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(54) ADJUSTABLE FLOW TEXTURE SPRAYER WITH PERISTALTIC PUMP

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(52) **U.S. Cl.** **401/48**

(57) **ABSTRACT**

A texture sprayer (**10**) has a cart (**12**) containing one adjustable flow peristaltic pumps (**14**), a motor (**16**)), a material supply hopper (**18**) and a flow control device (**20**). A double-ended motor shaft may be provided wherein one end drives the pump (**14**) and the other end drives an air compressor (**22**). A hose retention mechanism (**26**) on the pump (**14**), consists of a coupled hose (**28**), a hose retainer plate (**30**), a mounting plate (**32**) and a retainer screw (**34**). An adjustor (**40**), which is a variable force device for varying the amount of tension on the hose (**28**) closer or farther away from center of the rotor (**42**) by raising and lowering the mounting plate (**32**) relative to the cart (**12**), rotor (**42**) and rollers (**44**). In the pump (**14**), the distance over which the hose (**28**) is stretched is made or adjustable so that a variable rate of flow may be achieved.

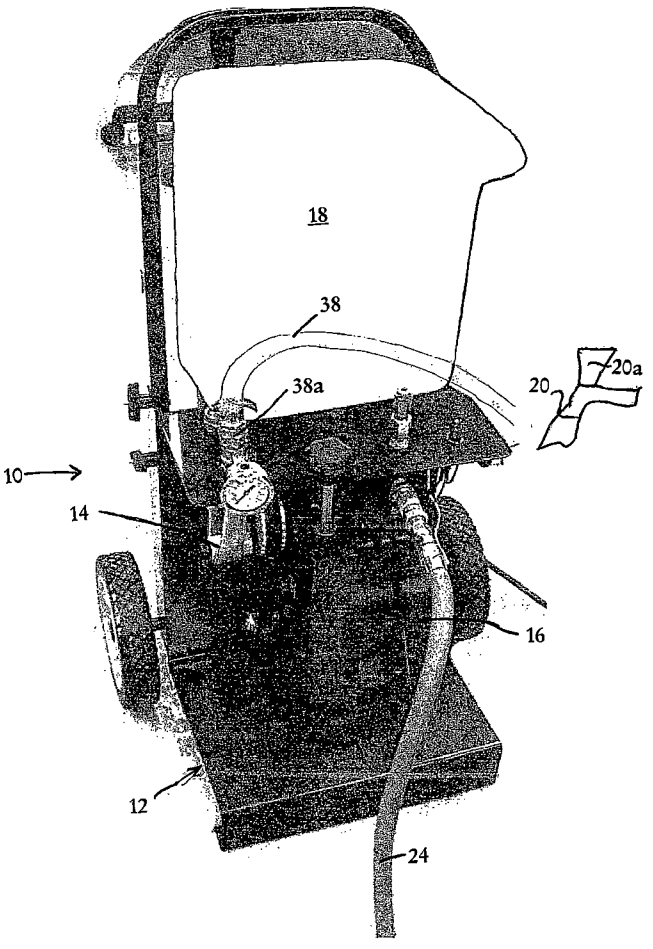


FIG. 1

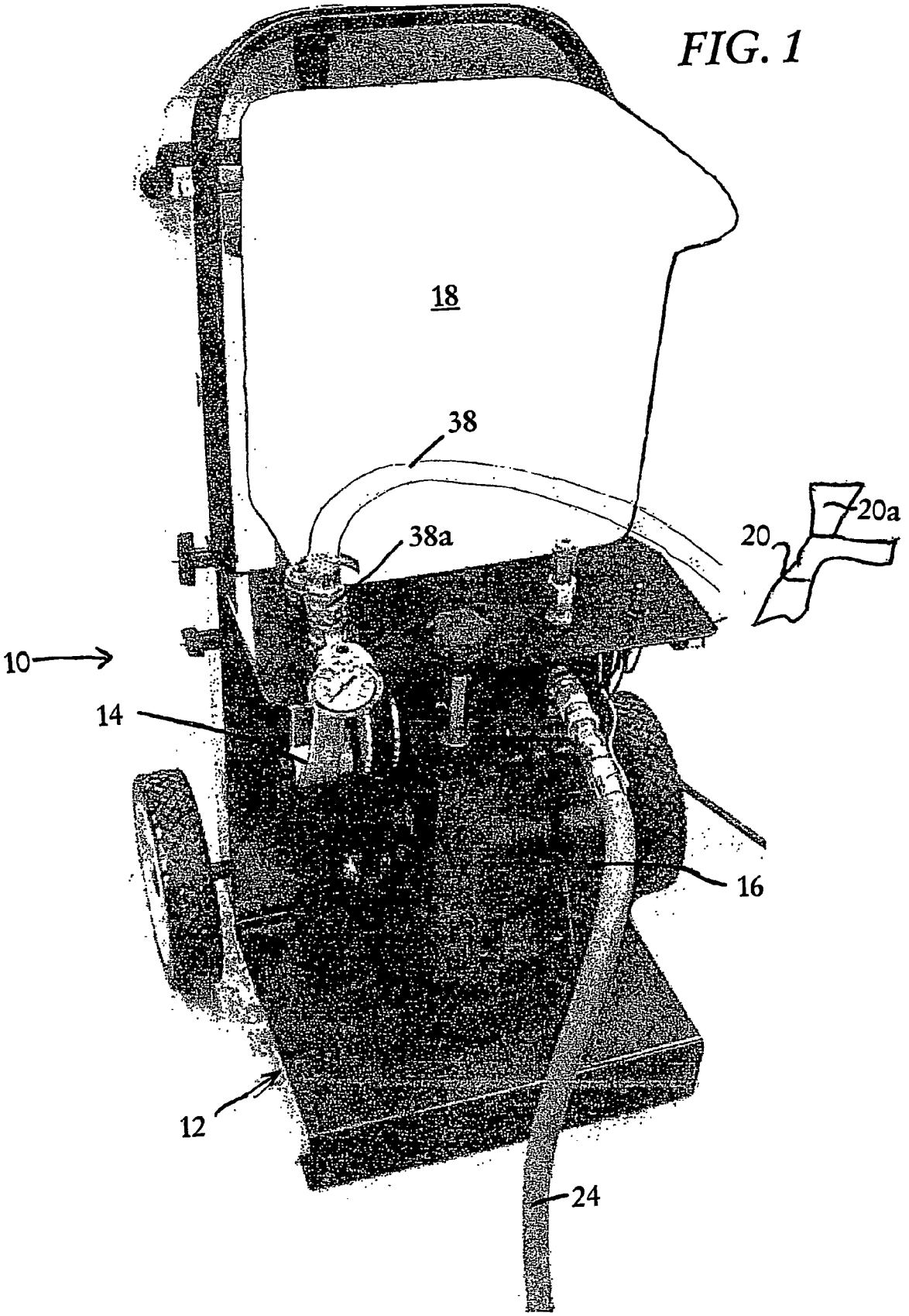
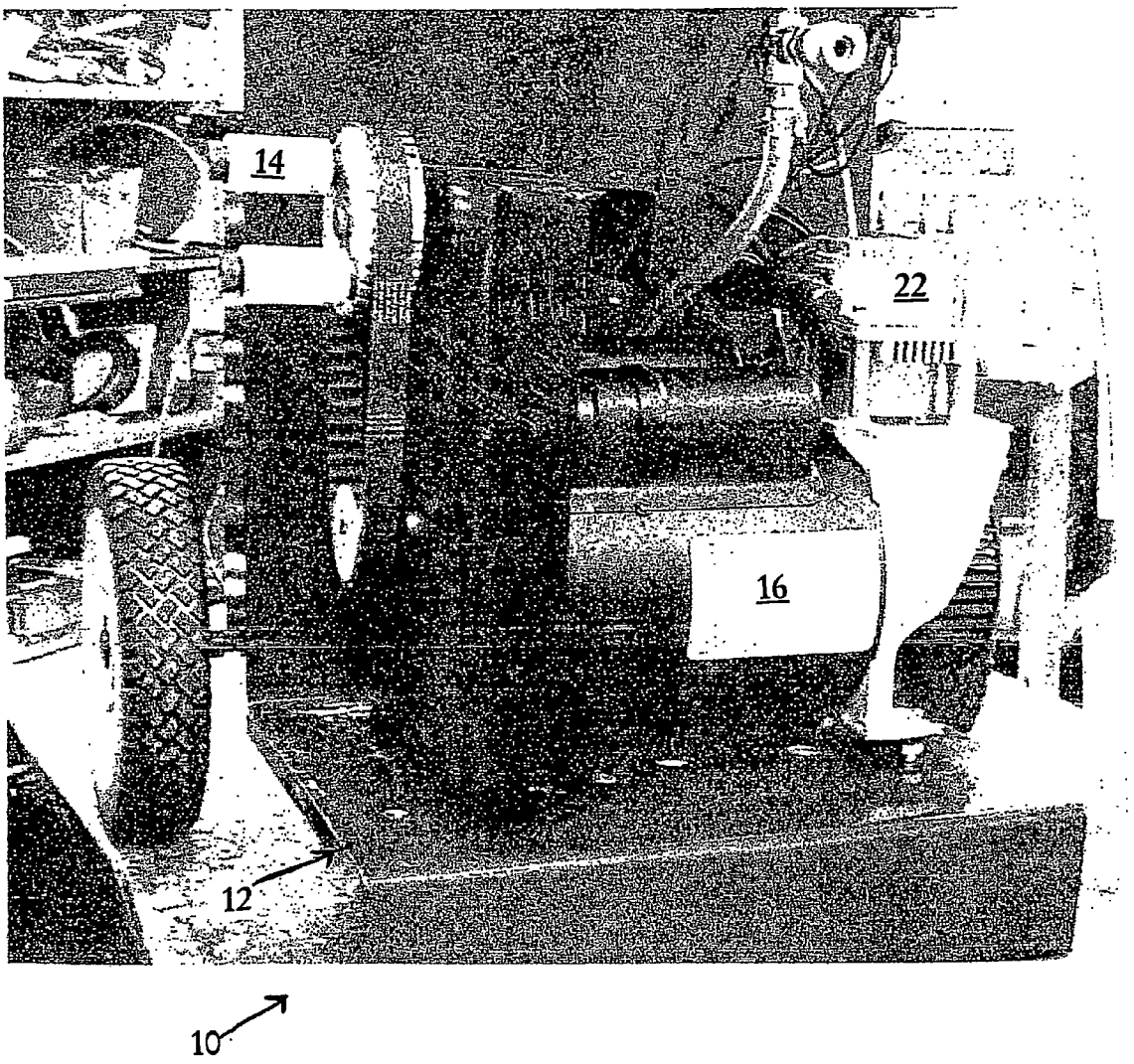


