United States Patent [19]

Whitt

[11] **3,889,850**

[45] **June 17, 1975**

[54] **TEXTURE AND ACOUSTIC SPRAYING EQUIPMENT**

[75] Inventor: **Delbert K. Whitt**, Kent, Wash.

[73] Assignee: **Pete Whitt, Inc.**, Kent, Wash.

[22] Filed: **Apr. 21, 1971**

[21] Appl. No.: **135,859**

[52] **U.S. Cl.** **222/135**; 222/236; 222/255; 222/263

[51] **Int. Cl.** **B67d 5/52**

[58] **Field of Search** 222/135, 255, 263, 334, 222/226, 236; 239/130, 150, 127

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Primary Examiner—Stanley H. Tollberg
Assistant Examiner—John P. Shannon

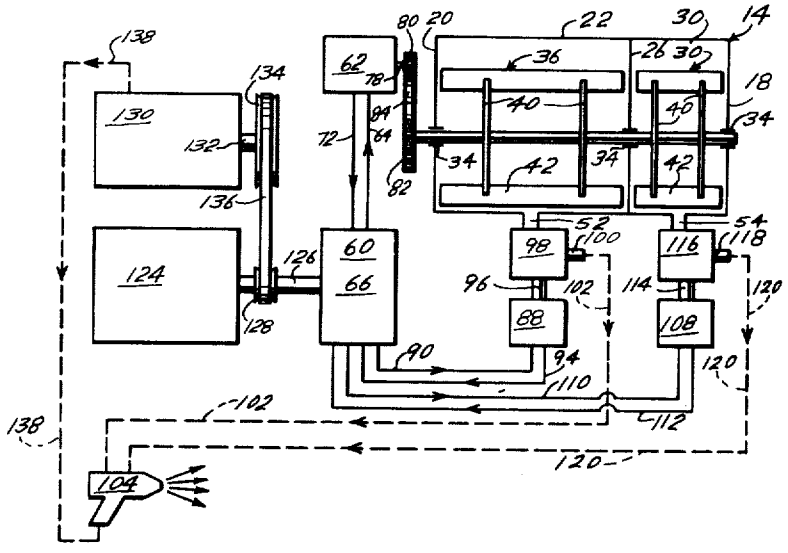
[57] **ABSTRACT**

This invention is directed to texture and acoustic spraying equipment for spraying texture material on walls and acoustic material on ceilings.

This spraying equipment comprises one prime mover for driving a first hydraulic pump and also for driving an air compressor.

In turn, this first hydraulic pump drives a hydraulic motor for agitating the texture material and the acoustic material. Further, this first hydraulic pump drives hydraulic motors for driving hydraulic pumps for pumping the texture material and the acoustic material to the pneumatic spray gun.

