

March 26, 1935.

J. A. BLANKEN

1,995,414

PLASTERING MACHINE

Filed Aug. 12, 1933

2 Sheets-Sheet 1

Fig. 2.

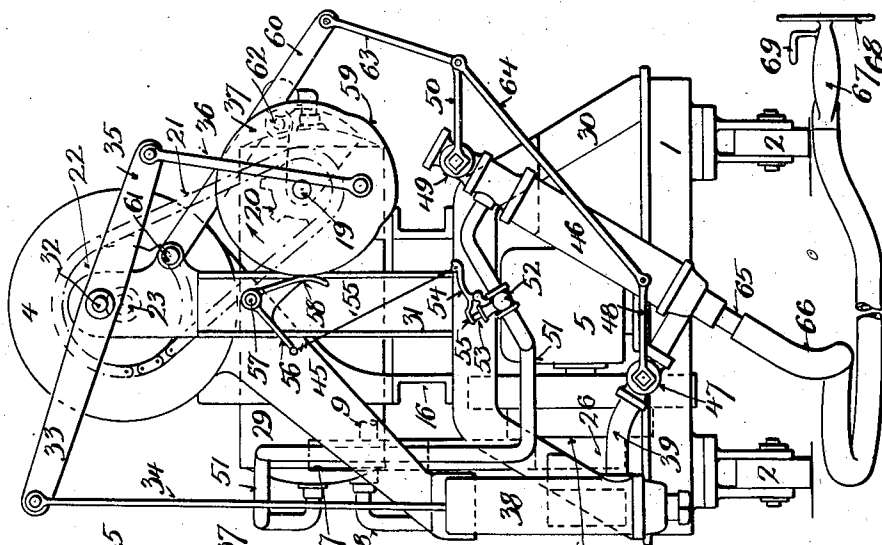
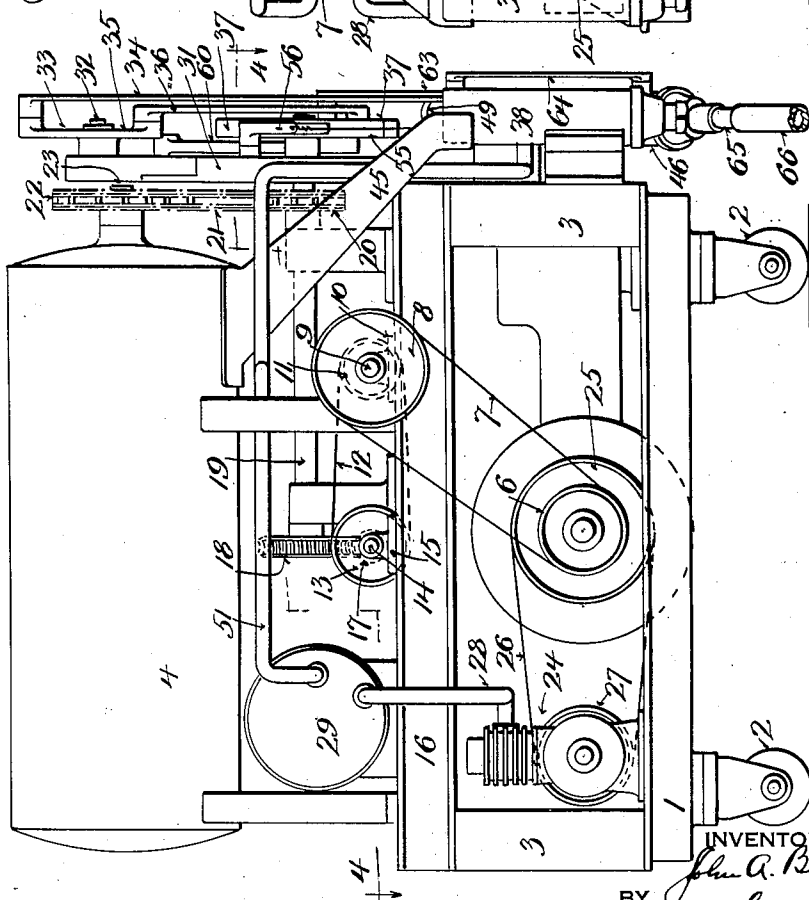


Fig. 1



INVENTOR
J. A. Blanken
BY
Charles E. Hensley
ATTORNEY

UNITED STATES PATENT OFFICE

1,995,414

PLASTERING MACHINE

John A. Blanken, Vaux Hall, N. J.

