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Fenley, Jr.

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(54) **WET ABRASIVE BLAST MACHINE WITH REMOTE CONTROL RINSE CYCLE**

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USPC 451/91, 90
See application file for complete search history.

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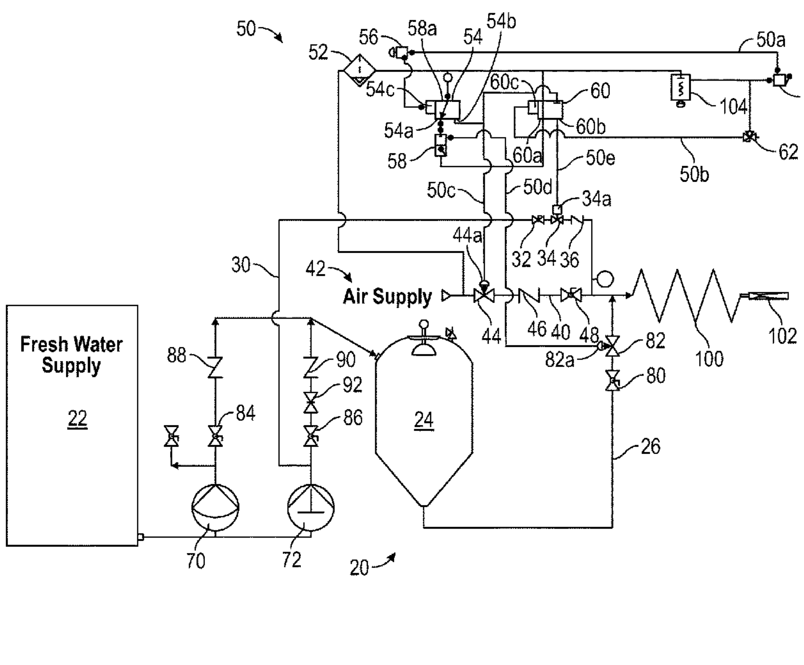
(57) **ABSTRACT**

An improved wet abrasive blast machine with remote control rinse cycle enables a pilot operating the apparatus to control remote switching between blast and rinse cycles directly, for example from a nozzle of a blast hose or from a panel. A first and second hydraulic circuit and a pneumatic circuit are controllable via communication with a control circuit which is operable remotely to direct a configurable pilot signal between various valve states. In a preferred embodiment, the control circuit is powered pneumatically via a branch circuit fed from the pneumatic circuit. Switching between to configurations is effected by directing an air pilot signal between airflows interior to a series of valves. In an alternate embodiment switching airflows between configurations is effected electrically.

