Jan. 21, 1964 K. H. LIEDBERG ET AL 3,118,569

POWER FEEDING DEVICE FOR LIQUID OR SEMILIQUID MATERIAL

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Fig. 1

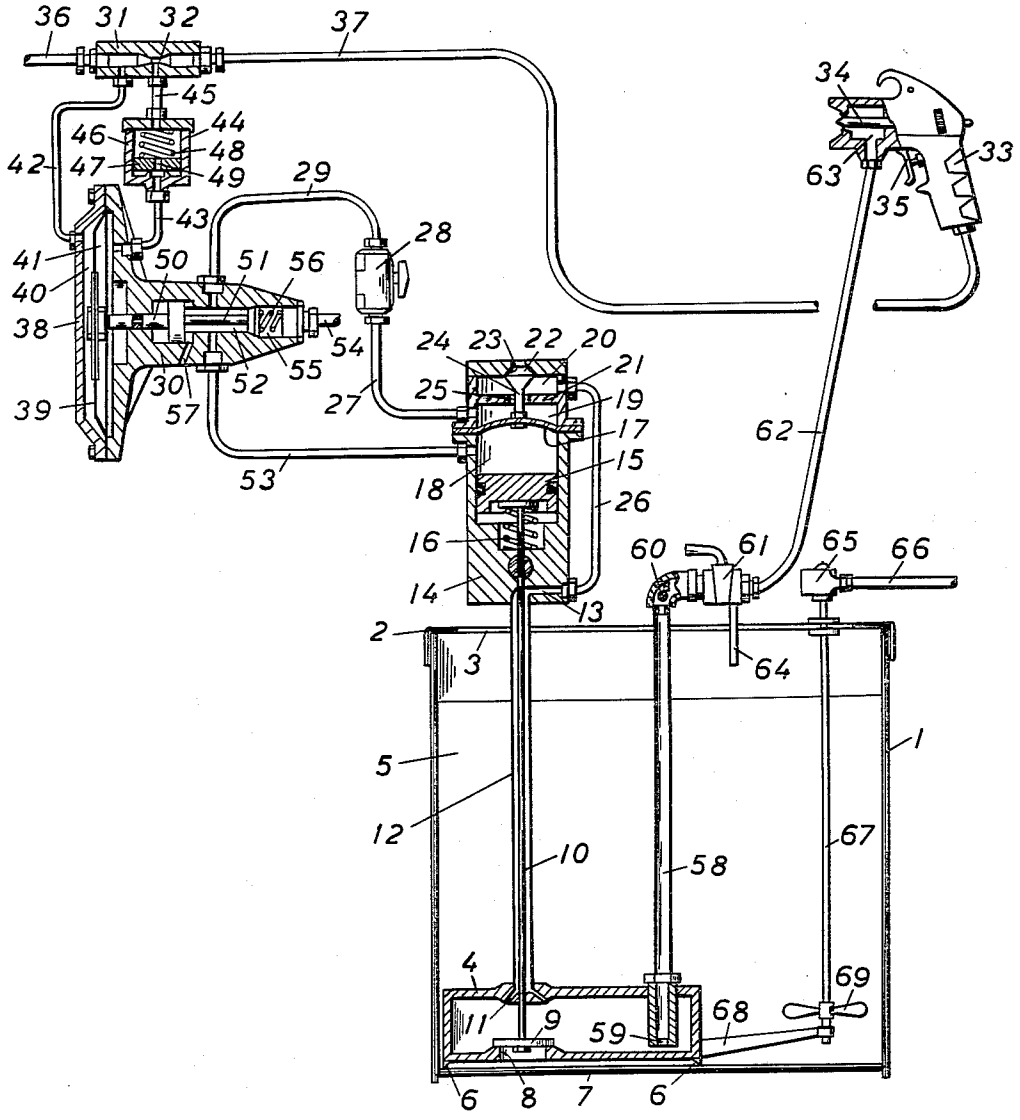

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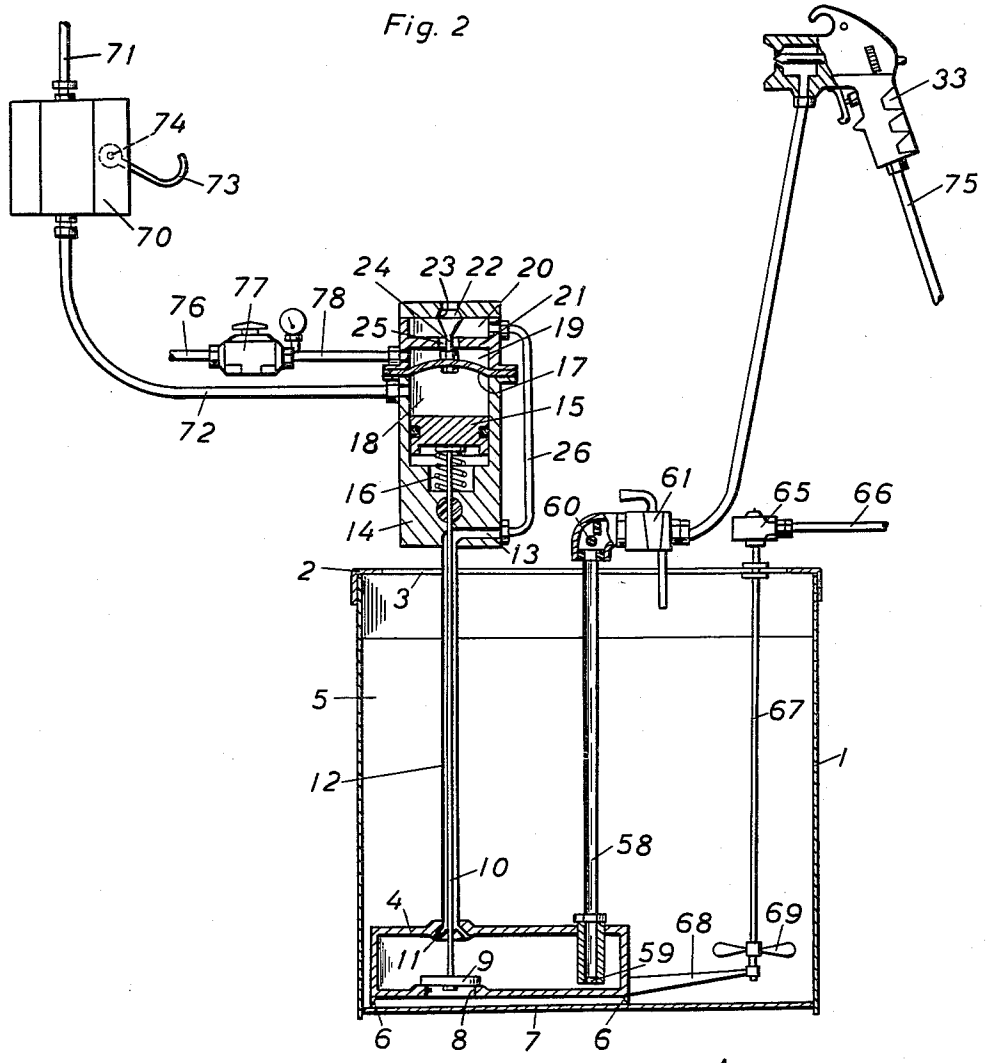
Fig. 2



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POWER FEEDING DEVICE FOR LIQUID OR SEMILIQUID MATERIAL

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This invention relates to power feeding devices for liquid or semiliquid material such as paint, bitumen, plaster or the like. A considerable difficulty in connection with handling of such materials consists in the necessity to use high pressure material containers from which the material is conveyed to spray guns or other coating appliances. One object of the present invention is to avoid the use of the heavy and awkward pressurizable containers for paint or other material. Another object of the invention is to provide a container which does not need to be pressurized and which may be refilled without interrupting the operation of the spray gun or the like. A further object of the invention is to provide a power feeding device which is cheap in manufacture. A still further object of the invention is to provide a power feeding device in which the pressurized elements have small volumes so that damage caused by rupture will be rather limited. A still further object of the invention is to provide a device which is easy to clean and in which wear of the parts in contact with the material is reduced. Other objects and advantages of this invention will be apparent from the following description, the accompanying drawings, and the appended claims.

Two embodiments of the invention are illustrated on the accompanying drawings in which FIG. 1 illustrates a device with automatic supply of material to the receptacle when the discharge is interrupted and FIG. 2 shows a device in which material is supplied to the receptacle when the spraying appliance such as a spray gun is hung up on a suitable hook.