FIG. 2



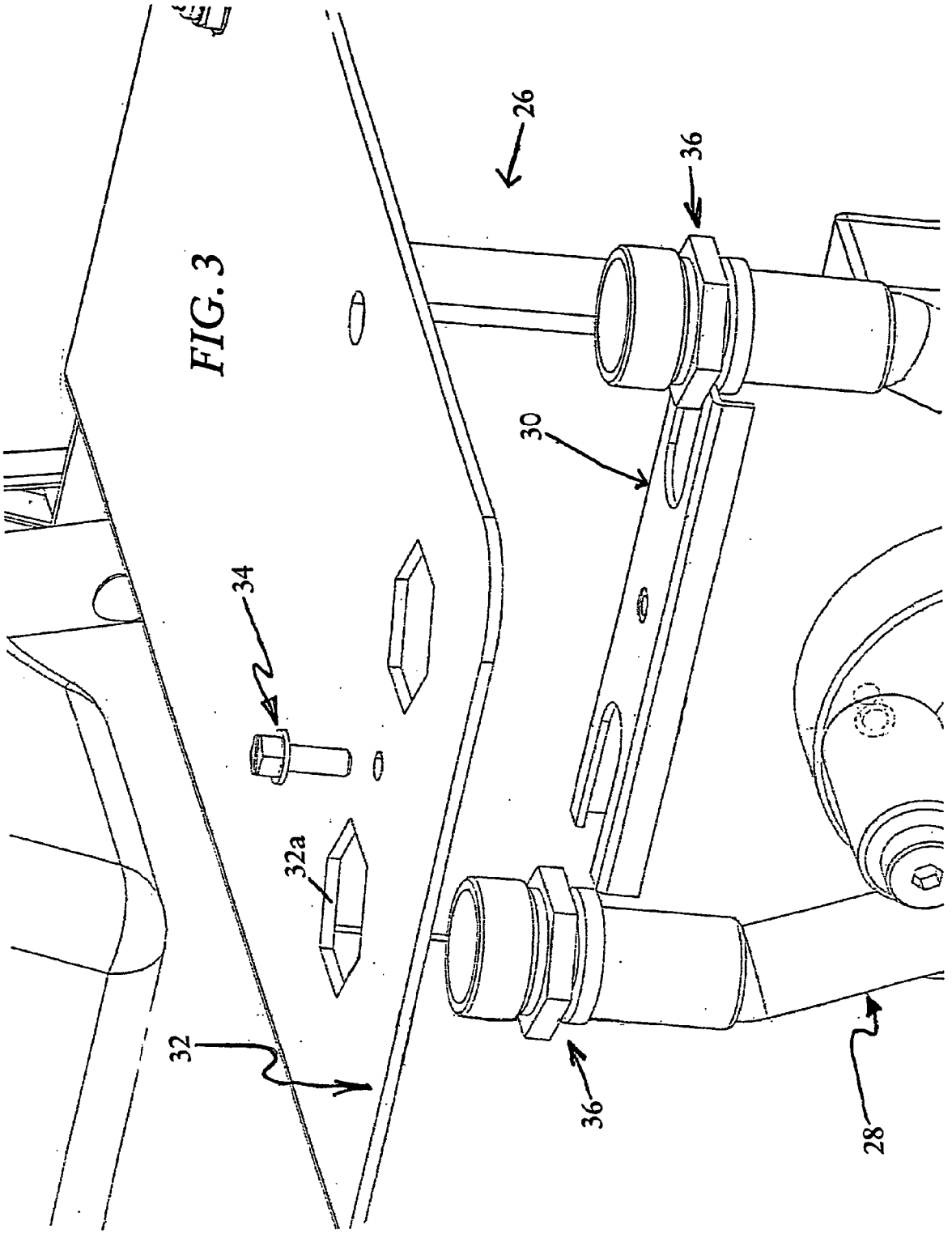


FIG. 3