4 Claims, 4 Drawing Figures



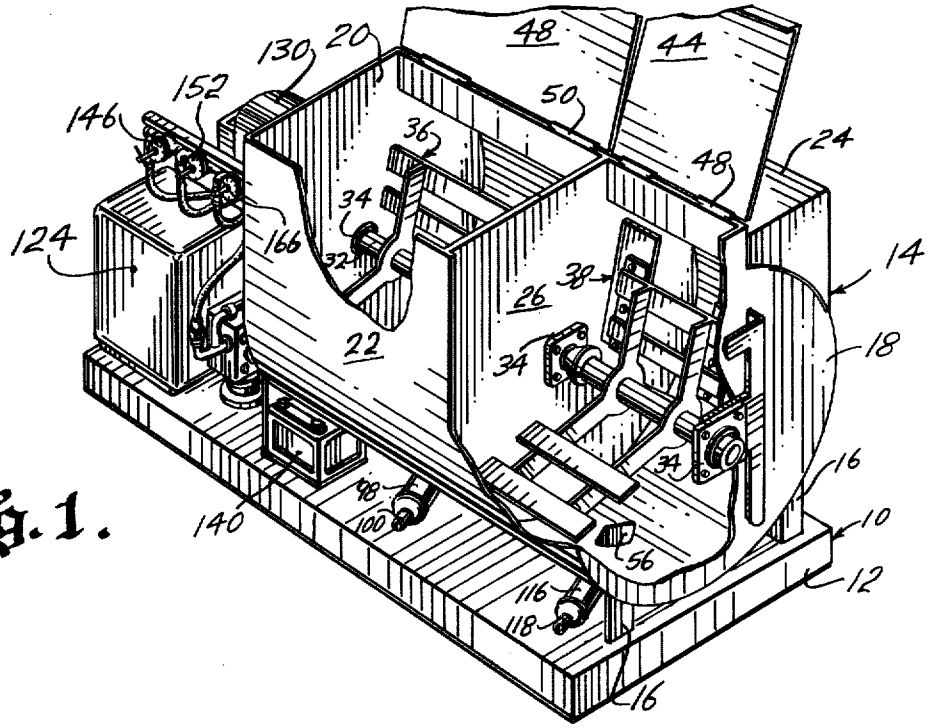
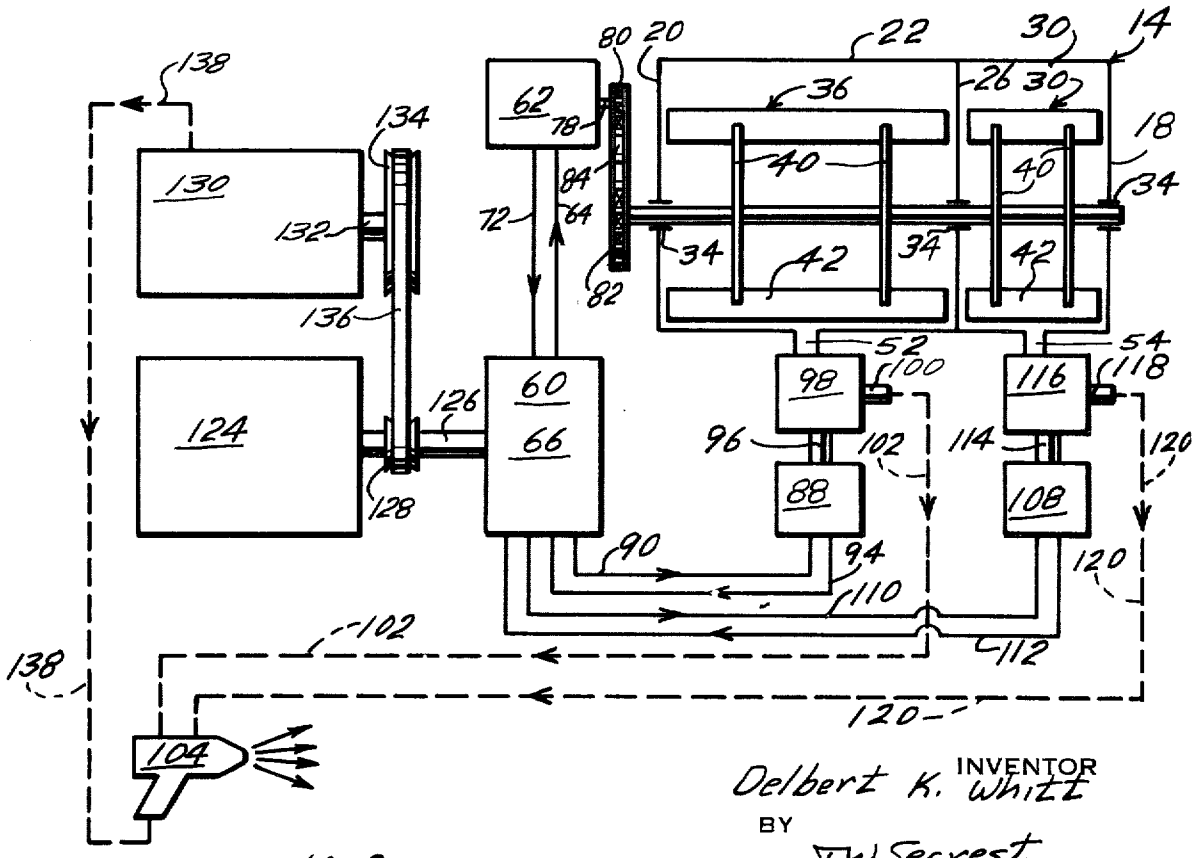


Fig. 1.



Delbert K. Whitt INVENTOR

BY

W Secrest

Fig. 2.