14 Claims, 12 Drawing Sheets



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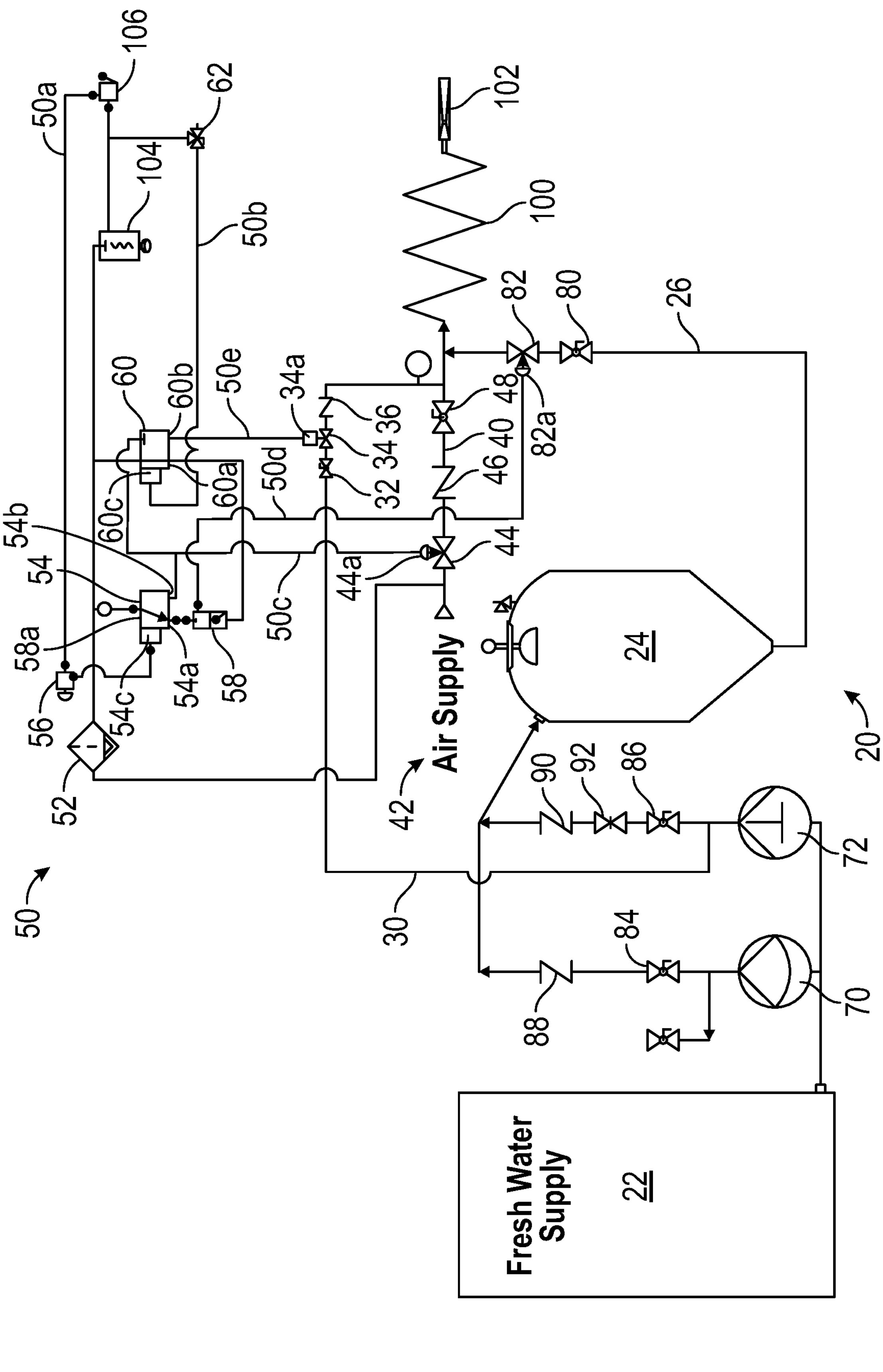
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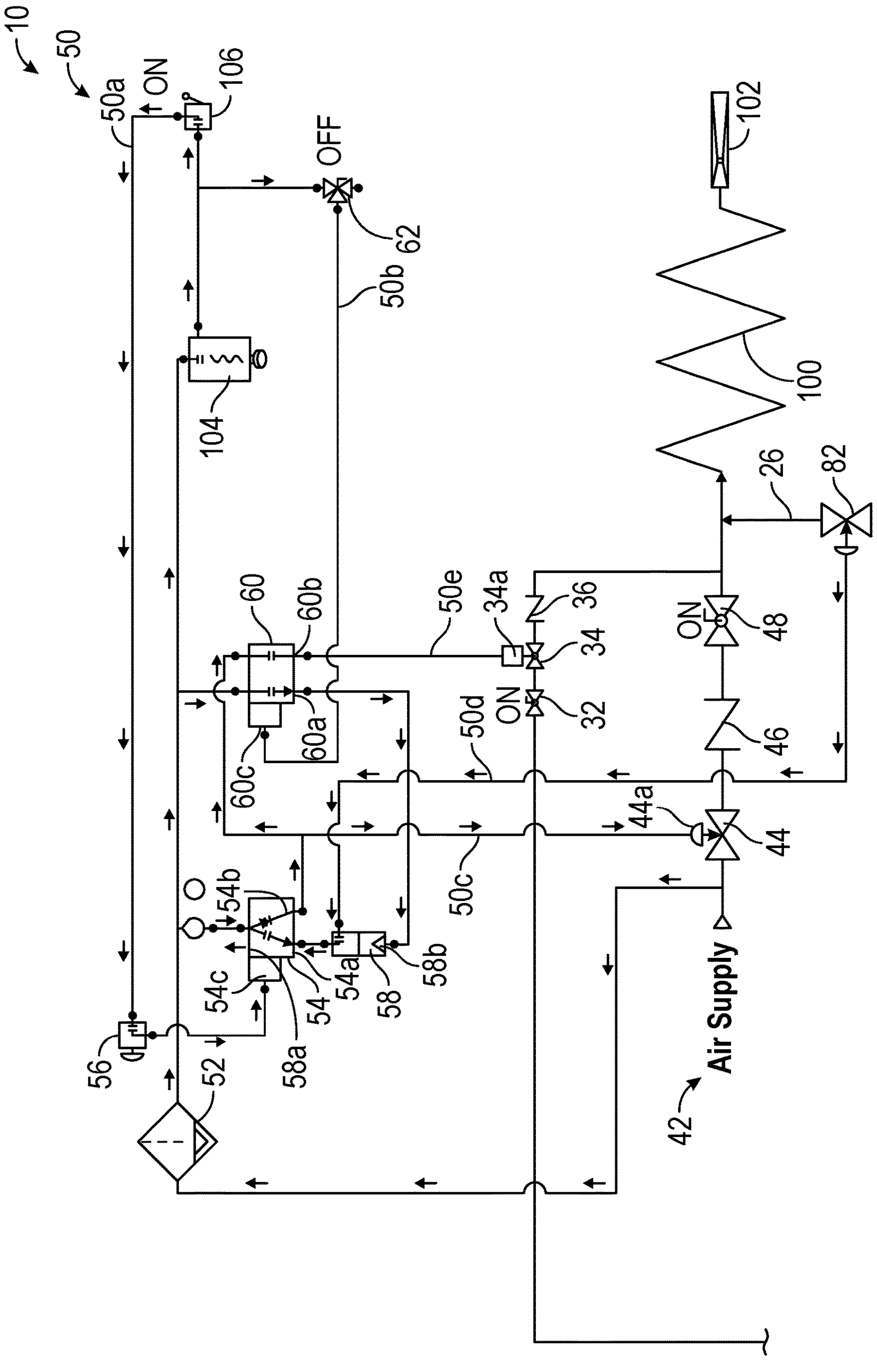
FIG. 1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50d
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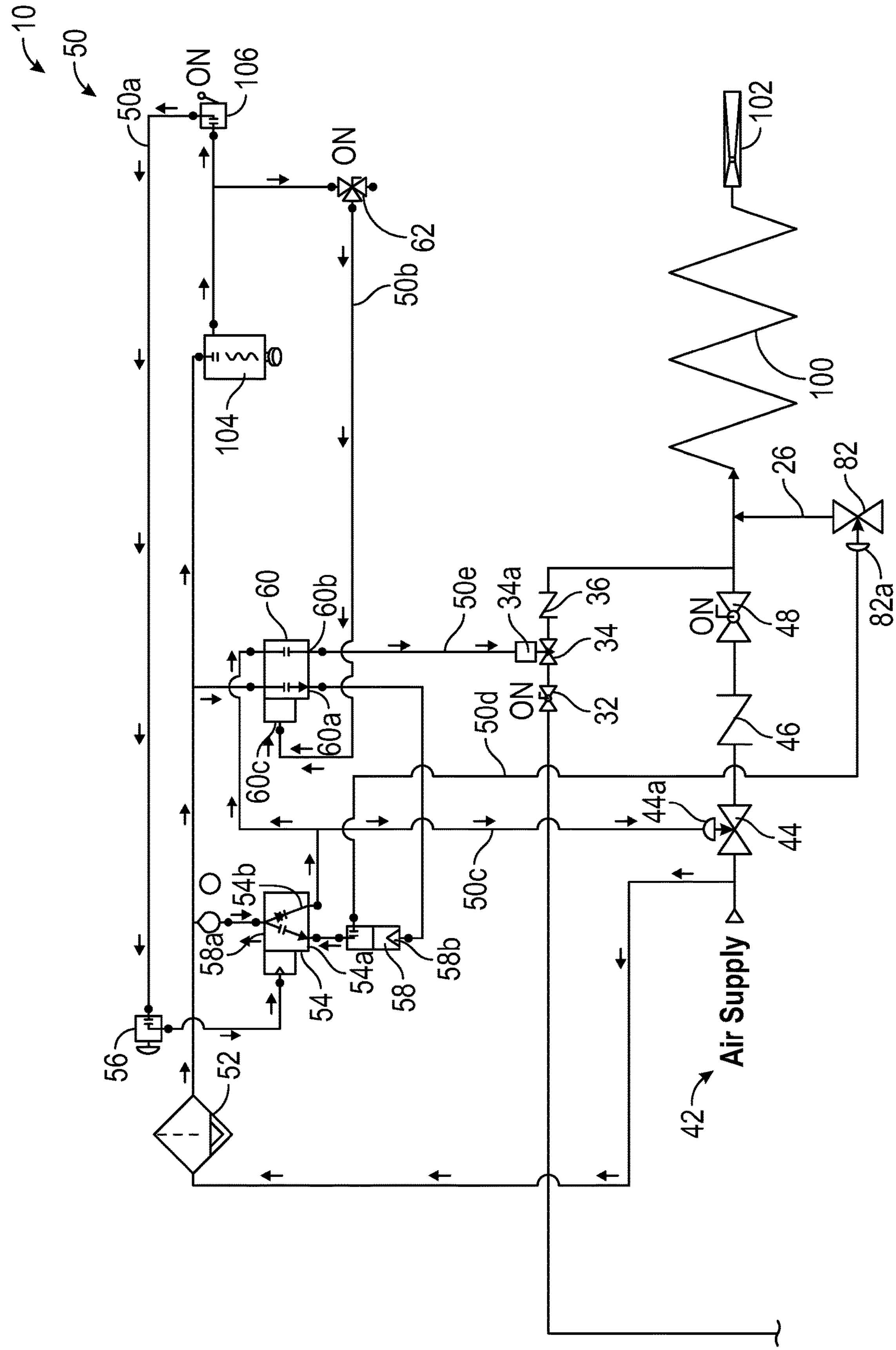
58a
Air Supply
42

