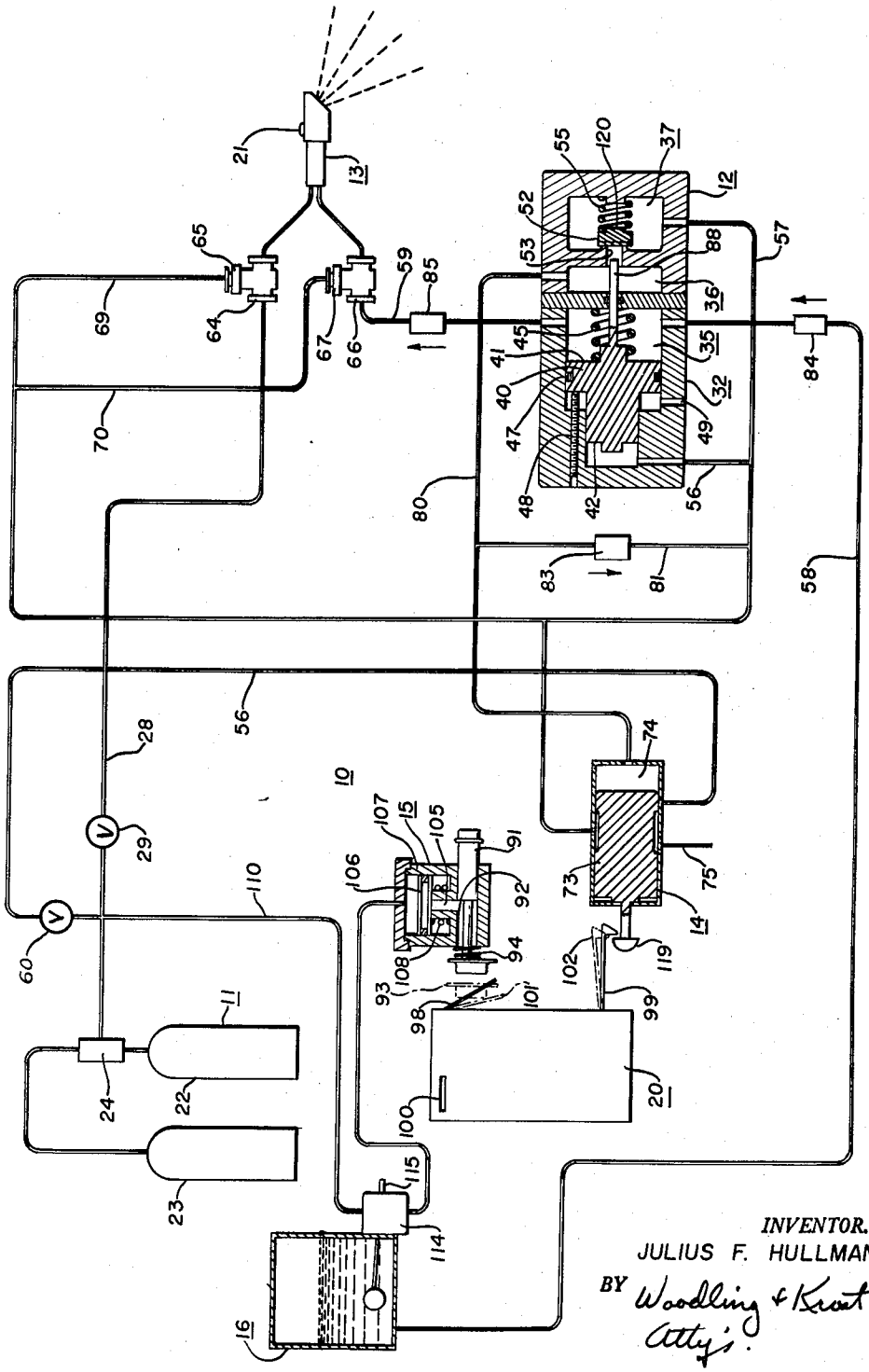
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LIQUID METERING DISPENSING APPARATUS

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LIQUID METERING DISPENSING APPARATUS

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The invention relates in general to dispensing machines and more particularly to dispensing machines wherein dispensing material is dispensed by the movement of a piston within a cylinder.