Application August 12, 1933, Serial No. 684,791

10 Claims. (Cl. 72-130)

My invention relates to a machine for delivering plaster from a supply tank, either directly onto a wall which is being plastered, or to a position convenient for the plasterer to apply the plaster to the walls. I have shown the invention embodied in or applied to a portable truck which permits the machine to be wheeled from one location to another and it is preferably of such width as to permit it to be passed through doorways, so that it may be moved about a building to be in convenient location to the particular room or wall which is to be plastered.

It is desirable in machines of this type, to feed the plaster regularly as desired, and at the required speed, to properly supply the workman with enough plaster to be applied to the wall at whatever speed he may operate, and the present machine is designed to accomplish this.

In machines for feeding plaster there has been difficulty in feeding the plaster as required and avoiding compacting or plugging of the plaster in the machine and the various pipes and hose through which it passes, and the present machine meets these requirements successfully.

To a great extent the method of propelling the plaster through the machine and the hose has a great deal to do with the successful propulsion of the plaster. If certain devices are used for propelling the plaster, they will cause more or less separation of the liquid and solid content of the material and cause the latter to plug up the hose as well as parts of the machine.

It is an object of the present invention to first receive the plaster from a supply tank, hopper or other container into the shell of a pump and to force the plaster from this pump casing or shell, by means of a piston, into a receiver chamber or tank which has approximately the same capacity as the pump, so that at each stroke of the pump this chamber is filled with a charge of plaster.

The receiving chamber is open at one end while the charge is being pumped therein, after which it is closed. A valve between the pump and the receiving chamber is then closed to prevent the return of the charge from the receiving chamber to the pump; and at the same time or about the same time a valve is opened to allow a current of compressed air to flow from a compressor tank into one end of the receiving chamber for the purpose of driving the charge of material from this chamber outwardly and through the hose to the point of application.

By using compressed air for delivering the charge from the receiving chamber, I avoid the tendency of the material to separate as between

the solid and liquid content, so that the plaster is delivered in proper condition to the point of application, and there is no clogging in the machine or the hose through which the plaster is distributed.

Another object of my invention is to provide a machine of the above character, which is simple and inexpensive to construct and operate, as well as to provide a machine which will not get out of order.

One feature of my invention is a pump for delivering the material into the receiving chamber. This pump is simple in construction and operation and is very efficient in delivering materials such as plaster without rapid wear of the pump.

Other advantages and features will be set forth in the following detailed description of my invention.

In the drawings forming part of this application,

Figure 1 is a side elevation of a plastering machine embodying my invention,

Figure 2 is a front elevation thereof,

Figure 3 is a plan view of the machine,

Figure 4 is a sectional view taken on the line 4-4 of Figure 1,

Figure 5 is an enlarged sectional view of a portion of the pump,

Figure 6 is a similar view showing the pump at the time the piston is making its upward stroke, and

Figure 7 is a sectional view taken on the line 7-7 of Figure 5.

In the drawings I have shown a truck 1 on which the parts of the machine are mounted; and the truck is shown as provided with casters or rollers 2 which permit it to be wheeled along a floor to place it in a convenient position to be near the work. On this truck there is supported a framework 3 forming an elevated support for various parts of the machine. On the upper part of the machine there is a tank or container 4 for holding a supply of plaster or similar material which is to be distributed by the machine, and if desired the material, including the liquid or water and the plaster and other ingredients, may be mixed or stirred in this container so that the mixing operation will take place at the machine. On the other hand, the material may be mixed at any other point and may be delivered in the mixed condition into this tank.