FIG. 2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Air Supply
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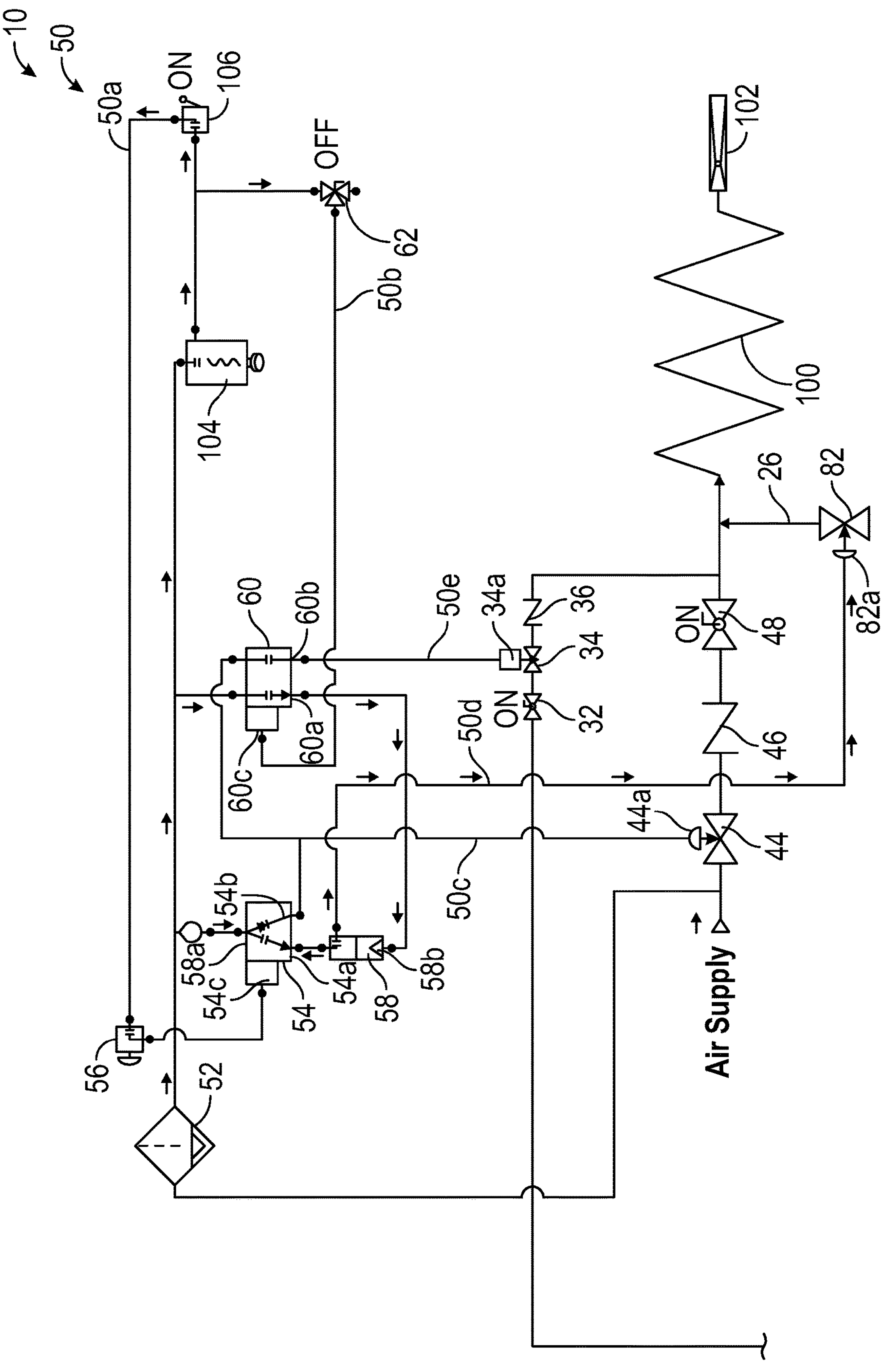
FIG. 3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54c
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54a
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58b
50c
56
52
Air Supply