The dispensing machine which will be more fully described hereinafter is particularly intended for use at beaches and swimming pools to dispense suntan oil, but it should be readily recognized that the machine has a much wider range of application and is not limited to this specific use.

An object of the invention is to provide dispensing apparatus wherein electrical power is unnecessary for its operation.

Another object of the invention is to provide a dispensing machine having a piston movable by means of a pressurized gas source acting on a first face thereof from a first and second position to force dispensable material from the cylinder and having means actuated upon movement of the piston to the second position to move the piston back to the first position.

Another object of the invention is to provide a dispensing machine wherein a pressurized gas is utilized to dispense material therefrom and is also utilized to dispense the material in spray form.

Another object of the invention is to allow one who is purchasing material from the dispensing machine to use the dispensed material at his leisure and not limiting him to an absolute period of time in which he has to use the purchased quantities, but in fact, limiting him to the total amount which he may receive.

Another object of the invention is to provide a pressurized gas source as the sole source of power in dispensing material and in controlling the dispensing mechanism.

Another object of the invention is to provide means by which the quantity of material to be dispensed within the dispensing cycle can be easily changed or varied by simple mechanical adjustment.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

The sole figure is a schematic drawing showing the assembled relationship of the various components of the dispensing apparatus.

The dispensing machine of the present invention has been indicated generally by the reference numeral **10** and includes generally a pressurized gas source **11**, a liquid metering cylinder **12**, a spray dispensing head **13**, a starting valve **14**, a gas and liquid empty indicator mechanism **15**, and a liquid container **16**. A coin actuated mechanism **20** is used to initiate a dispensing cycle and it should be recognized that many of such coin mechanisms may be adapted for use with the present invention. In the description of the present invention, the liquid container **16** will be described as containing a liquid suntan oil solution which is to be dispensed in predetermined quantity at beaches, swimming pools and other similar places. The

dispensing head **13** includes any suitable mechanism which is capable of intermixing two fluids, for example, carbon dioxide and the suntan oil solution of the present invention. The dispensing head **13** is provided with a hand valve **21** which is movable between open and closed positions to alternately allow and prevent flow of material therefrom. The pressurized gas source **11** comprises two tanks of carbon dioxide **22** and **23**, each at a pressure, for example, of 800 p.s.i. A changeover valve **24** has been shown connected to the outlets of the tanks **22** and **23**, respectively, to indicate how one of the carbon dioxide tanks may be removed after it becomes empty and released without shutting off the carbon dioxide in the other tank and interrupting the operation of the apparatus. This type of change-over valve is generally known throughout the industry and may be of the type which is shown in Patent No. 2,641,273, issued to Norman H. Siebens on June 9, 1953.

A first conduit **28** provides communication between the pressurized gas source **11** and the spray dispensing head **13**. A suitable reducing valve **29** is interposed in conduit **28** and serves to reduce the pressure from the source **11** down to a predetermined quantity. For example, a suitable reduction would be down to 10 p.s.i. The liquid metering cylinder **12** comprises wall means **32** which define first, second and third chambers indicated by the reference numerals **35**, **36** and **37**, respectively. A piston **40** having first and second faces **41** and **42**, respectively, is slidably mounted within the first chamber **35** for movement between first and second positions. The piston as seen in the drawing, is in the first position and in the second position would be moved to the right hand side of the cylinder. A first spring **45** is interposed in the first chamber **35** and extends between a side wall and the first face of the piston to urge the same toward the first position. The piston **40** is provided with a suitable sealing ring **47** on the outer periphery thereof to maintain a good seal between the piston and the chamber wall. An adjusting screw **48** is provided and limits the movement of the piston within the chamber **35**. As will be more readily understood hereinafter, the adjusting screw also determines the quantity of suntan oil to be dispensed during one operating cycle of the machine. A relief port **49** is provided for allowing escape of any material trapped by the piston so that movement of the piston within the chamber will not be hindered. A valve member **52** which is movable between open and closed positions is interposed in an opening **53** which provides communication between the chambers **37** and **36**. The valve member **52** is shown in the closed position in the single drawing and in this position prevents communication between the chambers **37** and **36** and conversely allows communication therebetween when in the open position. A second spring **55** normally biases the valve member **52** toward the closed position.