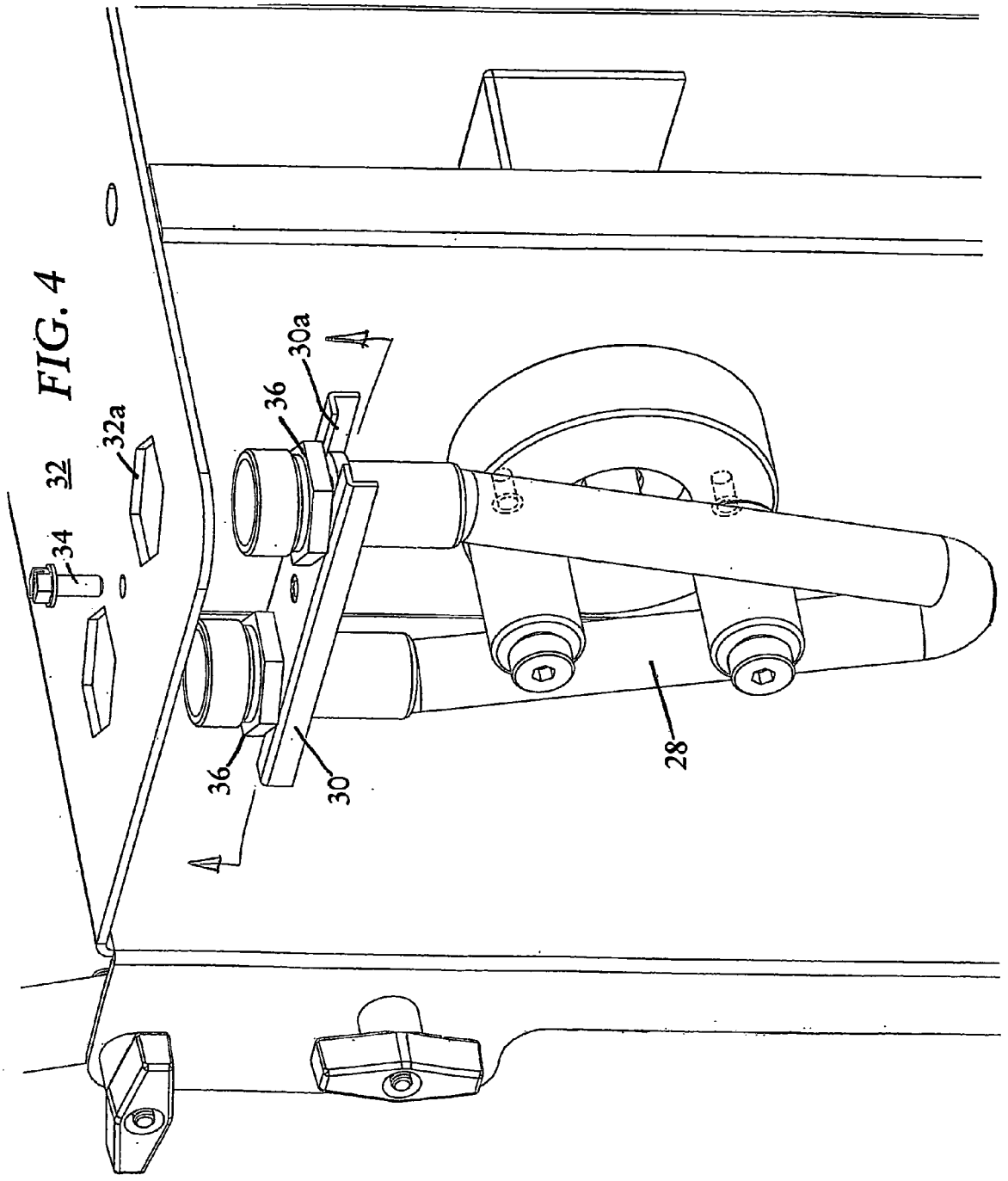


FIG. 4

FIG. 5

