not under control of the operator in his remote working position. The unloader 9 is set primarily with regard to the requirements of

safety at the tank 1 and is not reset at the whim of an operator at the gun 33.

The result of the above is that fewer manual adjustments are required of the operator at the regulator 21. If the operator desires more or less material to accommodate more or less speed of operation he sets the volume control valve 69 and this does not necessitate as many resettings at the valve 21 as was the case when the pressure of the material was initially regulated, instead of the volume of the material as herein described.

It is to be understood that there is some inherent pressure drop through the material passages from the pot to the gun; but the resulting variation in pressure at the nozzle, is not of the order of the pressure variation at the nozzle which was had by manually regulating pressure from the reducer 41 to change the paint flow. Therefore the required settings are simplified. The above statements hold for the system while spraying.

Another advantage comprises the fact that the hose 89 does not carry full pot pressure during the spraying operation or when paint is flowing due to other causes; but only when the system is idle for a period and pressure has had a chance to build up in the line 89. Hence, a break in the line or a nozzle which is stuck and open to the flow of material does not result in an excessive outrushing of paint with consequent loss and damage, as has been the case heretofore, where the line 91 had no volume control between it and the pot under pressure. In the present invention the material line is restricted against any abnormal rush of fluid therethrough. The loss of paint and resulting damage, due to accidents which happen frequently in this industry, are thus greatly reduced by means of the present invention. It is to be noted in this connection, that some time is required to reach the cocks 27, 69 from an operator's position at the gun 33, which may be at the end of a long length of hose. The outrush of fluid may therefore be more disastrous if not checked, as by the volume control.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a liquid sprayer, a main air supply tank, a pressure tight pot for liquid, a communicating line between said tank and said

pot including therein a non-adjustable pressure reducer, a branch from said line on the high pressure side of said reducer to an adjustable pressure reducer, an outlet from said pot adapted to have liquid forced therefrom by means of the fixed pressure within said pot, said outlet communicating with a volume control valve, a spray gun including means for atomizing liquid by means of air under pressure, communicating means from said adjustable reducer to the air inlet of the spray gun and communicating means from said volume control valve to the liquid inlet of said spray gun, said volume control valve comprising a body having a passage, a movable closing stem intersecting said passage and having openings of various sizes therein adapted to control the volume of fluid going through said passage when the stem is moved.

2. In a liquid sprayer, a main air supply tank, under substantially constant pressure, a pressure tight pot for liquid, a communicating line between said tank and said pot including therein a fixed pressure reducer, a branch from said line on the high pressure side of said reducer to an adjustable pressure reducer, an outlet from said pot adapted to have liquid forced therefrom by means of the fixed pressure within said pot, said outlet communicating with a volume control valve, a spray gun including means for atomizing liquid by means of air under pressure, communicating means from said adjustable reducer to the air inlet of the spray gun and communicating means from said volume control valve to the liquid inlet of said spray gun, said volume control valve comprising a passage intersected by a movable member having various sized openings.

3. In a sprayer, a liquid-carrying pot, means for supplying a positively constant pressure to said liquid-carrying pot comprising compressing means and a fixed pressure reducer, a spray gun having an air inlet and a liquid inlet, means for supplying an adjustable pressure of air to said air inlet comprising said compressing means and an adjustable pressure reducer, a volume control valve, said pot having a liquid outlet communicating with said volume control valve, and volume control valve having a communication with the liquid inlet of said gun, said volume control valve comprising means for adjustably inserting in the liquid outlet from said pot a member having various orifices and means for holding said last-named member in predetermined position without attention from an operator.

In testimony whereof, I have signed my name to this specification this 29th day of December, 1926.

THEODORE BIRKENMAIER.