A second conduit **56** provides communication between the pressurized gas source **11** and the portion of the chamber **35** in which the second face **42** of the piston resides with the starting valve **14** interposed therebetween. A reducing valve **60** is interposed in conduit **56** and serves to reduce the pressure from the source **11** down to a predetermined quantity, for example, 35 p.s.i. A third conduit **57** provides communication between the pressurized gas source and the third chamber **37** with the starting valve **14** interposed therebetween and a fourth conduit **58** provides communication between the liquid container and the portion of the first chamber **35** which communicates with the first face **41** of the piston **40**. A fifth conduit **59** provides communication between the first chamber and the spray dispensing head **13**.

The first normally closed valve **64** is interposed in the first conduit **28** and has pressure responsive means **65** for

moving it from its normally closed position to an open position and a second normally closed valve 66 is interposed in the fifth conduit 59 and has pressure responsive means 67 for moving the valve from its normally closed to open position. The valves 64 and 66 may be of the type shown in my co-pending application entitled "Dispensing Machine" and shown in detail in Figure 4 thereof. Sixth and seventh conduits 69 and 70, respectively, provide communication between the pressurized gas source and the pressure responsive means 65 and 67, respectively. It will be noted that in some instances the conduits, for example, the conduit 57 is an extension of conduit 56, as are conduits 69 and 70. However, this is only for the sake of saving material and saving space and it should be readily recognized that separate conduits could be extended from the pressurized gas source to all of the places where the branch lines extend.

The starting valve 14 is interposed in the second conduit 56 and is also in effect, interposed in conduits 57, 69 and 70 since these conduits also include a portion of conduit 28. The starting valve 14 has a valve plunger 73 which is movable between first and second positions and it also has pressure responsive means 74 and an exhaust port 75. When the starting valve is in the first position (illustrated in the single drawing) the second face 42 of the piston 40, the third chamber 37, and the pressure responsive means 65 and 67 of the valves 64 and 66, respectively, are connected to the exhaust port 75 and therefore exhaust any gas under pressure to the outside atmosphere. When the starting valve 14 is in the second position or when the valve plunger 73 is moved to the right as seen in the single figure, the second face of the piston along with the third chamber 37 and the pressure responsive means of valves 64 and 66 are respectively connected to the pressurized gas source 11. An eighth conduit 80 provides communication between the second chamber 36 and the pressure responsive means 74 of the starting valve 14. A ninth conduit 81 provides communication between the second conduit 56 and the eighth conduit 80. A one-way check valve 83 is interposed in the ninth conduit 81 and permits flow in only one direction as indicated by the arrow; namely, flow from the conduit 80 to conduit 56. A one-way check valve 84 is also interposed in the conduit 58 and a check valve 85 is interposed in conduit 59.

An extension member 88 is carried by the piston 40 and is engageable with the valve member 52 to open the same when the piston reaches the second position. When the valve member 52 is moved to the open position, communication is permitted between the conduit 57 and the pressure responsive means 74 by way of the chambers 37 and 36 and the conduit 80.