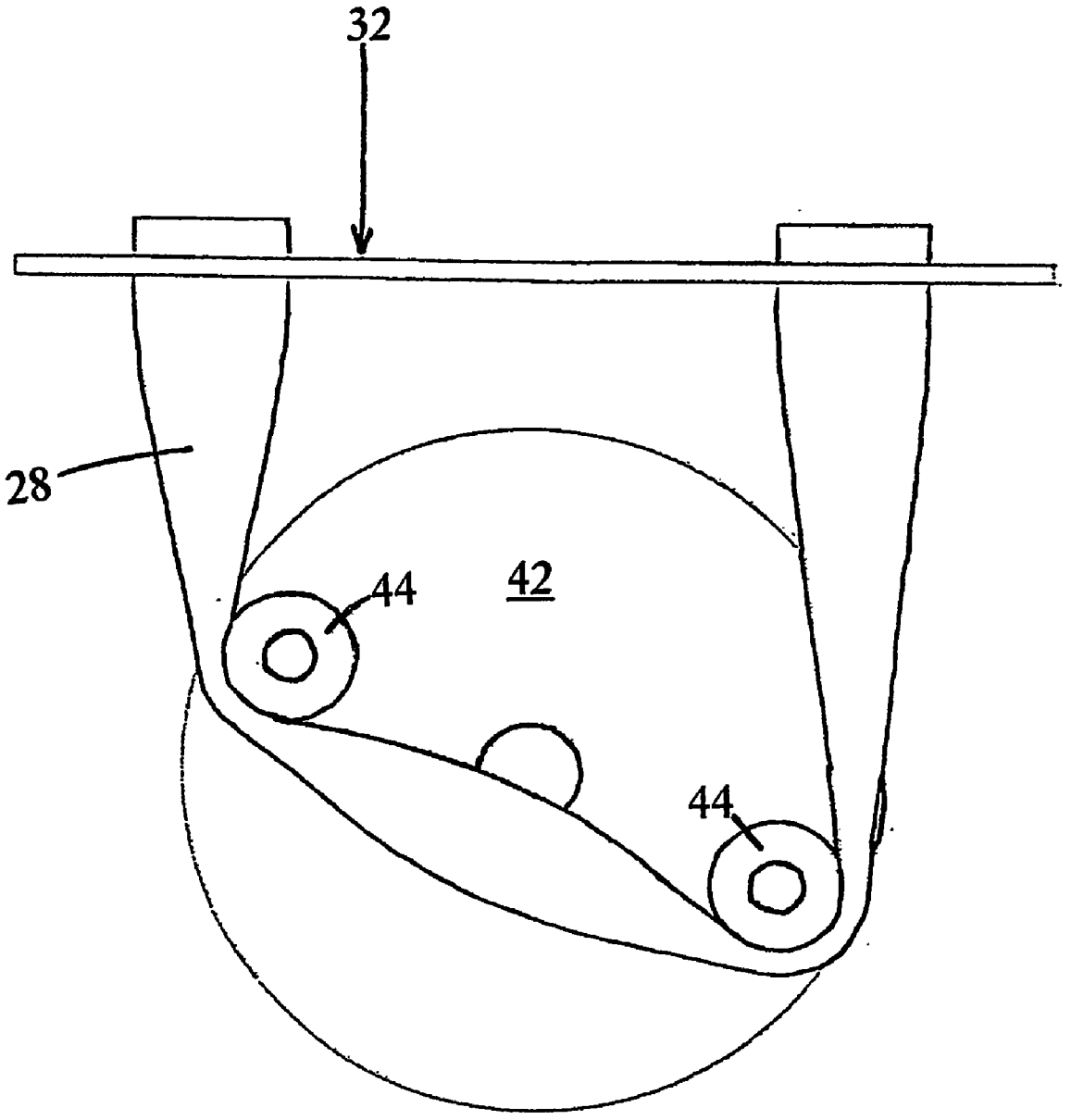


FIG. 6