On the truck there is mounted a motor 5 for driving various parts of the machine and on the shaft of this motor there is fixed a pulley wheel 6 which drives an endless belt 7 and the latter

engages also around the pulley wheel 8 which is fixed to a shaft 9 and is mounted cross wise of the machine in suitable bearings 10.

There is a smaller pulley 11 mounted on the shaft 9 and the endless belt 12 engaging around this pulley and driven by it operates another pulley 13 which is mounted upon a shaft 14 that is journaled in the bearings 15 which are mounted upon the beam 16 of the upper structure and crosswise of the machine. On this same shaft 14 there is fixed a worm 17 which meshes with and drives the worm gear 18 and through this the shaft 19 which runs longitudinally of the machine is driven at a much lower speed than the speed of the motor. On this shaft 19 to the right in Figures 1, 3 and 4, there is fixed a sprocket wheel 20 which drives the endless chain 21 and this chain in turn drives the sprocket wheel 22 which is fixed to the shaft 23. The latter extends into the tank 4 and is supplied with the usual propeller device (not shown) for mixing the material contained within the feeding tank 4. Even though the material may be mixed at some location other than the machine, it is desirable to agitate the material within the tank in order to prevent separation of the moisture and solid content before the material is delivered from the machine.

At the left in Figure 1 and Figure 3 I have shown an ordinary compressor 24 which is driven from a second pulley 25 on the shaft of the motor, by means of an endless belt 26 travelling over this pulley and also travelling over a pulley 27 on the shaft of the compressor. I have not shown the interior construction of the compressor because the ordinary stock compressor may be used for this purpose. The air compressed in the compressor is delivered by means of a pipe 28 to a pressure tank 29 in which the compressed air is stored under pressure until fed to the receiving chamber to be hereinafter described.

I have found that in the operation of a machine of this type it is desirable to maintain the air in the compression tank 29 at about thirty or thirty-five pounds; that if the pressure exceeds this to a great extent, the machine will not operate as satisfactorily and there is a tendency of the liquid and solid contents to be separated.

At the front end of the machine I have shown mounted on the framework 30 a vertical or up-standing post 31 at about the middle of the machine. This post or standard forms a support for various movable parts as will be described. I have shown mounted on a stud shaft 32 at the upper end of the standard, a lever having one arm 33 extending to the left in Figure 2, and to the free end of which is pivotally connected a piston rod 34 the lower end of which piston is connected with the piston of a pump.

The other arm 35 of this lever has pivotally connected with it a link 36 and the other end of this link is pivotally connected with a cam disc 37 which is mounted on the shaft. The cam disc 37 is revolved in the direction indicated by the arrow in Figure 2 because it is fixed to one end of the longitudinal shaft 19 which has previously been described and which is driven from the motor by the belts and pulleys above described. The revolving motion of the cam disc 37 causes this disc to act as a crank and to operate the link 36 for the purpose of rocking the lever 33, 35 thus moving the pump piston up and down.

At the left in Figure 2 and in Figures 5 to 7

I have shown a simple form of pump casing 38 consisting of a cylinder which at the bottom end has connected thereto a pipe or hose 39 through which the material is discharged by the action of the pump.

There is arranged to move vertically up and down in this pump casing a piston 40 which is shown as in the form of a circular disc of slightly smaller diameter than the bore of the casing 38. This piston is pivotally connected as shown at 41 by a hinge pin which is pivotally mounted upon a plate 42 extending vertically and connected as by rivets with the lower portion of the piston rod 34 which is the piston rod connected with the rocking lever described above.

Around the hinge pin 41 there is coiled the spring 43 one end of which engages the under side of the piston 40 for the purpose of applying slight upward pressure to the latter in order to move it against the stop member 44 which is formed by bending the end of the piston rod, as shown in Figure 6. In this position the piston lies at right angles to the axis of the pump casing and is in position to force the material from the pump casing on the downward stroke of the piston rod. The piston may be swung downwardly in opposition to the light spring 43 as shown in Figure 6 while the piston rod is moving upwardly, in order to allow the piston to be moved above the material in the pump casing.