The gas and liquid empty indicator 15 comprises a plunger 91 having a shoulder 92 thereon and is biased toward a coin rejecting position, which position is indicated by the dot-dash line 93, by a spring 94. The gas and liquid empty indicator mechanism 15 is located closely adjacent the coin mechanism 20. The coin mechanism 20 has been only generally indicated but has been shown as having a coin rejecting arm 98, a latch arm 99 and a slot 100 into which a coin of suitable denomination may be inserted. Movement of the plunger 91 to the coin rejecting position causes the arm 98 to move into the position indicated by the dot-dash lines 101. When the arm is moved into position 101 then any coins which are inserted into the slot 100 will be rejected and returned to the customer. When the plunger 91 is in the full line position shown in the accompanying drawing, then coins which are inserted into the slot 100 will cause the latch arm 99 to move to the position indicated by the dot-dash lines 102. In this position 102 it is then possible to actuate the dispensing machine through an operating cycle by pushing the handle 119. A latch member 105 engages the shoulder 92 in a latched condition to maintain the plunger 91 away from the coin rejecting position. The latch member has a head 106 slidable in a cylinder 107 and being biased toward an unlatched condition by a spring 108.

A tenth conduit 110 provides communication between the cylinder 107 and the pressurized gas source 11 and this gas pressure maintains the latch member 105 in latched condition until this pressure drops to a predetermined condition whereupon the spring 108 moves the latch 105 to the unlatched condition. A liquid container valve 114 is interposed in the tenth conduit 110 and has an exhaust port 115 and is responsive to the amount of material or liquid in the container 16. When the amount of liquid in the container 16 is at a predetermined level, the valve 114 permits communication between the pressure source and the chamber 107 by way of the conduit 110. When the amount of liquid drops to a predetermined minimum amount, the valve 114 shuts off communication through conduit 110 and exhausts the portion of conduit 110 between the valve 114 and the empty indicator 15 to the atmosphere. This causes the latch member 105 to move to unlatched condition and the plunger 91 then moves to the above described coin rejecting position. It will thus be seen that the empty indicator mechanism 15 will cause coins to be rejected from the coin mechanism 20 under two conditions; namely, when the liquid drops to a predetermined amount in the container 16 and when the gas pressure drops to a predetermined amount in the pressure source 11.

To actuate the dispensing machine 10 through dispensing cycle, a coin of suitable denomination is inserted into the coin mechanism 20 through the slot 100. This causes the latch arm 99 to move to the dot-dash line position 102. The handle 119 of the starting valve 14 may then be pushed moving the valve plunger 73 to the right. Movement of the plunger 73 to the right permits pressurized gas flow from the pressure source 11 through conduits 56, 57, 69 and 70. The gas flow through conduits 69 and 70 actuates the pressure responsive means 65 and 67 of the normally closed valves 64 and 66, respectively. Pressurized gas flow through conduit 57 delivers gas under pressure to chamber 37 and pressurized gas flow through conduit 56 causes gas pressure to be introduced into the left end of the first chamber 35 which pressure acts upon the second face 42 of piston 40 tending to move it to the second position or to the right as viewed in the accompanying drawing. After the handle 119 has been depressed by the person desiring material from the dispensing machine all that is necessary for him to do is to depress the hand valve 21 of the spray dispensing head 13. This allows the plunger 40 to move to the right forcing suntan oil through the conduit 59 to the dispensing head 13 where it is dispensed in spray form by carbon dioxide traveling through conduit 28 to the spray dispensing head 13. When the piston 40 has reached the second position or its furthest movement to the right, the extension member 88 which is carried thereby engages the valve member 52 and moves it to open position. This is possible since the surface area of the face 42 of the piston is greater than the surface area on surface 120 of the valve member 52. When the valve member 52 has been moved to open position, pressurized gas flows from the chamber 37 into chamber 36 and from there to the pressure responsive means 74 of the starting valve 14 by way of conduit 80. This causes the valve plunger 73 to move to the left as viewed in the accompanying drawing. When the valve plunger 73 moves to the left, the gas pressure in lines 56, 57, 69 and 70 is caused to exhaust to the atmosphere through port 75. This causes the normally closed valves 64 and 66 to move to closed position thereby prohibiting flow through conduits 28 and 59, respectively. With the gas pressure exhausted from the left end of the chamber 35, the spring 45 moves the piston from the second position