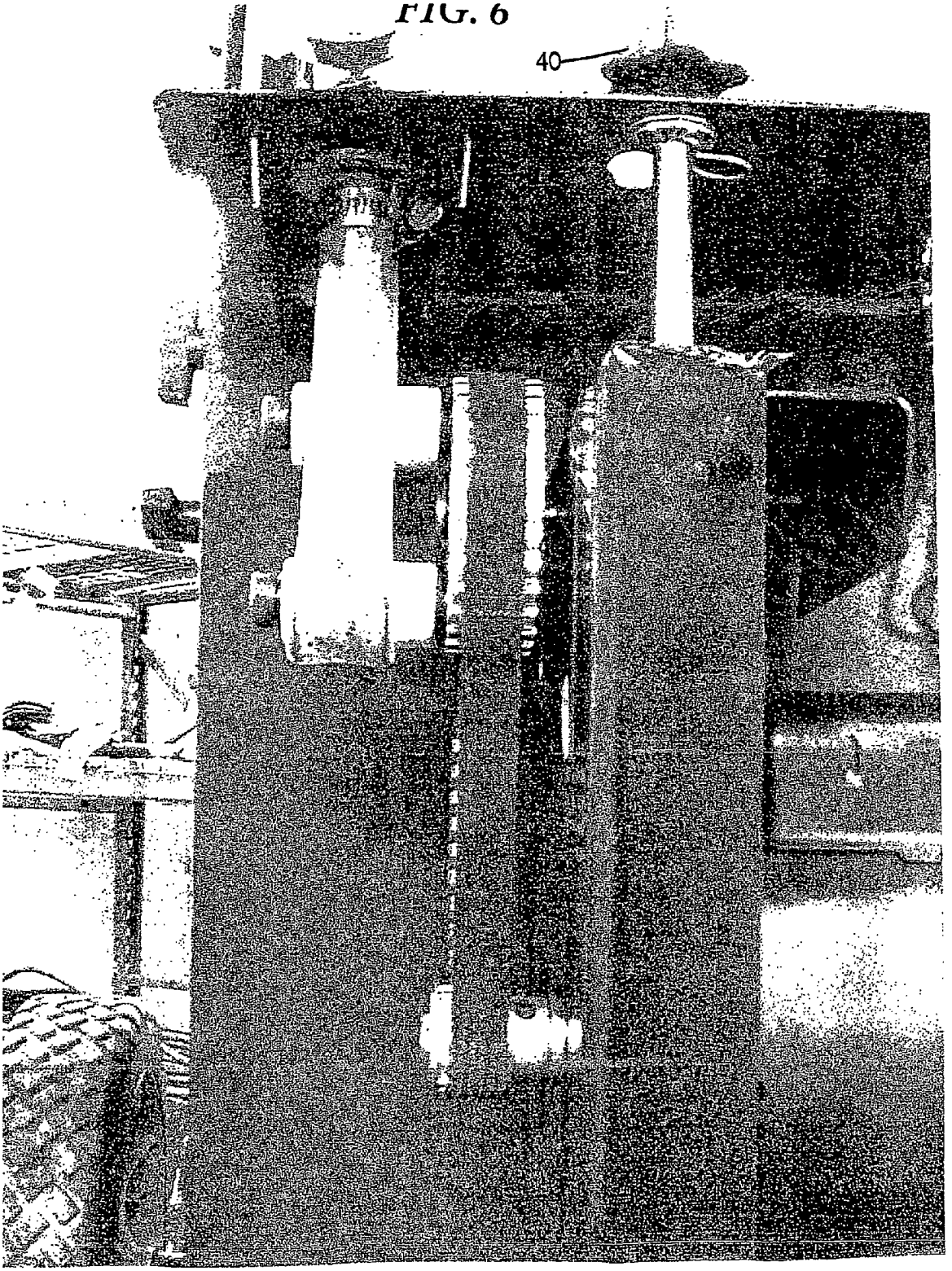
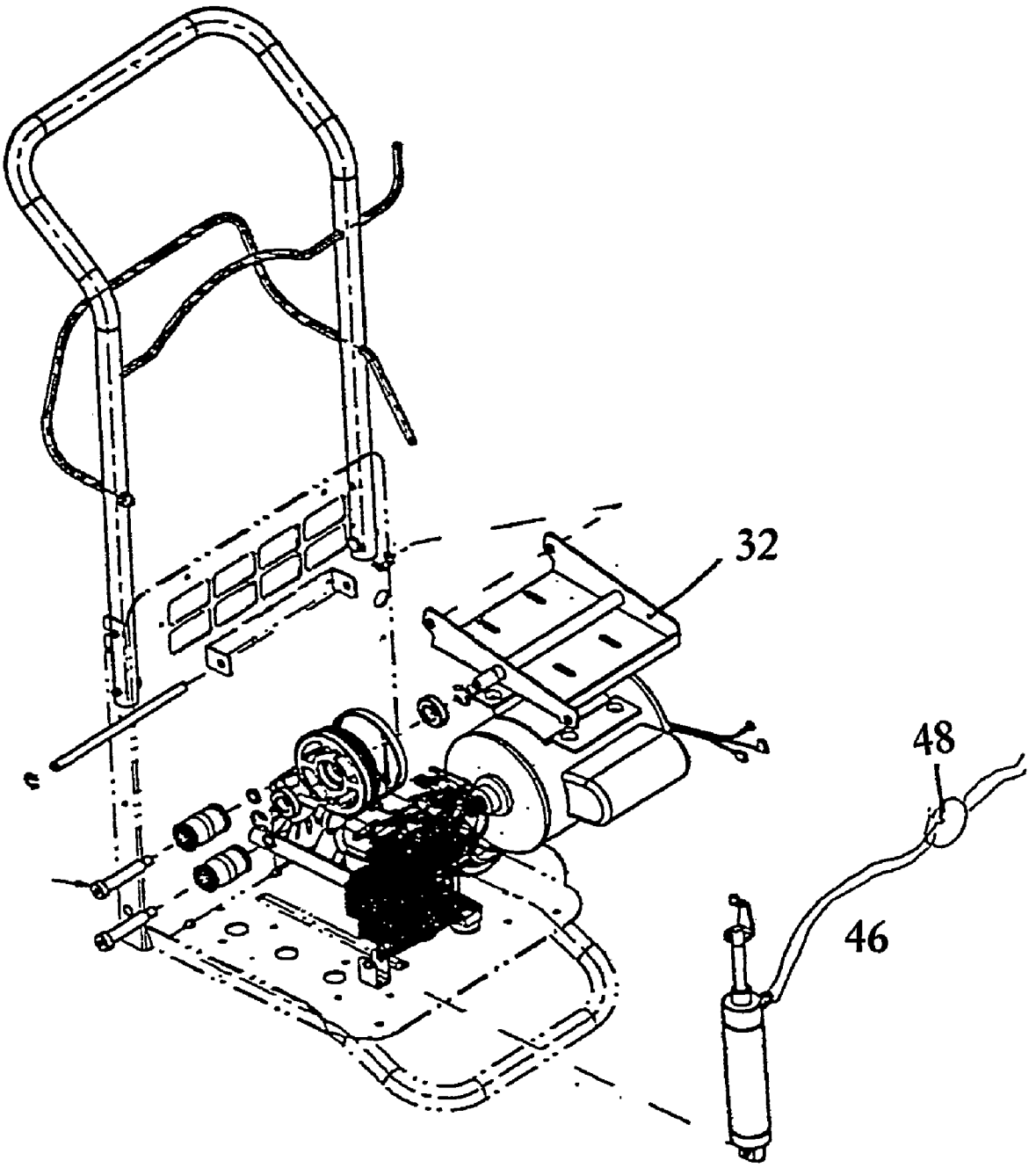