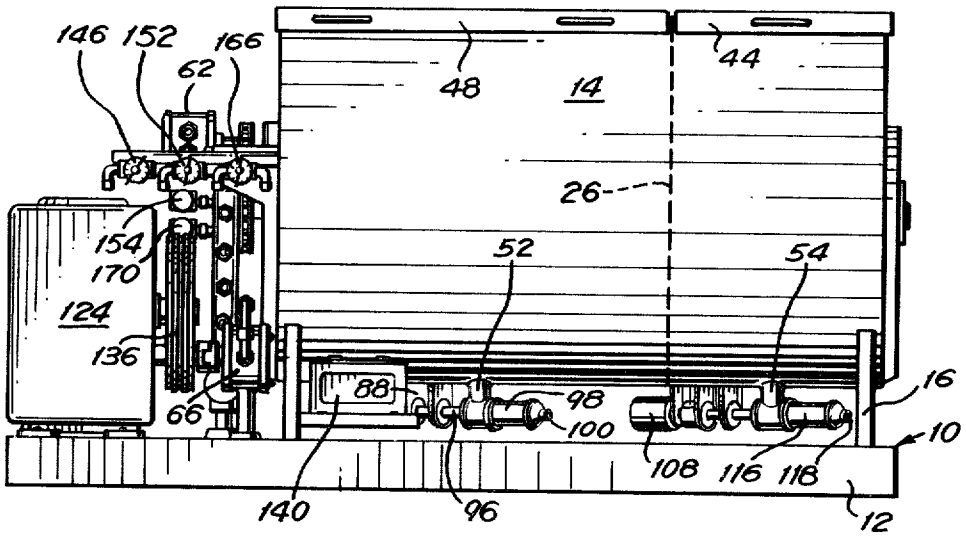


Fig. 3.

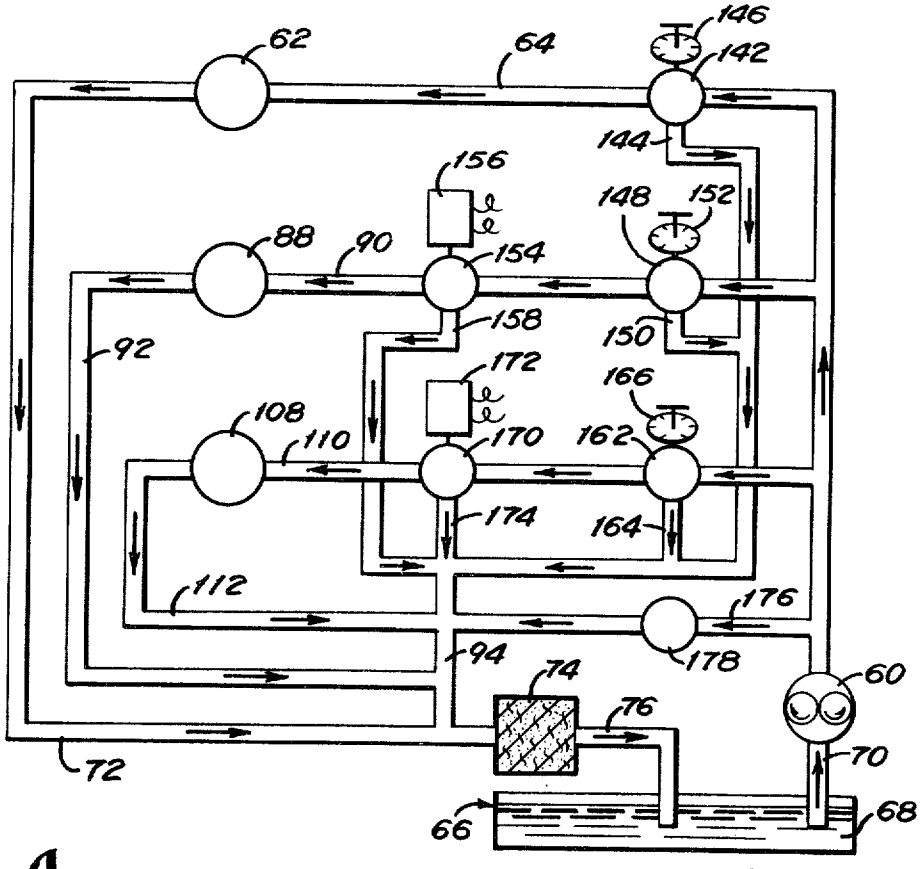


Fig. 4.

INVENTOR
DELBERT K. WHITT
BY
THOMAS W. SECREST

TEXTURE AND ACOUSTIC SPRAYING EQUIPMENT

I have worked with texture and acoustic spraying equipment for spraying texture material on walls and acoustic material on ceilings.

Some of the equipment with which I have worked has not been reliable and has comprised many moving parts. Further, the control for controlling the agitation of the texture material and the acoustic material and also for controlling the pumping of this material to the spray gun has not been desirable.

For example, one piece of equipment with which I am familiar has comprised two gasoline engines. The gasoline engines have been used to drive the air compressor and by means of a gearbox or transmission to drive the agitator for agitating the texture material and the acoustic material. Further, these gasoline engines have connected with gearboxes or transmissions for operating pumps for pumping the texture material and the acoustic material through flexible hoses, at a remote distance, and to the spray gun for spraying this material in a building.