There is a chute or hopper 45 which is connected with one end of the supply tank 4 and into which the material from the tank feeds by gravity. The lower and smaller end of this chute engages the upper end of the pump casing, as shown in Figures 5 and 6, so that the material is fed down through this chute into the pump casing.

At the right in Figure 2 I have shown a hollow body 46 which forms a receiving chamber to receive the material which is delivered by the pump, in which the material is momentarily stored until it is driven out by the compressed air. This member is simply a hollow cylinder, and between the lower end thereof and the lower end of the pump casing there is a pipe 39 for connecting the same.

In this pipe there is a valve 47 for shutting off the flow of material and this valve is adapted to be operated by means of a lever arm 48 connected thereto. At the upper end of the receiving chamber 46 there is another valve 49 which is also adapted to be operated by a lever arm 50. The purpose of this valve is to permit the discharge of air from the charging chamber while the material is being forced therein by the pump in order that the charging chamber may be filled with the material. This valve simply permits the discharge of air from the charging chamber into the open air.

There is a pipe or hose 51, one end of which is connected with the pressure tank 29 and it extends forwardly and is connected to the upper end of the charging chamber 46, preferably just below the valve 49. In this pipe or hose there is a valve 52 for controlling the supply of compressed air to the charging chamber. This valve has a vertically moving spindle 53 and this is operated by means of the lever 54 which is pivoted to a portion of the valve casing and it has one arm 55 adapted to press on the spindle for the purpose of opening the valve. The other arm 54 of this lever is connected by a wire or rod 55 with one arm 56 of a bell crank which is pivoted

on a stud 57 fixed to the standard 31. The other arm 58 of this lever is provided with a curved portion which is acted upon by the cam portion 59 on the periphery of the cam disc 37.

There is a lever arm 60 pivoted at 61 to a stud on the post 31 and this arm extends downwardly and to the right in Figure 2, and it rests against a pin or roller 62 mounted on the rear face of the cam disc 37 so that at each revolution of this cam disc the lever arm 60 is first swung upwardly and then moved downwardly following the roller or pin 62 part of the way.

The lower end of the lever arm 60 is pivotally connected with a link 63 and the other end of this link is pivotally connected with the lever arm 50 which operates the valve 49. There is another link 64 having one end connected pivotally with the same pin which unites the link 63 and the lever arm 50. The other end of this link 64 is pivotally connected with a pin on the end of the lever arm 48 which operates the valve 47.

The lower end of the charging chamber 46 is provided with a nozzle 65 and to this is connected one end of a flexible hose 66 which is adapted to convey the material to the point of application. The other end of this hose may simply discharge the material into a receptacle where the plasterer is working, but preferably there is a fan shaped spout 67 connected with the end of the hose, to discharge the material through a central slot or aperture in the trowel 68. The member 67 is shown provided with handles 69 by which the operator may manipulate the trowel in applying the plaster to a wall or ceiling. I do not claim in the present case any patentable features in the trowel or nozzle.

Operation

Assuming the machine is in operation, that is, the motor 5 is driving the various parts of the machine, the following operations will take place; that is to say, the compressor 24 is continually driven through the pulley 25, the belt 26, and the pulley 27, for the purpose of compressing air and feeding the compressed air to the compression tank 29 to maintain sufficient air pressure to drive the material in the manner hereinafter described. The pressure tank is connected by means of the pipe 51 with the upper portion of the charging chamber 46 and is therefore ready to supply compressed air to the charging chamber whenever the valve 52 is operated for this purpose.

Through the pulley 6 the belt 7 and the pulley 8 the shaft 9 is driven and from there the power is applied by the pulley 11, the belt 12, and the pulley 13, to the shaft 14 which carries the worm 17.