In the two figures of the drawings equivalent elements have been indicated by the same reference numerals in order to avoid too long descriptions. A paint container 1 of relatively thin and cheap sheet material is provided with a cover 2 having an opening 3 through which a pressurizable small receptacle 4 may be introduced and immersed in the material 5 such as paint. The receptacle 4 rests with short legs 6 on the bottom 7 of the container 1, and has a bottom inlet opening 8 controlled by a simple disc valve 9 carried at the lower end of a stem 10. The receptacle 4 is further provided with compressed air inlet openings 11 at the top of the receptacle which communicate through a tube 12 enclosing the stem 10 with a passage 13 in a cylinder casing 14 containing a piston 15 connected to the stem 10. A spring 16 is provided in the cylinder casing 14 and acts to move the piston 15 in opening direction of the check valve 9. A membrane 17 divides the cylinder casing 14 in chambers 18 and 19 and the cylinder casing further contains a chamber 20 separated from the chamber 19 by a partition 21. A valve member 22 controls an outlet opening 23 leading from the chamber 20 to the atmosphere and said valve member is carried by a stem 24 secured to the membrane 17 and extending through a passage 25 in the partition 21 which in closed position of the valve member 22 permits air flow from the chamber 19 to the chamber 20. The chamber 20 communicates through a conduit 26 with the passage 13 and the chamber 19 communicates through a hose 27 with a pressure reduction valve 28 communicating through a hose 29 with a control valve casing 30. 31 is a casing having a Venturi passage 32, and 33 is a paint

spray gun of conventional design having a material discharge valve 34 controlled by means of a trigger 35.

Compressed air is supplied from a suitable source through a hose 36 to the casing 31 and flows through the Venturi passage 32 through a hose 37 to the spray gun 33.

The control valve casing 30 has a cover 38 and a membrane 39 which separates two chambers 40 and 41 in the control valve casing. The pressure portion of the chamber 40 is connected through a pipe 42 to the casing 31 and the chamber 41 is connected through a pipe 43 over a flow restriction device 44 and a pipe 45 to the Venturi passage 32. The device 44 consists of a casing 46 accommodating a throttle member 47 which is loaded by a soft spring 48 and which has a narrow passage 49 through which compressed air may always flow in restricted quantities through the device 44. The device 44 provides small resistance to air flow from pipe 43 to pipe 45, but considerable resistance to air flow in the opposite direction. The membrane 39 is connected by a stem 50 to a member 51 provided in a space 52 in the valve casing 30 which in all positions of the member 51 communicates through the pipe 29 with the chamber 19 and through a pipe 53 with the chamber 18 in the cylinder casing 14. Compressed air is supplied to the casing 30 through a pipe 54 which communicates with a space 55 in the casing 30 which upon movement of the member 51 to the right in FIG. 1 against the action of a spring 56 opens supply of compressed air to the chamber 18 and of compressed air of reduced pressure to the chamber 19 thereby causing the piston 15 to move down and close the valve 9 and the membrane 17 to move upwards and close the opening 23 so that compressed air is supplied to the receptacle 4 through the orifices 11. 57 is a vent passage in the casing 30 through which compressed air is vented to the atmosphere when spraying is interrupted, i.e. when the air flow through the Venturi passage 32 is interrupted and full line pressure is applied on both sides of the membrane 39.

When the trigger 35 is pulled air pressure drops in the Venturi passage 32 and the membrane 39 quickly moves to the right in FIG. 1 causing the member 51 to open the passage from pipe 54 to the pipes 27 and 53 so that the membrane 17 moves to the illustrated position, the piston 15 moves down and closes valve 9, and compressed air is supplied to the openings 11 and the top of the receptacle 4.

A conduit 58 leads from an outlet opening 59 near the bottom of the receptacle 4 over a ball check valve 60 and a two-way-valve 61 to the paint conduit 62 which is attached to the spray gun 33. The paint is then conveyed to a chamber 63 from which the paint is discharged upon retraction of the needle valve 34 by means of the trigger 35. 64 is a return flow pipe which may be brought in communication with the paint hose 62 when the two-way-valve is turned to a position in which the passage from the pipe 58 is closed.

65 is a compressed air driven motor which is supplied with compressed air through a hose 66 and drives a shaft 67 mounted in a bracket 68 extending from the receptacle 4 and carrying a stirring propeller 69.

When operation of the paint gun is interrupted air pressure in 45 and 42 is equalized and air supply over hoses 27 and 53 is interrupted by member 51 which returns to the illustrated position and chamber 18 is then vented through hose 53, space 52 and vent passage 57 so that spring 16 opens valve 9. When spraying has been finished the two-way-valve 61 may be brought into the position in which 58 is closed and the hose 62 communicates with the return flow pipe 64 and if the trigger 35 is then pulled the air in the spray gun will force any paint in the hose 62 back to the container 1. This position of the valve 61 may also be used when it is desired to flush the spray gun and conduit with cleaning liquid.