The gearboxes or transmissions did not provide a fine control for the speed of agitation of the agitator and did not provide fine control for the pumping of the material to the spray guns. In addition, the gearboxes or transmissions and the mechanical connections were subject to failure, and there was a high maintenance problem.

With this in mind, I have invented the subject spraying equipment and which spraying equipment comprises fewer moving parts than the previously described and used spraying equipment; and which spraying equipment is less expensive to manufacture than previously available spraying equipment; and which spraying equipment, because of its reliance upon hydraulics, provides better control for the agitation of the texture material and the acoustic material; which spraying equipment provides better control for the pumping of the texture material and the acoustic material through the flexible hoses and to the pneumatic spray guns; and which spraying equipment makes it possible for the operator operating the pneumatic spray guns to have better remote control for the pumping of the texture material and the acoustic material to these pneumatic spray guns; which spraying equipment is less expensive to maintain than previously available spraying equipment; which spraying equipment may be made in a wide range of sizes such as from a portable spraying equipment capable of being carried on a relatively small truck such as a half-ton pickup to large stationary spraying equipment; and, which spraying equipment comprises a continuous variable speed from a low speed to a relatively high speed for agitating the texture material and acoustic material and also for pumping the texture material and the acoustic material.

These and other important objects and advantages of the invention will be more particularly brought forth upon reference to the accompanying drawings, the detailed description of the invention and the appended claims.

In the drawings:

FIG. **1** is a fragmentary perspective view looking at the tank having a divider for dividing the tank into a first compartment and a second compartment, the agitators in said compartments, the first hydraulic pump and the control station for controlling the rate of agitation and also the rate pumping of the material from the compartments;

FIG. **2** is a schematic illustration illustrating the tank divided into two compartments and the agitators in the compartments, the prime mover or gasoline engine in a driving relationship with an air compressor and also with the first hydraulic pump, the first hydraulic motor in a driving relationship with the agitators in the tanks, the first hydraulic pump in a driving relationship with the second hydraulic motor which in turn is in driving relationship with the second hydraulic pump for pumping material from one compartment of the tank, and the first hydraulic pump in driving relationship with the third hydraulic motor which in turn is in driving relationship with the third hydraulic pump for pumping material from the second compartment;

FIG. **3** is a side elevational view of a specific embodiment of the invention and illustrates the tank for holding the texture material and the acoustic material, the prime mover for driving the first hydraulic pump, and the second hydraulic motor connecting with one compartment of the tank and the third hydraulic motor connecting with the other compartment of the tank; and,

FIG. **4** is a schematic illustration illustrating the hydraulic system and shows the first hydraulic pump, the first hydraulic motor, the second hydraulic motor and the third hydraulic motor, and the valves for controlling the flow of the hydraulic fluid from the first hydraulic pump to the various motors and also for bypassing these various motors.

In the drawings it is seen that this invention is directed to an apparatus for applying texture material and acoustic material to the interior of a building. There is one source of power for driving a hydraulic pump. This hydraulic pump, in turn, drives hydraulic motors which agitate the texture material and the acoustic material and also pump the texture material and the acoustic material to a dispensing means at a desired location. Then, there is an air compressor, which is driven by the one source of power, and which air compressor connects with the dispenser means for spraying the texture material and the acoustic material in the interior of the building. This use of hydraulic pumps and motors makes it possible to eliminate transmissions, gear shifts, mechanical connections which are subject to mechanical failure, and also the cumbersome arrangement of these mechanical units. In addition, this apparatus makes it possible to more finely control, even in a remote location, the pumping of the texture material and the acoustic material to the dispenser means.

In the drawings, it is seen that there is a texture and acoustic spraying equipment **10.** The equipment **10** comprises a base **12.** There is a tank **14** mounted on the base **12** by upright pedestals or supports **16.**

The tank **14** has two ends **18** and **20.** The ends **18** and **20** on their lower parts are curved. Also, there is a wrap around side **22** which wraps around from one side of the ends **18** and **20,** goes around the curved bottom and up the other side. Also, there is a partial top **24** which covers part of the tank **14.**

In FIGS. **1** and **2** it is seen that there is a dividing wall **26** in the tank **14** and which dividing wall **26** divides the tank **14** into a first compartment **28** and a second compartment **30.** The first compartment **28** is somewhat larger than the second compartment **30.**

In the tank 14 there is a driven shaft 32. The driven shaft 32 is journaled in the three bearings 34 in the end walls 18 and 20 and the dividing wall 26.