FIG. 7



ADJUSTABLE FLOW TEXTURE SPRAYER WITH PERISTALTIC PUMP

[0001] This application claims the benefit of U.S. Application Ser. No. 60/389,088, filed Jun. 13, 2002.

TECHNICAL FIELD

BACKGROUND ART

[0002] Texture sprayers have traditionally ranged from simple guns having top-mounted hoppers (hopper guns) to progressive cavity pumps which can pump large amounts of material substantial distances at substantial cost and weight.

[0003] Prior art peristaltic pumps are provided with a rotor having two (or more) rollers, the rotor being capable of rotation in either direction while a tube or hose is stretched across a distance. This creates kinks or closures in the tube at the points of roller contact. As the rotor revolves, the kinks travels with the rollers providing a positive displacement of the fluid contained between the kinks. Most such pumps provide a follower plate which sandwiches the hose between itself and the rollers.

DISCLOSURE OF THE INVENTION

[0004] It is a desire to have a small, relatively inexpensive and self-contained texture sprayer. A cart contains one or more adjustable flow peristaltic pumps, a motor (electric or gas), a material supply hopper and a flow control device. A double-ended motor shaft may be provided wherein one end drive the peristaltic pump and the other end drives an air compressor.

[0005] This apparatus may also be provided without the compressor where the user will supply atomization air. A texture spray gun is provided with a small hop so that it may be used either independently or with the cart mounted material supply. Another version may be provided with a separate compressor having its own motor for independent operation of material and air.

[0006] It has been found that the peristaltic pump provides a unique vibration which enhances the flow of high viscosity materials such as texture by loosening the bond between the hose and the high viscosity materials as well as self-cleaning the hopper. The pump may be run forward or reverse with reverse being used to empty the hose or transfer material.

[0007] The hose retention mechanism on the peristaltic pump consists of a coupled hose, a hose retainer plate, a mounting plate and a retainer screw. A hose with couplings slides onto each end of the hose retainer plate. The hose retainer plate is secured to a mounting plate or surface with a fastener while the hose couplings protrude through the surface of the mounting plate for access. The hose retainer plate supports the downward loads imposed by the peristaltic pump while the mounting plate or surface keeps the coupled hose in proper alignment in the pump. Matching the profile of the fittings (e.g. hexagon) with the opening of the mounting plate or surface prevents rotation of the fittings when mating hoses are attached with threaded couplings.

[0008] In the peristaltic pump of the instant invention, the distance over which the hose is stretched is made variable or adjustable so that a variable rate of flow may be achieved. The flow is varied by an adjuster that pulls the tubing closer or farther away from the center of the rotor. As the distance D from the mounting point increases, hose tension T is increased thereby decreasing leakage QL at the points of roller contact. The relationship between output/input pressure P, tube or hose tension T, fluid viscosity V and tube/hose material choices will determine the pump efficiency. Because of these factors, the pump can run anywhere from zero to 100% volumetric efficiency.

[0009] When the spray gun or dispense valve is closed (no material flow) and pump running, leakage volume QL becomes equal to the displacement volume (2 Q×rpm) thus preventing overpressurization. The self-compensating pump design eliminates the need for expensive motor speed and/or shutoff controls as well as eliminating high current motor starts (allowing the use of a standard 15 amp outlet).

[0010] These and other objects and advantages of the invention will appear more fully from the following description made in conjunction with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views.

BRIEF DESCRIPTION OF DRAWINGS

[0011] **FIG. 1** is a front perspective view showing the sprayer of the instant invention without a compressor.

[0012] **FIG. 2** is a front perspective view showing the sprayer of the instant invention with a compressor.

[0013] **FIG. 3** is an exploded view showing hose retention mechanism of the sprayer of the instant invention.

[0014] **FIG. 4** is an front perspective view showing hose retention mechanism of the sprayer of the instant invention.

[0015] **FIG. 5** is an side plan view showing hose pressure adjustment mechanism of the sprayer of the instant invention.

[0016] **FIG. 6** is an front plan view showing hose pressure adjustment mechanism of the sprayer of the instant invention.