In the embodiment illustrated in FIG. 2 the control device 30 has been replaced by a valve device 70 which may be of the same design as the valve device 32 illustrated in FIG. 1 of K. H. Liedberg's U.S. Patent 2,819,928 granted January 14, 1958. The valve device 70 is connected through the hose 71 to a compressed air source and through a hose 72 to the chamber 18 of the cylinder casing 14. A hook 73 is movably mounted in the valve device 70 on a suitable pivot 74 and may be arranged to operate in the same way as the hook 37 in K. H. Liedberg's above numbered U.S. Patent 2,819,928 so that when the spray gun 33 is hung up on the hook the air flow from the hose 71 to the hose 72 is interrupted and the hose 72 is instead vented to the atmosphere. In the embodiment of FIG. 2 compressed air is supplied to the spray gun 33 through a separate hose 75 and furthermore compressed air is supplied through a conduit 76 over a pressure reduction valve 77 and a pipe 78 to the chamber 19 of the cylinder casing 14. The device according to FIG. 2 operates in such a manner that when the spray gun is hung up on the hook 73 the receptacle 4 is vented and the valve 9 lifted so that paint may enter into the interior of the receptacle 4 and when the spray gun is lifted from the hook 73 venting of the chamber 18 is interrupted and compressed air is supplied over the pressure reduction valve 77 through the chambers 19 and 20 to the openings 11 and the top of the receptacle 4 so that paint in said receptacle is subjected to pressure and forced to the spray gun.

The above described material feeding devices should only be considered as examples and may be modified in various different ways within the scope of the claims without departing from the principle of the invention.

What we claim is:

1. In a self-contained and partially submersible fluid pressured activated feeding and dispensing apparatus for the pressure fluid pumping and dispensing of liquid and semi-liquid materials when said apparatus is partially immersed in said material in a container therefor, the combination which comprises a closed feeding receptacle for immersion in said liquid material and disposed at one end of said apparatus, pressure fluid supply and control means remotely disposed at the other end of said apparatus, said receptacle having a material inlet therein for admitting said liquid material thereinto for pressure feeding therefrom under the action of a pressure fluid different from said material to be fed, a remotely controlled valve for said material inlet, means for introducing said pressure fluid into said receptacle, means including an outlet conduit from said receptacle for the pressurized feeding of said material from said receptacle to a remote dispensing head under the action of said pressure fluid in said receptacle, additional means for separately supplying said pressure fluid directly to said dispensing head during dispensing said material thereat, a control valve at said dispensing head for controlling said pressure fluid supplied thereto, and means in said pressure fluid supply and control means responsive to pressure of said pressure fluid at said dispensing head for controlling said inlet valve in said material receptacle and said supply of pressure fluid thereto.

2. A self-contained feeding and dispensing apparatus as recited in claim 1 in which said means in said pressure fluid supply and control means responsive to pressure of said pressure fluid at said dispensing head includes means for automatically actuating said valve for said material inlet and said means for introducing said pressure fluid into said receptacle so as to admit pressure fluid into said receptacle for said pressurized feeding of said material from said receptacle to said dispensing head and to open said material inlet valve for refilling of said receptacle after a feeding of said material from said receptacle to said dispensing head.

3. Self-contained feeding and dispensing apparatus as recited in claim 1 which also includes a discharge device at said remote dispensing head, said discharge device and said dispensing head being movable with respect to the remainder of said apparatus and with at least a portion of said outlet conduit means between said receptacle and said discharge device being flexible, support means for temporarily supporting said discharge device on said apparatus when not in use, automatic pressure valve means responsive to the weight of said discharge device when supported on said support means for actuating said control means to close said inlet valve and admit pressure fluid into said receptacle when said discharge device is not on said support means and to open said inlet valve and vent said receptacle when said discharge device is supported on said support means.

4. Self-contained feeding and dispensing apparatus as recited in claim 1 in which said remotely disposed control means includes a fluid pressure activated piston for closing said inet valve in said receptacle, means for biasing said piston into open position in the absence of fluid pressure, a diaphragm valve responsive to fluid pressure thereon for selectively supplying fluid pressure into said receptacle and venting fluid pressure therefrom, and actuating means responsive to use of said control valve at said remote dispensing head for automatically actuating said piston and said diaphragm valve.

5. Self-contained feeding and dispensing apparatus as recited in claim 4 which also includes a discharge valve at said remote dispensing head and in which said actuating means is responsive to fluid pressure at said discharge valve.

6. Self-contained feeding and dispensing apparatus as recited in claim 4 in which said operating means at said remote dispensing head includes a discharge valve control for discharge of said material and said pressure fluid, and in which said automatic actuating means is responsive to fluid pressure at said discharge valve for actuating said remotely disposed control means to close said inlet valve and admit pressure fluid into said receptacle whenever said discharge valve is open and to open said inlet valve and vent said receptacle whenever said discharge valve is closed.

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