There is mounted on the shaft 32 in the first compartment 28 a first agitator 36. There is mounted on the driven shaft 32 in the second compartment 30 a second agitator 38.

The first agitator 36 and the second agitator 38 comprise essentially spokes 40 connecting paddles 42 with the shaft 32. With this construction, it is possible to agitate and mix the texture material and the acoustic material in the first compartment 28 and the second compartment 30 and to maintain clean the inner walls of these compartments.

In FIG. 1 it is seen that there is a cover 44 for the second compartment 30. The cover 44 is hinged at 46 to the upper part of the housing for the second compartment 30. Also, there is a cover 48 for the first compartment 28. The cover 48 is hinged at 50 to the upper part of the housing for the first compartment 28.

In FIG. 3 it is seen that a down pipe 52 connects with the lower part of the first compartment 28. Similarly, a down pipe 54 connects with an opening 56 in the lower part of the second compartment 30. In the lower part of the first compartment 28 there is an opening, not shown, and with which opening the down pipe 52 connects.

There is a first hydraulic pump 60 which connects with a hydraulic motor 62 by means of a hydraulic line 64.

There is a reservoir 66 for the hydraulic fluid 68. The first hydraulic pump 60 connects with the reservoir 66 by means of a hydraulic line 70. The hydraulic motor 62 by means of a return line 72 connects with a filter 74. The filter 74 by means of a line 76 connects with the reservoir 66.

In the schematic illustration of FIG. 2 the hydraulic pump 60 and the reservoir 66 are illustrated as being combined.

The hydraulic motor 62 has an output shaft 78. There is mounted on the output shaft 78 a sprocket 80.

There is a sprocket 82 mounted on the driven shaft 32. A chain 84 connects the sprockets 80 and 82 so that the hydraulic motor 62 is in a driving relationship with the driven shaft 32 to agitate the first agitator 36 in the first compartment 28 and to agitate the second agitator 38 in the second compartment 30.

The pump 60 connects with a hydraulic motor 88 by means of a hydraulic line 90. The hydraulic motor 88 by means of a hydraulic line 92 connects with a common return line 94 which in turn connects with the filter 74.

The hydraulic motor 88 by means of drive shaft 96 connects with a hydraulically driven pump 98. The hydraulic pump 98 connects with the down pipe 52 of the first compartment 28 of the tank 14. The hydraulic pump 98 has an outlet 100.

The hydraulic pump 98 can pump the material from the first compartment 28 and through the nozle 100 and a connecting flexible rubber hose 102 to a dispenser means 104 or a pneumatic spray gun 104.

The hydraulic pump 60 connects with a hydrualic motor 108 by means of a hydraulic line 110. The hydraulic motor 108 by means of a return hydraulic line 112 connects with the line 94 which in turn connects with the filter 74.

The hydraulic motor 108 by means of a drive shaft 114 connects with a hydraulically driven pump 116. The hydraulic pump 116 connects with the outlet pipe or down pipe 54 of the second compartment 30 of the tank 14. The hydraulically driven pump 116 has an outlet or nozzle 118.

It is seen that the hydraulic pump 60 by means of a hydraulic motor 108 drives the hydraulically driven pump 116 for pumping material from the second compartment 30 through the nozzle 118 and through a flexible line, such as a flexible hose 120 to a dispenser means 104 or a pneumatic spray gun 104.

There is a prime mover 124 for driving the hydraulic pump 60. The prime mover 124 has an output shaft 126 which connects with the pump 60 for driving the pump 60.

The prime mover 124 may be a gasoline engine such as a one cylinder, two stroke, gasoline engine. The size of the gasoline engine will vary depending upon the size of the equipment 10. For example, the gasoline engine may vary in size from a five horse power gasoline engine to a fifteen or twenty horse power gasoline engine. Naturally, with the smaller equipment 10, the gasoline engine will be smaller and at the larger equipment 10, the gasoline engine will be larger.

There is a pulley 128 on the shaft 126.

There is an air compressor 130 having an input shaft 132. A pulley 134 is mounted on the input shaft 132. A drive belt 136 interconnects the pulley 128 and the pulley 134 so that the prime mover 124 is in a driving relationship with the air compressor 130.

The air compressor 130 by means of a pneumatic line 138 connects with the dispenser means 104 or the pneumatic spray gun 104.

In this manner it is seen that the material can be pumped from the first compartment 28 or from the second compartment 30 by means of an appropriate hydraulic pump 98 or 116, to the pneumatic spray gun 104. Then, the air under pressure from the air compressor 130 can be used to blow this material into the interior of the building and onto the ceiling or the wall.