This worm operates the worm gear 18 and therefore drives the longitudinally arranged shaft 19 at a speed which is much less than the speed of the motor, due to the reduction effected through the worm and worm gear drive. As the shaft 19 carries the cam disc 37, the latter is operated in synchronism with the other parts of the machine and as the lever 33, 35 is operated from this cam disc the pump piston is reciprocated vertically in synchronism with the cam disc.

At each revolution of the cam disc, the piston rod 34 makes a stroke first downwardly and then upwardly. When the piston rod moves downwardly with the lever arm 33 the piston is cross-

wise of the pump casing and as this piston moves downwardly it forces the material which is below it from the pump casing through the pipe 39 and into the charging chamber 46. I prefer to so design the machine that the capacity of the charging chamber will be the same or approximately the same capacity as the pump in order that it may receive and hold temporarily the same quantity of material which is discharged in one operation of the pump. Although these proportions may be varied more or less, I find that when this charging chamber is about of the same capacity as the pump, the best results are obtained because the charging chamber is filled at one stroke of the pump and is discharged while the pump is making its return stroke.

During the downward movement of the piston, as well as at other times, the material in the hopper 45 has a tendency to flow down by gravity into the pump casing so that when the piston is moving downwardly to force the material which is below the piston out of the pump casing, the material from the hopper is flowing into the pump casing above the piston.

When the lever arm 33 makes its upward movement and raises the piston rod 34 the piston is caused to swing on its pivot 41 to the position shown in Figure 6 by reason of the weight of material which is above the piston. This allows the piston to rise through the material which is now about filling the pump casing and by the time the piston rod reaches its extreme upper position as shown in Figure 5, the piston will be swung by the spring 43 into the horizontal position shown in Figure 5. However, the piston will operate in this manner notwithstanding the spring although somewhat later because as soon as the piston rod starts on its downward motion the greatest pressure of the material is below the piston and this forces it into the horizontal position. However, I prefer to use the light spring 43 in order to have the piston move to the horizontal position while the piston rod is in its upper position as shown in Figure 5.

These operations are repeated at each rocking motion of the lever 33, 35. The material is somewhat sluggish but since it is feeding into the pump cylinder while the piston is making its downward stroke the pump casing is filled in time for each downward stroke of the piston.

At each revolution of the cam disc 37 the lever arm 60 is rocked upwardly and downwardly by means of the pin or roller 62 and this lever arm by reason of the links 63, 64 causes both of the valves 52, 47 to be opened and closed at the same time. Furthermore, at each revolution of the cam disc the cam 59 acts on the bell crank lever 58 to rock it and thus act through the wire or link 55 to rock the lever 54 and thus open and close the valve 52 which controls the supply of compressed air to the upper portion of the charging chamber.

These several operations are so timed that the valves 49 and 47 are held open during the time the piston is making its downward stroke and therefore the material is driven out of the pump casing by the downward stroke of the pump and is caused to travel through the pipe 39 and to fill the charging chamber 46.

While this operation is taking place, the valve 49 is held open so that the air in the charging chamber is allowed to escape into the open air while the material is being forced upwardly into

the charging chamber, thereby providing space for the reception of the material and allowing the charging chamber to be filled. This condition exists while the piston is making its complete downward stroke. At this time the valve 52 which controls the passage of compressed air into the charging chamber is closed, so that there is no compressed air in the charging chamber while the charge is being pumped into it. While the piston is making its upward stroke, both of the valves 49, 47 are closed. When these valves are closed, the cam 59 on the cam disc acts on the bell crank 58 to rock the lever 54 and thus open the valve 52.

As stated above, the valves 49, 47 are closed while the piston is making its upward stroke. While the valve 52 is open, the compressed air rushes from the compression tank through the pipe 51 and into the upper portion of the charging chamber, and this compressed air forces the charge of material which had previously been supplied to the charging chamber, out of the latter and through the hose 66 to a point where the material is being applied to a wall.