back to the first position. The movement of the piston **40** from the right or second position to the left causes oil to be drawn into the chamber **35** through conduit **58** from the liquid container **16**. At the same time the spring **55** moves the valve member **52** to the closed position. When the piston has completed its movement to the left, the machine is ready for another dispensing cycle. The same procedure is followed to go through another operating cycle. The gas and liquid empty mechanism **15** is, as described hereinabove, not actuated unless the pressure drops too low in the pressure source **11** or the quantity of liquid drops to a predetermined low in the container **16**. The coin mechanism **20** has been shown by way of illustration merely to indicate the function of the various parts of the dispensing machine and it should be readily recognized that many coin mechanisms could be suitably adapted for use with the machine of the present invention. The conduits **56**, **57**, **69** and **70** may also be collectively referred to as second conduit means since they are all connected to the pressurized gas source **11**.

It will thus be seen that the dispensing machine of the present invention can be installed far from any source of electrical energy since none is needed for the successful operation of the apparatus. The pressurized gas source which is used to drive the piston which meters the liquid during a dispensing cycle, is also utilized to spray the liquid from the dispensing head **13**. The quantity of liquid which a customer receives for a predetermined consideration may also be used at his leisure by merely opening or closing the hand valve **21**, however, the total quantity which he receives cannot be varied. It will also be seen that the movement of the piston **40** to the second position in forcing liquid from the metering cylinder causes the actuation of means for moving the piston from this second position to the first position. This means in the present embodiment includes the opening of the valve **52** by the valve opening means **88** and the flow of pressurized gas to move the starting valve whereby pressure is relieved from the face **42** of the piston **40** so that the spring **45** can move the piston back to the first position. The apparatus which has been herein described is easily susceptible of adjustment to change the quantity of liquid to be dispensed during a dispensing cycle by turning the screw **48**.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. Dispensing apparatus including a pressurized gas source, a spray dispensing head, a liquid metering cylinder, a liquid container and a control valve, said liquid metering cylinder having a liquid chamber and a piston therein movable between first and second positions and also having a valve movable between open and closed positions, first conduit means providing communication between said pressurized gas source and said spray dispensing head, second conduit means providing communication between said pressurized gas source and said piston and valve of said liquid metering cylinder, third conduit means providing communication between said liquid container and said liquid chamber of said metering cylinder, fourth conduit means providing communication between said liquid chamber of said metering cylinder and said spray dispensing head, said spray dispensing head having a hand valve for alternately permitting and prohibiting flow from said first and fourth conduit means therethrough, first and second normally closed valves each having pressure responsive means interposed in said first and fourth conduit means respectively, said second conduit means also providing communication between said pressurized gas source and said pressure responsive means of said first and second normally closed valves respectively to cause said first and second normally closed valves to move to open position, said control valve being interposed in said second conduit means and movable between first and second positions, said control valve in said first position prohibiting flow through said second conduit means and in said second position allowing flow through said second conduit means, said control valve having an exhaust port, said control valve having manual means for moving same from said first to said second position and having pressure responsive means for moving same from said second to said first position, fifth conduit means providing communication between said valve of said liquid metering cylinder and said pressure responsive means of said control valve, actuation of said manual means of said control valve moving same from said first to said second position and permitting pressurized gas flow through said second conduit means to open said first and second normally closed valves and to move said piston of said liquid metering cylinder from said first to said second position to force liquid through said fourth conduit means when said hand valve of said spray head is in an open position, valve opening means carried by said piston, movement of said piston to said second position causing said valve opening means to open said valve of said liquid metering cylinder to allow flow of pressurized gas from said second conduit means through said fifth conduit means to said pressure responsive means of said control valve to move said control valve from said second to said first position, said control valve in said first position exhausting a portion of said second conduit means, means for moving said piston from said second position to said first position to fill said liquid chamber with liquid from said liquid container through said third conduit means, and means for closing said valve of said liquid metering cylinder.