There is a battery 140 to assist in the starting of the prime mover 124 or the gasoline engine 124.

There is a set of controls for controlling the rotational speed of the driven shaft 32 and the agitators in the compartments 28 and 30. Also, there is a control for controlling the operational speed of the hydraulically driven pump 98 and the operational speed of the hydraulically driven pump 116 so as to control the flow of materials from the first compartment 28 and the second compartment 30 to the pneumatic spray gun 104 or pneumatic spray guns 104. Further, at the pneumatic spray gun 104 there is a control, a remote control, for controlling the operational speed of the hydraulic pump 98 and the hydraulically driven pump 116 to control the flow of materials from the first compartment 28 and the second compartment 30. These controls work on a bypass principle for bypassing the hydraulic fluid 68 so that only a controlled portion of the hydraulic fluid 68 reaches the hydraulic motor 62 or the hydraulic motor 88 or the hydraulic motor 108.

More particularly, it is seen that in the hydraulic line 64 there is a bypass valve 142. The bypass valve 142 connects with a hydraulic return line 144. The hydraulic return line 144 connects with the line 94. A handle and indicating dial 146 connect with the bypass valve 142. By varying the degree of the opening of the bypass

valve **142** it is possible to control the amount of hydraulic fluid flowing through the hydraulic motor **62** and thereby control the rotational speed of the first agitator **36** and the second agitator **38** in the compartments **28** and **30** of the tank **14.**

In the hydraulic line **90** there is a bypass valve **148.** The bypass valve **148** by means of hydraulic return line **150** connects with the hydraulic return line **144.** There is a handle and indicator **152** associated with the bypass valve **148.** It is possible to set the bypass valve **148** to a certain position and thereby control the rate of pumping of the material from the first compartment **28** by means of the hydraulic pump **98.**

Further, there is a solenoid controlled valve **154** in the line **90.** The solenoid controlled valve **154** is controlled by the solenoid **156.** The control for the solenoid **156** is at the dispenser means **104** or pneumatic spray gun **104.** The bypass valve **154** by means of hydraulic return line **158** connects with the return line **94.** From this it is seen that the operator of the pneumatic spray gun **104** can remotely control the flow of material from the first compartment **28** by controlling the flow of hydraulic fluid **68** to the hydraulic motor **88.**

In the hydraulic line **110** there is a bypass valve **162.** The bypass valve **162** by means of return line **164** connects with the return line **144.**

A handle and indicator **166** connect with the bypass valve **162** so as to control the opening of this valve. It is possible to set the indicator **166** so that a controlled portion of the hydraulic fluid from the hydraulic pump **60** reaches the hydraulic motor **108.** In this manner the pump **116** is controlled so that the desired amount of material from the second compartment **30** flows through the nozzle **118,** the flexible line **120** and to the pneumatic spray gun **104.**

Further, in the hydraulic line **110** there is a bypass valve **170** which is controlled by a solenoid **172.** The bypass valve **170** connects with the hydraulic return lines **144** and **158** by means of a hydraulic return line **174.**

It is possible for the operator of the pneumatic spray gun **104** to control the setting of the bypass valve **170** so as to operate the hydraulic motor **108** at a desired operational speed and thereby operate the pump **116** at a desirable operational speed. The operation of the pump **116** at this desired operational speed will pump the amount of material from the second compartment **30** through the nozzle **118,** the flexible hose **102** to the pneumatic spray gun **104** as desired by the operator. Again, the control of the valve **170** is accomplished by means of a remote control by the operator at the site of usage of the pneumatic spray gun **104.**

Further, there is a line **176** which connects with the hydraulic pump **60.** In the line **176** there is a bypass valve **178.** The line **176** connects with the hydraulic return line **94.**

It is possible to set the bypass valve **178** so that substantially all the hydraulic fluid **68** flows through the line **176** in the bypass valve **178** and returns to the reservoir **66.** Or, it is possible to close the bypass valve **178** so that all of the hydraulic fluid **68** flows through the hydraulic motor **62** and the hydraulic motors **88** and **108.** In essence, by varying the opening of the valves **178, 142, 148, 162, 154** and **172** it is possible to vary the flow of hydraulic fluid **68** to the hydraulic motors **62, 88** and **108.**

Further, in FIGS. **1** and **3** it is seen that the control handles and indicators **146, 152,** and **166** are centrally located and readily accessible so that the operator can set the appropriate control handle and indicator to a desired setting. Then, the operator, as a further refinement, by means of the remotely controlled valves **154** and **170** can achieve a finer setting for controlling the flow of material from the first compartment **28** and the second compartment **30** to the pneumatic spray gun **104** or pneumatic spray guns **104,** as the use requires.