FIG. 4

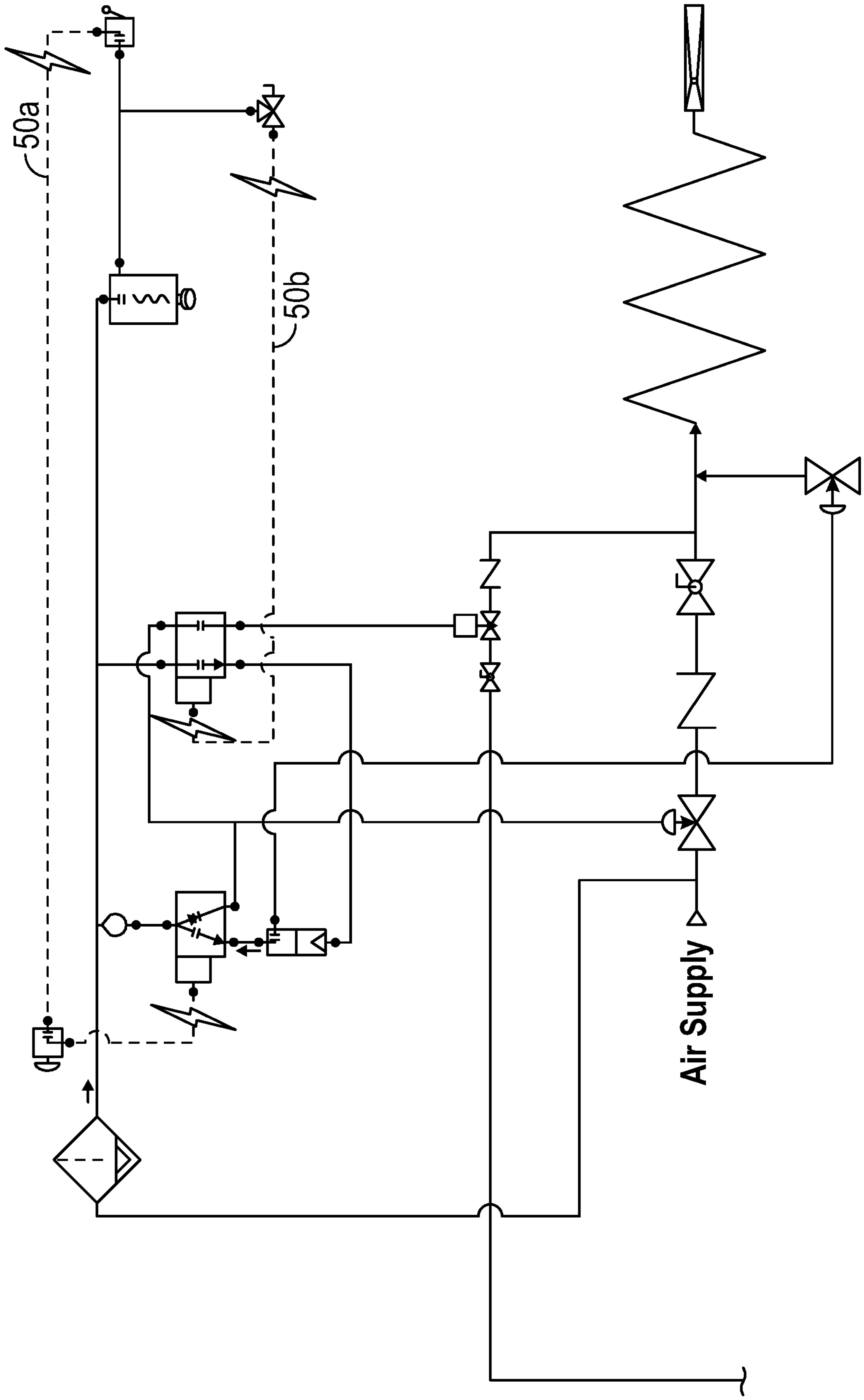

FIG. 5

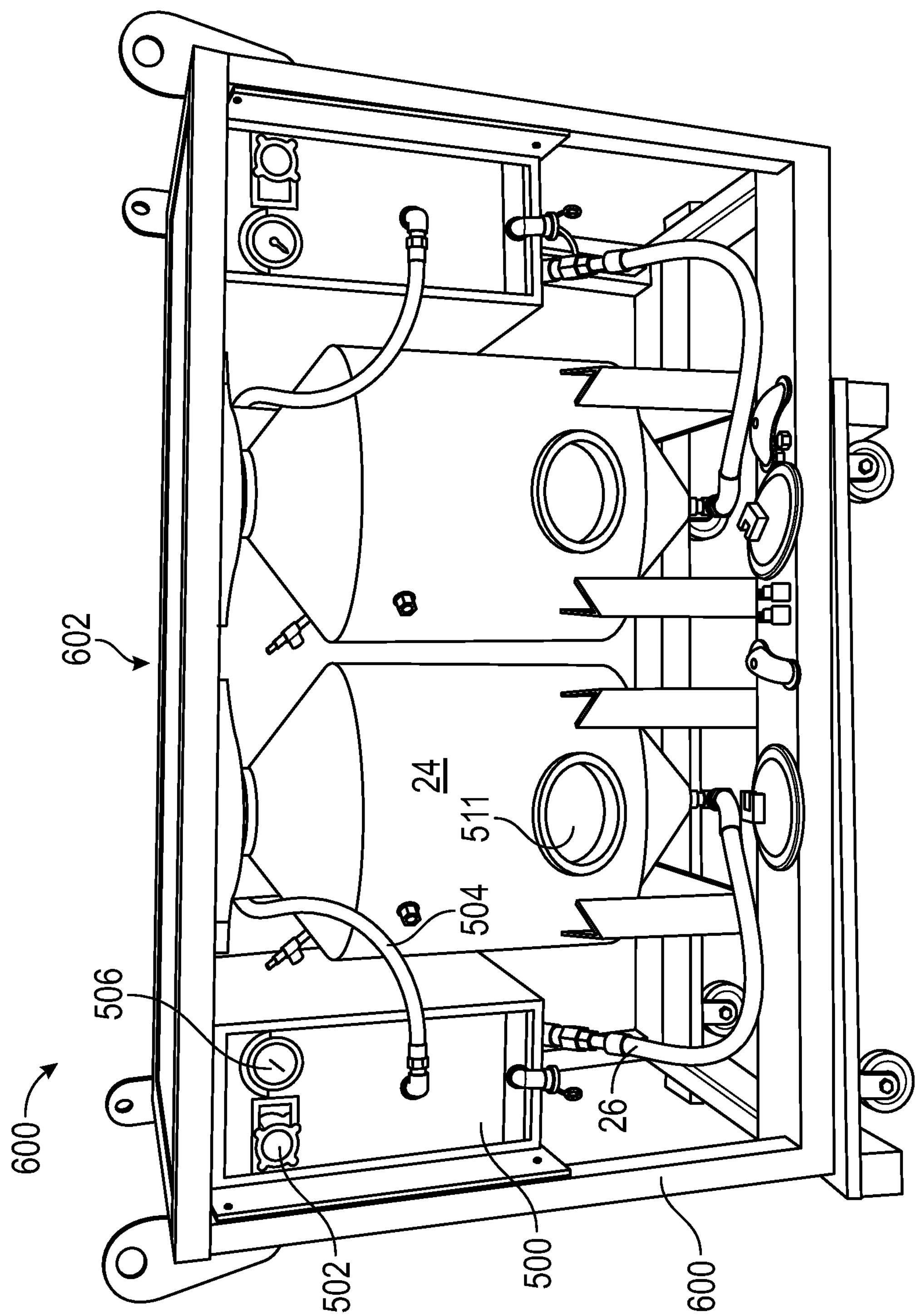

FIG. 6

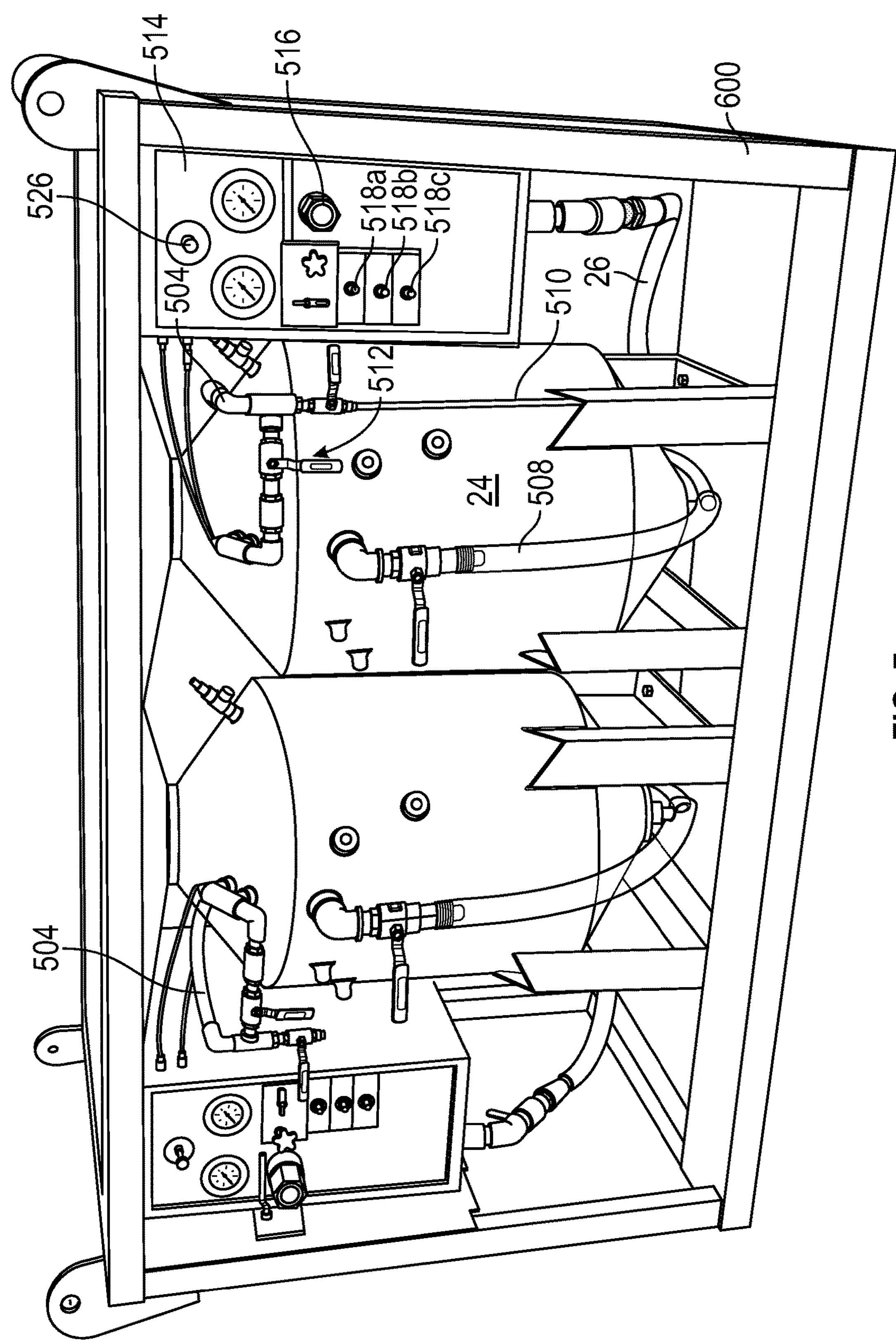

FIG. 7

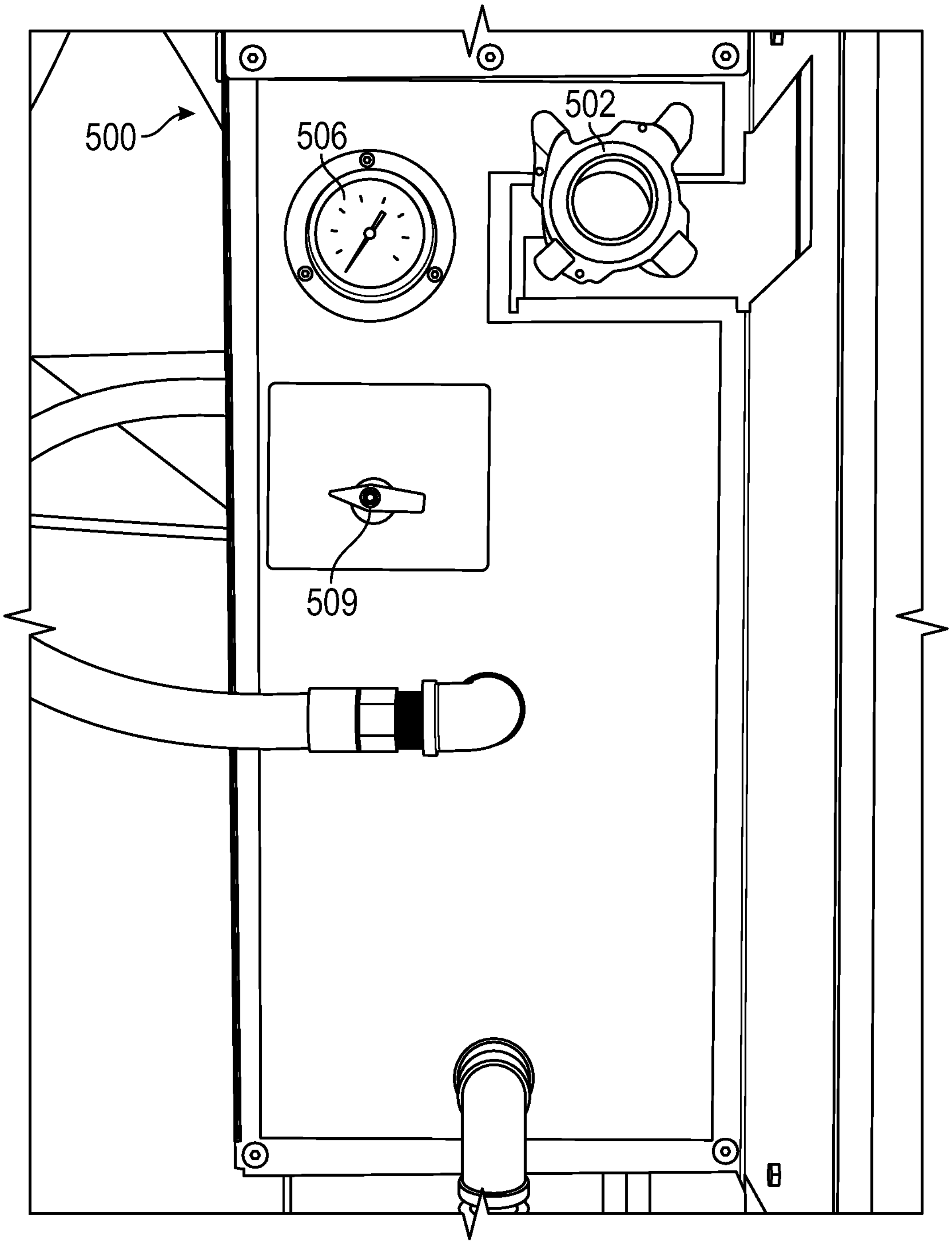

FIG. 8

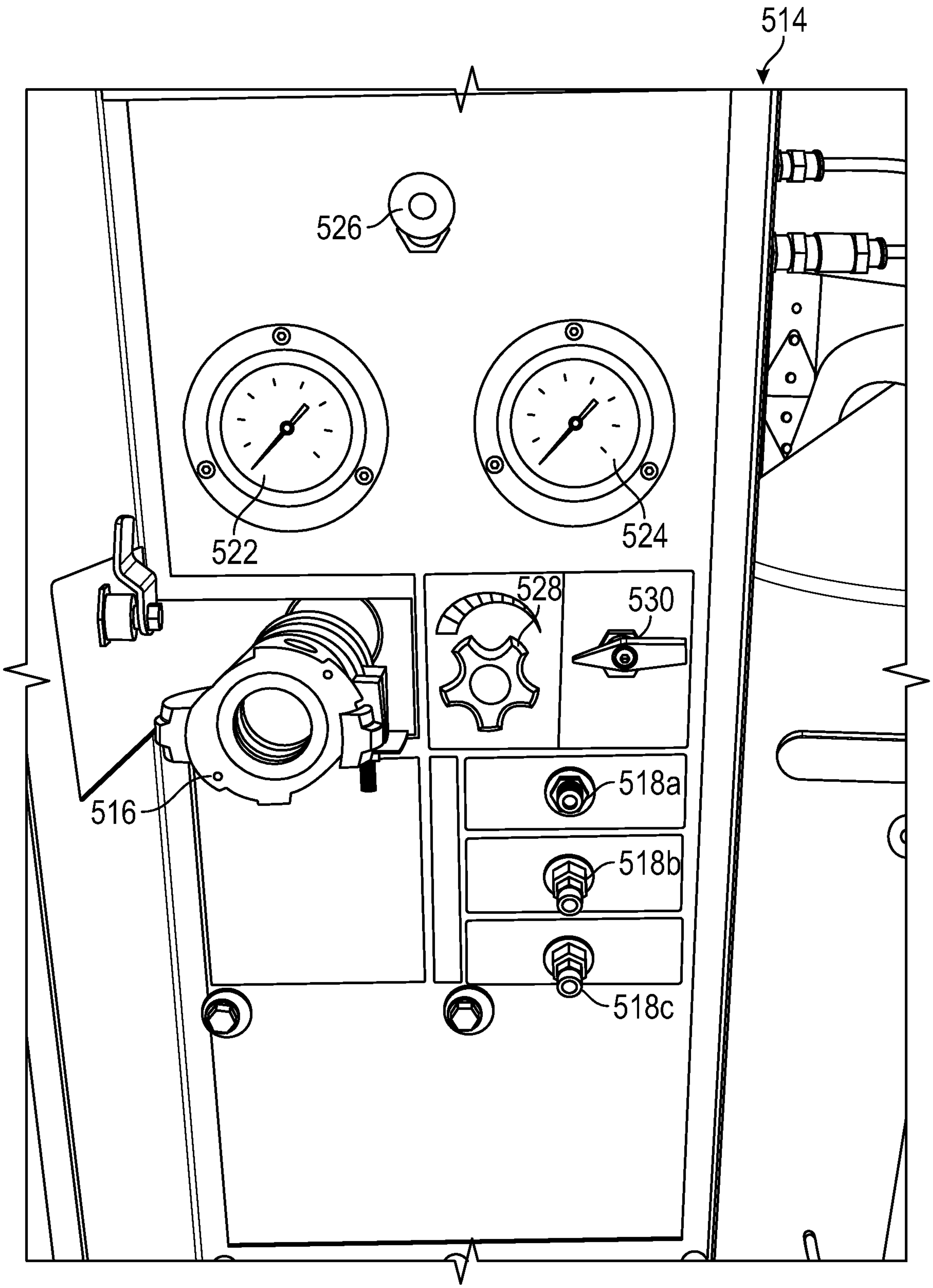

FIG. 9

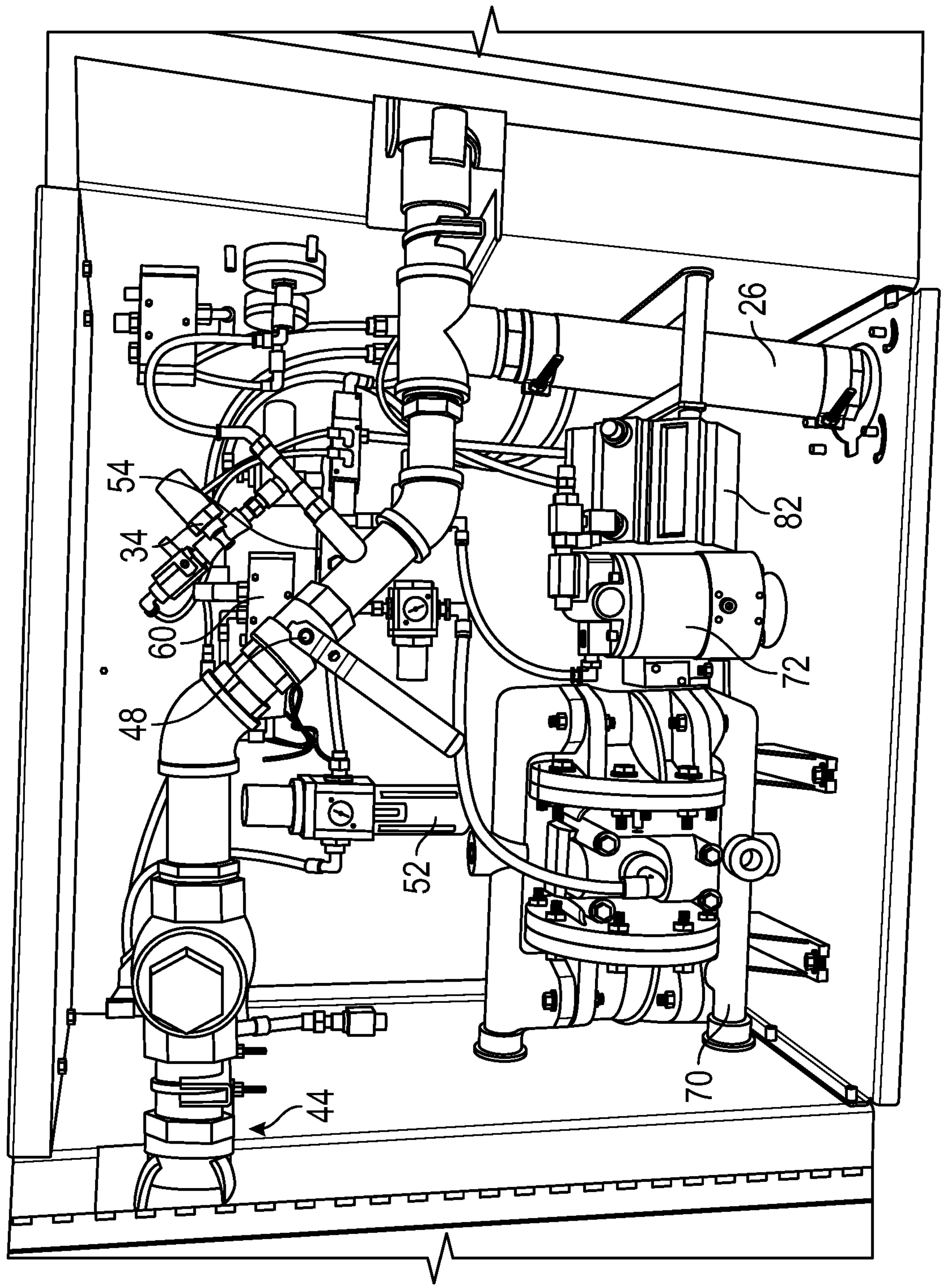

FIG. 10

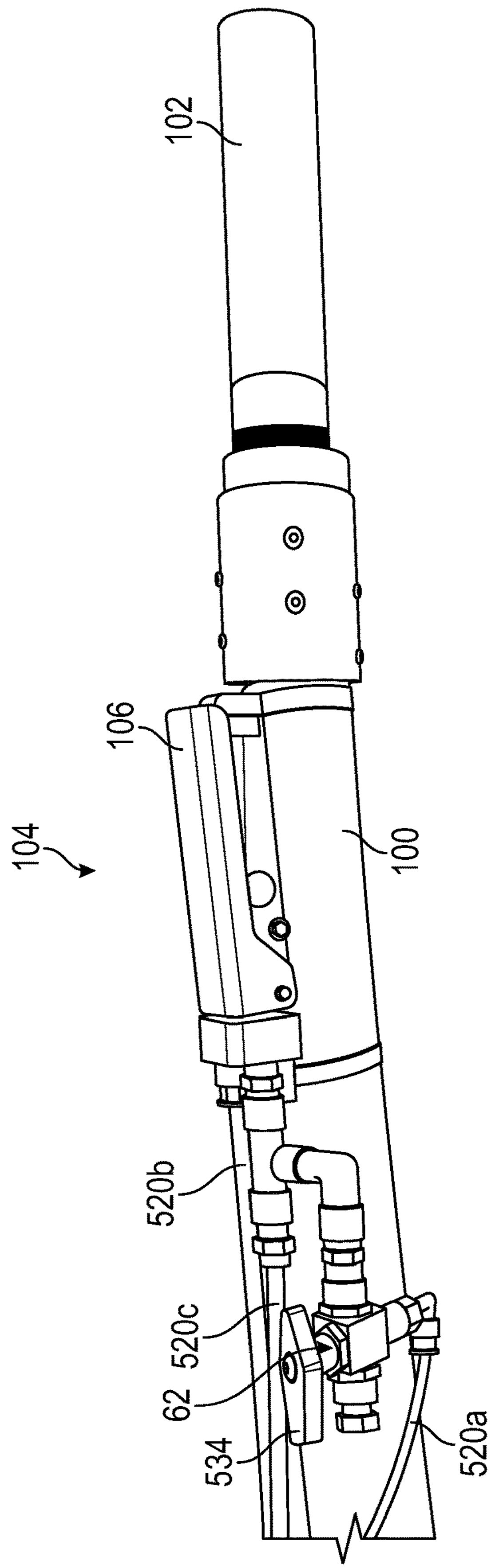

FIG. 11

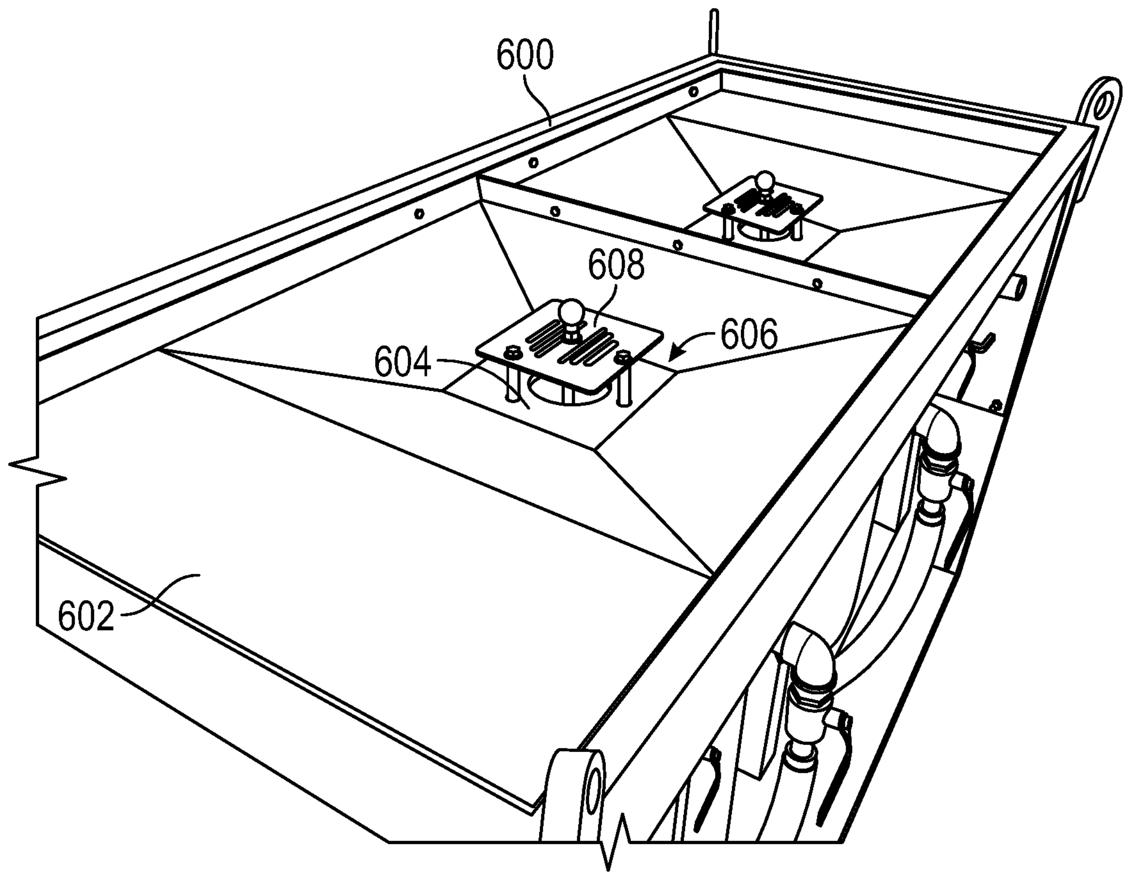

FIG. 12

WET ABRASIVE BLAST MACHINE WITH REMOTE CONTROL RINSE CYCLE

BACKGROUND OF THE INVENTION

Various wet abrasive blast machines and vapor blast machines (collectively "WAB" machines) are well known in the surface cleaning industry. Typically, a hydraulic side and a pneumatic side combine to enable blasting of pressurized fluids to scour and clean surfaces. A blast pot, containing grit, is pressurized by water pumped from a standalone water tank into the blast pot to maintain a pressure therein. Pneumatic pressure is thence generated via an air compressor into a blast hose via a piping manifold connected to the blast pot by a slurry hose. Slurry (grit and water) from the blast pot is thence introduced into the airflow in the blast hose to jet a spray of pressurized fluid containing grit against a targeted surface. The effect is to spray a high velocity stream