2. Dispensing apparatus including a pressure source, a liquid metering cylinder, a liquid container and a control valve, said liquid metering cylinder having a liquid chamber and a piston therein with an end portion and movable between first and second positions, said liquid metering cylinder having a valve movable between open and closed positions, conduit means providing communication between said pressure source and said end portion of said piston of said liquid metering cylinder, conduit means providing communication between said liquid container and said liquid chamber of said liquid metering cylinder, exhaust conduit means providing communication from said liquid chamber of said liquid metering cylinder, said control valve being interposed in said conduit means which lead to said piston and movable between first and second positions, said control valve in said first position prohibiting flow through said conduit means which lead to said piston and in said second position allowing flow through said conduit means which lead to said piston, said control valve having an exhaust port, said control valve having manual means for moving same from said first to said second position and having pressure responsive means for moving same from said second to said first position, conduit means providing communication between said valve of said liquid metering cylinder and said pressure responsive means of said control valve, actuation of said manual means of said control valve moving same from said first to said second position moving said piston of said liquid metering cylinder from said first to said second position to force liquid through said exhaust conduit means, valve opening means carried by said piston, movement of said piston to said second position causing said valve opening means to open said valve of said liquid metering cylinder to allow flow from said pressure source to said pressure responsive means to said control valve to move said control valve from said second to said first posi-

tion, means for moving said piston from said second position to said first position to fill said liquid chamber with liquid, and means for closing said valve of said liquid metering cylinder.

3. Dispensing apparatus including in combination a pressure source, a liquid metering cylinder, a liquid container, a spray dispensing head and a control valve, said liquid metering cylinder having piston means with first and second face sides and movable between first and second positions, conduit means providing communication between said pressure source and said first face side of said piston means, conduit means providing communication between said pressure source and said spray dispensing head, conduit means providing communication between said liquid container and said second face side of said piston means, conduit means providing communication between said second face side of said piston means and said spray dispensing head, first and second normally closed valves each having control means and respectively interposed in said two conduit means to said spray dispensing head, conduit means providing communication between said pressure source and said control means of said first and second normally closed valves for opening same, said control valve being located in said conduit means to said first face side of said piston means and in said conduit means to said control means of said first and second normally closed valves, said control valve movable between first and second positions, said control valve in said first position prohibiting flow from said pressure source to said first face side of said piston means and to said control means of said first and second normally closed valves, means for transmitting a force to said control valve to move same to said second position thereby initiating only a single cycle of said dispensing apparatus, said control valve in said second position permitting flow from said pressure source to said first face side of said piston means and to said control means of said first and second normally closed valves thereby causing said first and second normally closed valves to open, normally closed dispensing head valve means in said dispensing head, opening of said dispensing head valve means causing said piston means to move to said second position and causing liquid to be dispensed in spray form from said spray dispensing head, means at all times acting on said second face side of said piston means urging same to said first position, means operable on movement of said piston means to said second position for transmitting a force to said control valve to move same to said first position thereby causing said pressure on said first face side of said piston means and on said control means of said first and second valves to be released thereby causing said piston means to return to said first position to complete a dispensing cycle and said first and second valves to close.

4. Apparatus for dispensing a predetermined quantity of liquid including in combination a pressure source, a liquid metering cylinder, a liquid container, a dispensing head and a control valve, said liquid metering cylinder having piston means with first and second face sides and movable between first and second positions, conduit means providing communication between said pressure source and said first face side of said piston means, conduit means providing communication between said liquid container and said second face side of said piston means, conduit means providing communication between said second face side of said piston means and said dispensing head, a normally closed valve having control means interposed in said conduit means to said dispensing head, conduit means providing communication between said pressure source and said control means of said normally closed valve for opening same, said control valve being located in said conduit means to said first face side of said piston means and in said conduit means to said control means of said normally closed valve, said control valve movable between first and second positions, said control valve in said first position prohibiting flow from said pressure source to said first face side of said piston means and to said control means of said normally closed valve, means for transmitting a force to said control valve to move same to said second position thereby initiating a cycle of said dispensing apparatus, said control valve in said second position permitting flow from said pressure source to said first face side of said piston means and to said control means of said normally closed valve thereby causing said normally closed valve to open, normally closed dispensing head valve means in said dispensing head, opening of said dispensing head valve means causing said piston means to move to said second position and causing liquid to be dispensed from said dispensing head, means acting on said second face side of said piston means urging same to said first position, means operable on movement of said piston means to said second position for transmitting a force to said control valve to move same to said first position thereby causing said pressure on said first face side of said piston means and on said control means of said normally closed valve to be released thereby causing said piston means to return to said first position to complete a dispensing cycle and said normally closed valve to close.