[0017] **FIG. 7** is an exploded view of the preferred embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0018] The instant invention, generally designated **10**, is a small, relatively inexpensive and self-contained texture sprayer. A cart **12** contains one or more adjustable flow peristaltic pumps **14**, a motor **16** (electric or gas), a material supply hopper **18** and a flow control device **20** such as a spray gun or dispense valve. A double-ended motor shaft may be provided wherein one end drive the peristaltic pump **14** and the other end drives an air compressor **22**.

[0019] As shown in **FIG. 1**, this apparatus may also be provided without the compressor where the user will supply atomization air. A texture spray gun is provided with a small hopper **20***a* so that it may be used either independently or with the cart mounted material supply. Another version may be provided with a separate compressor having its own motor for independent operation of material and air.

[0020] It has been found that the peristaltic pump **14** provides a unique vibration which enhances the flow of high

viscosity materials such as texture by loosening the bond between the hose **24** and the high viscosity materials as well as self-cleaning the hopper **18**. The pump **14** may be run forward or reverse with reverse being used to empty the hose or transfer material.

[**0021**] The hose retention mechanism **26** on the peristaltic pump **14** consists of a coupled hose **28**, a hose retainer plate **30**, a mounting plate **32** and a retainer screw **34**. A hose with couplings **36** slides onto each end **30***a* of the hose retainer plate **30**. The hose retainer plate **30** is secured to a mounting plate or surface **32** with a fastener **34** while the hose couplings **36** protrude through the surface of the mounting plate **32** for access. The hose retainer plate **30** supports the downward loads imposed by the peristaltic pump **14** while the mounting plate or surface **32** keeps the coupled hose **28** in proper alignment in the pump **14**. Matching the profile of the fittings **36** (e.g. hexagon) with the opening **32***a* of the mounting plate or surface **32** prevents rotation of the fittings **36** when mating hoses **38** are attached with threaded couplings **38***a*.

[**0022**] In the peristaltic pump **14** of the instant invention, the distance D over which the hose **28** is stretched is made variable or adjustable so that a variable rate of flow may be achieved. The flow is varied by an adjuster **40** that pulls the tubing **28** closer or farther away from the center of the rotor **42** by raising and lowering the mounting plate **32** relative to the frame **12**, rotor **42** and rollers **44**.

[**0023**] The preferred adjuster **46** is a variable force device for varying the amount of tension on the tubing **28** and the resulting flow. Such device may be a fluid (air or liquid) cylinder which may have, if desired, a separate pressure adjustment **48** for controlling the amount of force applied and accordingly the flow rate. The adjuster **46** may also be a solenoid, adjustable spring or other art recognized force generator.

[**0024**] As the distance D from the mounting point increases, hose tension T is increased thereby decreasing leakage QL at the points of roller **44** contact. The relationship between output/input pressure P, tube or hose tension T, fluid viscosity V and tube/hose material choices will determine the pump efficiency. Because of these factors, the pump can run anywhere from zero to 100% volumetric efficiency.

[**0025**] When the spray gun or dispense valve **20** is closed (no material flow) and pump **14** running, leakage volume QL becomes equal to the displacement volume (2 Q×rpm) thus preventing overpressurization. The self-compensating pump design elimates the need for expensive motor speed and/or shutoff controls as well as eliminating high current motor starts (allowing the use of a standard 15 amp outlet).

[**0026**] It is contemplated that various changes and modifications may be made to the texture sprayer without departing from the spirit and scope of the invention as defined by the following claims.

1. A sprayer for application of viscous materials such as texture, said sprayer comprising:

a frame;

a loop of tubing having first and second ends and being attached to said frame;

a motor, said motor having a shaft with a rotor attached thereto, said motor being pivotably attached to said frame to vary the distance between said shaft and said first and second tubing ends;

a plurality of rollers attached to said rotor and engaging said tubing; and

a force generator attached between said motor and said frame to vary the force with which said rollers contact said tubing.

2. The sprayer for application of viscous materials of claim 1 wherein said force generator comprises an air cylinder.

3. The sprayer for application of viscous materials of claim 2 wherein said force generator comprises a pressure regulator attached to said air cylinder.

4. The sprayer for application of viscous materials of claim 1 wherein said force generator comprises an air cylinder.

5. The sprayer for application of viscous materials of claim 1 wherein said tubing is attached at one of said ends to a source of viscous material and at the other of said ends to an application device.

6. The sprayer for application of viscous materials of claim 1 wherein said tubing has couplings at said ends and further comprising a tubing retention mechanism comprising a mounting plate; and

a hose retainer plate, said couplings sliding onto each end of said hose retainer plate with said couplings protruding through the surface of said mounting plate for access and said retainer plate supporting the loads imposed said rollers.

7. The sprayer for application of viscous materials of claim 6 wherein said couplings comprise a profile and said mounting plate comprises openings to match said profile of said couplings to prevent rotation said couplings when tubing is attached.

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