As the valves 49, 47 are closed at this time, the charge cannot pass back into the pump casing and it is compelled to travel out through the hose.

As the valve 49 is also closed while the compressed air is in the charging chamber, the compressed air or the material in the charging chamber cannot pass out of this release valve. At about the time the piston completes its upward stroke or prior thereto, the bell crank 58 rocks back to the position shown in Figure 2, so that the valve 52 is closed and the machine is ready for a repetition of the operations just described.

It will be apparent that the operation of the several valves is synchronized in relation to the operation of the pump and there is nothing to destroy or interfere with this synchronization.

It will be apparent that the action of the machine is intermittent or pulsating, but since the machine may operate rapidly, the pulsations are sufficiently close together to produce a practically steady flow of material through the nozzle. It will be apparent that the mechanism described above may be duplicated by providing two pumps and two charging chambers operating in alternation for the purpose of maintaining a substantially constant flow if it is found that the pulsations of the single pump and charging chamber do not furnish a sufficiently constant supply of material. However, I have found that a single pump and charging chamber produce a sufficiently constant flow for all practical purposes.

The pump employed in this machine is very simple in construction and operation, which is a desirable feature in handling material such as plaster. It is not necessary that the piston fit snugly to the wall of the pump shell because of the somewhat sluggish nature of the material and in order for the piston to be swung downwardly into the position shown in Figure 6 it cannot be made to fit snugly to the pump shell when in the horizontal position shown in Figures 5 and 7.

This type of pump, in addition to being very simple, also provides for the filling of the pump casing above the piston while the latter is making its downward stroke in order that there will be sufficient material below the piston at the time the latter moves into the horizontal position shown in Figure 5, ready for a downward stroke. The material tends to flow from the hopper 45 into the pump casing at all times, and the pump casing

is practically filled with the material at the time the piston is making its upward stroke, as shown in Figure 6.

The machine is very simple and effective in its operation and the various parts operate in the necessary sequence and in synchronization with each other. By employing compressed air to drive the material from the charging chamber, the liquid and solid constituents of the material are not separated nor do any parts of the machine become plugged or clogged by the material. By the employment of a pump and a charging chamber I am enabled to charge the latter once with each stroke of the pump and then to discharge completely the charging chamber while the pump is making its return or upward stroke. By completely discharging the charging chamber, there is less likelihood of any of the solids accumulating in the charging chamber and interfering with the successful operation of the machine.

Having described my invention, what I claim is:

1. A machine for delivering fluid material, including means for holding the fluid material, a reciprocating pump for receiving the material from said holding means and for propelling it, a charging chamber adapted to receive the material delivered by said pump, means for discharging air from said charging chamber while it is being charged with the material by said pump and for closing said discharge during return strokes of the pump, and means for delivering compressed air into said charging chamber during the return strokes of the pump to force the material from said charging chamber.

2. A machine for delivering fluid material, including means for holding the material, a reciprocating pump for receiving the material and for propelling it, a charging chamber and means connecting said pump and charging chamber at one end of the latter, means for discharging air from said charging chamber at the opposite end to which the material is fed thereto by said pump and for closing said discharge during return strokes of the pump, and means for delivering compressed air into said charging chamber to force the material therefrom.

3. A machine for delivering fluid material, including means for holding the material, a reciprocating pump for receiving the material and for propelling it, a charging chamber and means connecting said pump and charging chamber at one end of the latter, means for discharging air from said charging chamber at the opposite end to which the material is fed thereto by said pump and for closing said discharge during return strokes of the pump, and means for delivering compressed air into said charging chamber at the opposite end to which the material is delivered thereto by said pump for forcing the material from said charging chamber.

4. A machine for delivering fluid material, including means for holding the material, a reciprocating pump for receiving the material and for propelling it, a charging chamber and means connecting said pump and charging chamber at one end of the latter, means for discharging air from said charging chamber at the opposite end to which the material is fed thereto by said pump and for closing said discharge during return strokes of the pump, and means for delivering compressed air into said charging chamber at the opposite end to which the material is delivered thereto by said pump for forcing the material from said charging chamber, the capacity of said charging chamber corresponding approximately

with the quantity of material delivered by said pump at each stroke thereof.