5. Apparatus for dispensing a predetermined amount of a liquid during a cycle and acting only through one complete cycle until another cycle is initiated including in combination a pressure source, a liquid metering cylinder, a liquid source, and a control valve, said liquid metering cylinder having piston means with first and second face sides and movable between first and second positions, conduit means providing communication between said pressure source and said first face side of said piston means, conduit means providing communication between said liquid source and said second face side of said piston means, conduit means providing communication from said second face side of said piston means, a first valve having control means and interposed in said conduit means from said second face side of said piston means, conduit means providing communication between said pressure source and said control means of said first valve for operating same, said control valve being located in said conduit means to said first face side of said piston means and in said conduit means to said control means of said first valve, said control valve movable between first and second positions, said control valve in said first position prohibiting flow from said pressure source to said first face side of said piston means and to said control means of said first valve, means for transmitting a force to said control valve to move same to said second position thereby initiating only one complete cycle of said dispensing apparatus, said control valve in said second position permitting flow from said pressure source to said first face side of said piston means and to said control means of said first valve thereby causing said first valve to operate, means acting on said second face side of said piston means urging same to said first position, means operable on movement of said piston means to said second position for transmitting a force to said control valve to move same to said first position thereby causing said pressure on said first face side of said piston means and on said control means of said first valve to be released.

6. A dispensing machine including a pressurized gas source, a spray dispensing head, a liquid metering cylinder, and a liquid container, said liquid metering cylinder having a piston with first and second face sides and slidably mounted therein for movement between first and second positions, conduit means connecting said pressurized gas source and said spray dispensing head, conduit means connecting said pressurized gas source and said first face side of said piston, conduit means connecting said liquid container and said liquid metering cylinder on the second face side of said piston, conduit means connecting said liquid metering cylinder on the second face side of said piston and said spray dispensing head, first

and second valves interposed in said conduit means between said gas source and dispensing head and said cylinder on said second face side of said piston and said dispensing head respectively, said spray dispensing head having a valve for alternately permitting and prohibiting flow through said spray dispensing head from said liquid metering cylinder and said pressurized gas source, initiating means for initiating a cycle of said dispensing machine, said initiating means also opening said first and second valves and causing pressurized gas from said gas source to act on said first face side of said piston, means actuable on movement of said piston to said second position for exhausting said conduit means which leads from said pressurized gas source to said first face side of said piston, and means constantly acting on said piston urging said piston from said second to said first position.

7. A dispensing machine including a pressurized gas source, a dispensing head, a liquid metering cylinder, and a liquid container, said liquid metering cylinder having a piston with first and second face sides and slidably mounted therein for movement between first and second positions, conduit means connecting said pressurized gas source and said first face side of said piston, conduit means connecting said liquid container and said liquid

metering cylinder on the second face side of said piston, conduit means connecting said liquid metering cylinder on the second face side of said piston and said spray dispensing head, a first valve interposed in said conduit means between said cylinder on said second face side of said piston and said dispensing head respectively, said dispensing head having a valve for alternately permitting and prohibiting flow through said dispensing head from said liquid metering cylinder, initiating means for initiating a cycle of said dispensing machine, said initiating means also opening said first valve and causing pressurized gas from said gas source to act on said first face side of said piston, means actuable on movement of said piston to said second position for exhausting said conduit means which leads from said pressurized gas source to said first face side of said piston and for closing said first valve, and means acting on said piston urging said piston from said second to said first position.

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