of grit particles to scour and clean the targeted surface. Depending on the grit used and the pressures employed, the surface may be scoured to remove paint, rust, residue, chemicals, oxides, and other surface elements or contaminants, to expose, restore, or refinish the surface.

During blasting operations, introduction of grit from the blast pot into the airstream is controlled by a pinch valve operating at the juncture of the slurry hose and the blast hose. When an operator enacts a switch at the blast hose nozzle, typically a deadman switch to require active engagement, the pinch valve is automatically opened to release pressure on the hydraulic side whereby slurry is forced into the airstream and thence carried, at pressure, for blasting.

As seen in the art, water from the standalone tank is also applied to a rinse cycle after blasting operations have ceased. The present state of the art controls application of rinse water by requiring manual shut-off of a ball valve disposed upon the slurry hose whereby water is introducible into the airstream while the slurry from the blast pot is excluded. This presents several problems and inefficiencies when blasting. First, a second operator is generally required to tend the blast pot and respond to signals from the operator to disengage the hydraulic side for rinsing to commence. Slurry remnant in the slurry hose downstream from the ball valve, and up to the blast hose nozzle, must then be evacuated by the rinse stream before rinsing operations can properly commence. This results in wasted time, resources, wear on the ball valve, and additional manpower—especially when switching between blasting and rinsing operations frequently since the ball valve must be manually set each time between blasting and rinsing and the slurry in the slurry hose downstream from the ball valve and in the blast hose must be evacuated.

What is needed is a control circuit feeding back to the pinch valve from the blast hose proper wherein the operator of the blast hose is enabled remote control of a pinch to switch between blasting and rinsing operations without having to employ use of the upstream ball valve in sealing off the blast pot, nor deactivate the pumps pressurizing the hydraulic circuit(s), nor deactivating the compressor(s) pressurizing the pneumatic circuit. Thus, singlehanded blasting operations are enabled and immediate switching between rinse and blasting cycles is effectuated more efficiently with the hydraulic and pneumatic circuits maintained at pressure.

FIELD OF THE INVENTION

The present invention relates to an improved wet abrasive blast machine with remote control rinse cycle, and more

particularly, to an improved wet abrasive blast machine with remote control rinse cycle that includes a control circuit enabling remote control of blasting and rinsing operations. The control circuit directs a pilot air signal, drawn off the pneumatic circuit and fed between various configurations, to control a main blast air inlet valve, a rinse solenoid valve, a pinch air block valve, and a pinch valve whereby an operator, and a pilot at the blast hose nozzle, are enabled to remotely control introduction of slurry into the blast stream and immediately switch between, and cease, blasting and rinse cycles.

SUMMARY OF THE INVENTION

The present improved wet abrasive blast machine with remote control rinse cycle has been devised to enable an operator to switch between blast and rinse cycles remotely and at the nozzle of the blast hose. The present improved wet abrasive blast machine obviates the need for a second party (or other party) to control introduction and exclusion of slurry from the blast hose, instead enabling a single user or pilot operating the blast nozzle to control immediate cycling between blasting and rinsing.