With this spraying equipment, it is possible to control the rotational speed of the first agitator **36** and the second agitator **38** to a desired rotational speed, say of 10 revolutions per minute, or even slower, to as high as 50 revolutions per minute, or, where required, to a higher rotational speed.

It is to be realized that the texture material and the acoustic material are made from a solid which is mixed with a liquid such as water. The materials can be mixed in the compartments **28** and **30** by means of the agitators **36** and **38.** The result is a mixture of solid and liquid which has a high viscosity and needs to be pumped so as to flow from the compartment, through the flexible hoses **102** or **120,** and to the pneumatic spray gun **104.** At the pneumatic spray gun **104** the air under pressure from the air compressor **130** blows the material onto the ceiling or the wall as required. There are many materials which may be used for the acoustic material and the texture material. Examples of these materials are vermiculite which is an expanded ore, an expanded polystyrene bead which forms a foam, a pearlalite material and a zonolite material. There may be used a binder such as casein, vinyl, clay and talc. The result is a mixture of liquid and solid which has a high viscosity and, possibly, a dough like characteristic.

The hydraulic pump **60** may be a reciprocating pump or a rotor pump. Either a reciprocating pump or a rotor pump can be used. The choice is made by the operator or the purchaser.

An incidental advantage of this spray equipment **10** is the fact that if there is texture material or acoustic material in the second compartment **30** or the first compartment **28** it is not necessary to thoroughly clean these compartments or to clean the flexible hoses **102** and **120** and also the pneumatic spray gun **104.** For example, it is possible to add some more liquid such as water to the compartment **28** and to the compartment **30** and to mix this liquid in with the material in these compartments. Then, the covers **48** and **44** can be lowered so as to substantially seal off the compartments from the surrounding atmosphere. This precludes the possibility of moisture evaporating from the material in the compartments **28** and **30** and also in the flexible hoses **102** and **120.** Since the moisture will not evaporate the texture material and the acoustic material will not harden but will stay in this dough like consistency being a mixture of a liquid and a solid. Then, when it is desired to use the spraying equipment **10,** again, it is possible to start up the machinery and the spraying equipment will spray the texture material or the acoustic material. In fact, one time I allowed the spraying equipment to be shut down for approximately thirty days with the texture material or the acoustic material in the flexible lines **102** and **120** and also with some of the material in the first compartment **28** and the second compartment **30.** I started the equipment **10** and proceeded to spray as though the spraying equipment **10**

had not been out of operation for approximately 30 days.

From the foregoing, and having presented my invention, what I claim is:

1. An apparatus for flowing a material comprising a liquid and a solid to a desired location, said apparatus comprising:

a. an agitation tank;
b. a first agitator in said tank;
c. a first hydraulic pump;
d. a first hydraulic motor;
e. said pump being in a driving relationship with respect to said motor for flowing liquid from said pump to said motor;
f. said motor being in driving relationship with said agitator;
g. a second hydraulic motor;
h. said first hydraulic pump connecting with said second hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said second hydraulic motor;
i. a second hydraulic pump connecting with said tank to move said material with respect to said tank;
j. said second hydraulic motor connecting with said second hydraulic pump in a driving relationship;
k. a first control means for controlling the flow of liquid between said first hydraulic pump and said first hydraulic motor;
l. a second control means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor;
m. a dispenser means for dispensing said material;
n. said dispensing means connecting with said second hydraulic pump; and,
o. a third control means juxtapositioned to said dispensing means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor.