5 5. A machine for delivering fluid material, including means for holding the material, a reciprocating pump for receiving the material therefrom and for propelling it, a charging chamber adapted to receive the material delivered by said pump, means connecting said pump with one end of said charging chamber, a valve controlling the
10 passage between said pump and said charging chamber, a valve for discharging air from said charging chamber, means for delivering compressed air into said charging chamber to force the material therefrom, a valve for controlling
15 the delivery of compressed air to said charging chamber, and means for operating said several valves so that said first two valves are opened while the pump is making its discharging stroke and are closed while the pump is making its return stroke and so that the compressed air valve is opened while the pump is making its return stroke and closed while the pump is making its discharge stroke.

25 6. A machine for delivering fluid material, including means for holding the material, a reciprocating pump for receiving the material therefrom and for propelling it, a charging chamber and means connecting said pump and one end of said charging chamber to permit the flow of
30 the material into the charging chamber, a valve for controlling the passage of the material into said charging chamber, a valve adjacent the opposite end of said charging chamber for discharging air therefrom while the material is moving
35 into said chamber, means for delivering compressed air to the end of said charging chamber to which said latter valve is connected, a valve for controlling the feed of the compressed air to said charging chamber and means for operating
40 said valves in timed relation whereby said first and second valves are opened during the driving stroke of said pump and closed during the return stroke of said pump and whereby said compressed air valve is opened while the pump
45 is making its return stroke and closed while it is making its driving stroke.

50 7. A machine for delivering fluid material, including means for holding a supply of the material, a pump having a cylinder in continuous communication with said supply, a piston rod and a piston pivotally connected therewith, whereby
55 said piston may lie crosswise of the cylinder during one stroke thereof, and move to a non-crosswise position during the opposite stroke of the piston rod, whereby the piston may move upwardly through the material on its return stroke,

and a charging chamber into which said pump is adapted to deliver the material, and means for delivering compressed air into said charging chamber to force the material therefrom.

8. A machine for delivering fluid material, including means for holding a supply of material, a pump having a cylinder for receiving the material from said supply, and a piston rod, for operating the pump, a rocking lever for operating
5 said piston rod, a cam disc and means connecting it with said lever whereby the cam disc rocks
10 said lever, a charging chamber into which the material is adapted to be delivered by said pump, a valve controlling the passage of material between said pump and charging chamber, a valve
15 for discharging air from said charging chamber while the charge is being fed thereto, means for delivering compressed air to said charging chamber, and a valve for controlling the same, and means all operated from said cam disc for operating
20 said several valves.

9. A machine for delivering fluid material, including means for holding a supply of material, a reciprocating pump for receiving the material therefrom, a charging chamber and means connecting
25 said pump and charging chamber, a valve controlling the passage of material between the pump and charging chamber, a valve for discharging air from said charging chamber, means for feeding compressed air to said charging chamber, and a valve for controlling the same, a lever
30 for operating said pump, a cam disc and means connected therewith whereby the cam disc acts through a crank motion to operate said lever, and a plurality of levers operated by said cam
35 disc, one of said last levers connected with said first two valves and the other connected with the valve for feeding the compressed air to said charging chamber.

10. A machine for delivering fluid material, including means for holding a supply of the material, a pump for receiving the material from
40 said supply, a charging chamber and means for connecting said pump with one end of said charging chamber and provided with a valve to control the passage of material between the pump
45 and charging chamber, a valve at the opposite end of said charging chamber to discharge air therefrom, means for supplying compressed air to the latter end of said charging chamber, a
50 valve for controlling the supply of compressed air to said charging chamber, and means for operating said several valves, and a distributing hose connected with that end of the charging chamber to which the material is supplied by said pump.

JOHN A. BLANKEN.