2. An apparatus for flowing a material comprising a liquid and a solid to a desired location, said apparatus comprising:

a. an agitation tank;
b. a first agitator in said tank;
c. a first hydraulic pump;
d. a first hydraulic motor;
e. said pump being in a driving relationship with respect to said motor for flowing liquid from said pump to said motor;
f. said motor being in driving relationship with said agitator;
g. a second hydraulic motor;
h. said first hydraulic pump connecting with said second hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said second hydraulic motor;
i. a second hydraulic pump connecting with said tank to move said material with respect to said tank;
j. said second hydraulic motor connecting with said second hydraulic pump in a driving relationship;
k. said agitator tank having a first compartment and a second compartment;
l. said first agitator being in said first compartment;
m. a second agitator being in said second compartment;
n. said first agitator and said second agitator being mounted on a driven shaft;
o. said first hydraulic motor connecting in a driving relationship with said shaft;
p. said second hydraulic pump connecting with said first compartment;
q. a third hydraulic motor;
r. said first hydraulic pump connecting with said third hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said third hydraulic motor;
s. a third hydraulic pump connecting with said second compartment to move said material with respect to said second compartment;
t. said third hydraulic motor connecting in a driving relationship with said third hydraulic pump;
u. a first control means for controlling the flow of liquid between said first hydraulic pump and said first hydraulic motor;
v. a second control means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor;
w. a third control means for controlling the flow of liquid between said first hydraulic pump and said third hydraulic motor;
x. a prime mover;
y. said prime mover connecting with said first hydraulic pump in a driving relationship;
z. an air compressor;
aa. said prime mover connecting with said air compressor in a driving relationship;
bb. a first pneumatic sprayer connecting with said second hydraulic pump for spraying said material;
cc. a second pneumatic sprayer connecting with said third hydraulic pump for spraying said material;
dd. said air compressor operatively connecting with said first pneumatic sprayer and with said second pneumatic sprayer;
ee. a fourth control means juxtapositioned to said first pneumatic sprayer for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor; and,
ff. a fifth control means juxtapositioned to said second pneumatic sprayer for controlling the flow of liquid between said first hydraulic pump and said third hydraulic motor.

3. An apparatus for flowing a material comprising a mixture of a liquid and a solid, such as texture material and acoustic material, to a desired location, said apparatus comprising:

a. an agitation tank;
b. a first agitator on a substantially horizontal shaft in said tank;
c. a first hydraulic pump;
d. a first hydraulic motor;
e. said pump being in a driving relationship with respect to said motor and for flowing liquid from said pump to said motor;
f. said motor being in driving relationship with said substantially horizontal shaft and said agitator;
g. a second hydraulic motor;
h. said first haudraulic pump connecting with said second hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said second hydraulic motor;
i. a second hydraulic pump connecting with said tank to move said material with respect to said tank;
j. said second hydraulic motor connecting with said second hydraulic pump in a driving relationship;

k. a first control means for controlling the flow of liquid between said first hydraulic pump and said first hydraulic motor;
l. a second control means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor;
m. a dispenser means for dispensing said material;
n. said dispensing means connecting with said second hydraulic pump; and,
o. a third control means juxtapositioned to said dispensing means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor.

4. An apparatus for flowing a material comprising a mixture of a liquid and a solid, such as texture material and acoustic material, to a desired location, said apparatus comprising:
a. an agitation tank;
b. a first agitator on a substantially horizontal shaft in said tank;
c. a first hydraulic pump;
d. a first hydraulic motor;
e. said pump being in a driving relationship with respect to said motor and for flowing liquid from said pump to said motor;
f. said motor being in driving relationship with said substantially horizontal shaft and said agitator;
g. a second hydraulic motor;
h. said first hydraulic pump connecting with said second hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said second hydraulic motor;
i. a second hydraulic pump connecting with said tank to move said material with respect to said tank;
j. said second hydraulic motor connecting with said second hydraulic pump in a driving relationship;
k. said agitator tank having a first compartment and a second compartment;
l. said first agitator being in said first compartment;
m. said second agitator being in said second compartment;
n. said first agitator and said second agitator being mounted on said substantially horizontal shaft;
o. said first hydraulic motor connecting in a driving relationship with said shaft;
p. said second hydraulic pump connecting with said first compartment;
q. a third hydraulic motor;
r. said first hydraulic pump connecting with said third hydraulic motor in a driving relationship for flowing liquid from said first hydraulic pump to said third hydraulic motor;
s. a third hydraulic pump connecting with said second compartment to move said material with respect to said second compartment;
t. said third hydraulic motor connecting in a driving relationship with said third hydraulic pump;
u. a first control means for controlling the flow of liquid between said first hydraulic pump and said first hydraulic motor;
v. a second control means for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor;
w. a third control means for controlling the flow of liquid between said first hydraulic pump and said third hydraulic motor;
x. a prime mover;
y. said prime mover connecting with said first hydraulic pump in a driving relationship;
z. an air compressor;
aa. said prime mover connecting with said air compressor in a driving relationship;
bb. a first pneumatic sprayer connecting with said second hydraulic pump for spraying said material;
cc. a second pneumatic sprayer connecting with said third hydraulic pump for spraying said material;
dd. said sir compressor operatively connecting with said first pneumatic sprayer and with said second pneumatic sprayer;
ee. a fourth control means juxtapositioned to said first pneumatic sprayer for controlling the flow of liquid between said first hydraulic pump and said second hydraulic motor; and,
ff. a fifth control means juxtapositioned to said second pneumatic sprayer for controlling the flow of liquid between said first hydraulic pump and said third hydraulic motor.

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