Wet abrasive blasting (also known as "vapor blasting") is established and well known in the art. Insoluble grit particles, typically sand-sized silicates and/or other grits, are delivered from a blast pot by a pressurized non-compressible fluid (typically water) pumped into the blast pot. The fluid acts as a carrier, displacing the grit from the blast pot as a slurry into a slurry hose for communication to a blast hose wherein an airstream sprays the slurry forth at pressure to clean and scour surfaces. Rinsing is enabled by shutting off the slurry hose to prevent slurry from entering the blast hose while pumping water bypassing the blast pot for dispersal via the airstream.

Wet abrasive blasting, therefore, employs at least three circuits—two hydraulic circuits and a pneumatic circuit. Switching between rinsing and blasting is typically accomplished in tandem—a user operating the blast hose at the point of operations (known as a "pilot" in the art) is typically distally disposed relative the blast pot, which may be large and heavy. A second operator, therefore, is required to manually engage at least one valve upon the slurry hose to prevent slurry from entering the blast hose during rinse cycles. Employment of the second party for such purposes increases costs associated with wet abrasive blasting and causes delays to accommodate communication back and forth between the pilot and the said second party.

Further, the valve employed in switching between blast and rinse cycles is typically the slurry hose shut-off valve, a ball valve that operates to seal off the slurry hose interiorly and wholly throttle the circuit. Blasting ejects coarse grit particles which rapidly wear and degrade such components that contact the slurry stream. Use of the ball valve to disable blasting and enable rinsing is therefore an inefficient use of an expensive part. Present day, slurry hose shut-off valves employed in this fashion are one of the most frequently replaced parts in the surface cleaning industry. Operation of a pinch valve to close of the slurry hose in a guillotine-like enclosure prevents direct wear on the valve. Since the interior of the slurry hose is smooth and disposed along the direction of flow, wear is significantly lessened and the hose itself considerably less expensive to replace anyway.

The sheer quantity of fluid and slurry used in wet abrasive blasting necessitates large vessels for storage of the water supply and for pressurizing the slurry. Such large vessels restrict a range of motion whereby operations are predominantly limited by the length of the blast hose proper. Surface cleaning requires ambulation by the pilot to cover the targeted area, which may include vertical and other non-horizonal surfaces requiring elevation of the pilot (such as, for example, when cleaning the interior of hulls of large ocean-faring vessels). As presently seen in the art, the pilot typically communicates with a second party to switch between blast and rinse cycles at the slurry shut-off valve and also, oftentimes, with a third party who tends the water supply, grit supply, and acts to control the air-compressor required to maintain the airstream in the pneumatic circuit. Often, disabling the pneumatic circuit is effectuated by turning off the compressor, thereby throttling the pneumatic circuit and blast and rinse cycles and requiring reboot and a time lapse while pressure is restored in the system.

The present invention, therefore, addresses and obviates these and other inefficiencies, enabling switching between the rinse and blast cycles remotely and, in a preferred embodiment, directly from the nozzle of the blast hose by a pilot actively engaging in surface cleaning operations. The pilot, therefore, need not arrest blasting or rinsing and await receipt of an all clear signal, but can control action between each of a first and second hydraulic circuit by action of a control circuit that, in a preferred embodiment set forth herein, operates via configuration of an air pilot signal directed within a branch circuit fed by the pneumatic circuit and controllable by a series of manual controls located remotely and at the nozzle of the blast hose.

An alternate embodiment is set forth herein that also contemplates an electrically operated control circuit by effecting electric switching of the various valves to direct the air pilot signal between controlling branch circuits, as will be described subsequently.

In the preferred embodiment set forth herein, such switching of various valves to direct the air pilot signal between controlling branch circuits is also controlled pneumatically, by the same air pilot signal. It should be understood by persons of ordinary skill in the art that such discussion of the preferred embodiment is entered herein to engender clarity in exemplifying a singular configuration of the present invention, with particular and specific examples by way of explanation, and that variations of parts and arrangements of parts informing the following disclosure are determined and contemplated to be within scope of the inventive step set forth herein where consistent with the overall motivation and intent exemplified and described.

Discussing now the preferred embodiment, then, air is drawn off the pneumatic circuit upstream of a main blast air inlet valve to feed the control circuit. The air is routed at approximately 100 psig through an instrument air filter-regulator that regulates air pressure and removes moisture and any particulates. The control circuit is thus operable pneumatically, by a pilot signal of air pressure ("air pilot signal" and, when contemplating electrical alternatives, just "pilot signal") maintained and cycled within the control circuit during blast and rinse operations and fed directly from the pneumatic circuit. (It is noted that alternative pressures are contemplated for operating the invention, and may be employed while practicing the invention. The range cited herein is not meant to be limiting. A pressure differential merely need be maintained between each of the first and second hydraulic circuits and the pneumatic circuit to ensure introduction of slurry (or water) into the blast airstream.)

A deadman remote control handle is disposed at the blast hose nozzle to enable manipulation of the pilot signal, to actuate valve actuators that effectively switch between the blast and rinse cycles, and to disable blasting if released. The deadman remote control handle is a normally-closed, two-way, manually operable pneumatic block valve that receives a control pressure signal from an upstream deadman supply air regulator via a twin line remote control tubing that connects the control circuit with the blast nozzle.

A main control valve-relay is disposed in the control circuit and functions as the main on-off control for the blast air cycle. The main control valve-relay is a pneumatic five-port, four-way, pneumatic air pilot controlled valve with one normally-closed and one normally-open port. When the deadman remote control handle is squeezed by a pilot operating the blast hose nozzle, air is routed through a branch circuit via an emergency stop valve to an actuator upon the main control valve-relay. Pressurization by airflow incident this actuator causes the main control valve-relay to actuate and switch airflow from a normally-open port to a normally-closed port, thereby enabling the blast cycle, as will be described subsequently.

Airflow through the normally-closed port of the main control valve-relay sends a pilot signal to a branch circuit that controls the main blast air inlet valve (to activate airflow through the pneumatic circuit) and concurrently instates a pilot signal at a normally-closed port of a rinse control valve-relay. When this normally-closed port of the rinse control valve-relay is closed, the air pilot signal thereat is preempted.

Airflow introduced into the control circuit is likewise fed in parallel into the rinse control valve-relay from the air filter-regulator. During blast operations, airflow is directed through a normally-open port inside the rinse control valve-relay. Airflow through the normally-open port of the rinse control valve-relay is directed to actuate a pinch air block valve disposed in fluid communication with the main control valve-relay and the pinch valve operative upon the slurry hose. When actuated, the pinch air block valve opens. When the pinch air block valve is open and airflow through the main control valve-relay is active through the normally-closed port therein, airflow is exhausted through a pinch valve exhaust to depressurize the branch circuit controlling the pinch valve, thereby ensuring the pinch valve is open whereby the first hydraulic circuit is enabled. Thus, blasting operations are enabled when the deadman remote control handle is squeezed (or activated).

The rinse control valve-relay is actuated by a pilot signal diverted thereto by action of a remote rinse control valve disposed at the blast hose nozzle (the remote rinse control valve may of course be remotely located as well). Manual action at the remote rinse control valve diverts airflow into a branch circuit to pressurize an actuator actuating the rinse control valve-relay to switch airflow through the rinse control valve-relay normally-closed port. When the normally-closed port of the rinse control valve-relay is opened by the pilot signal sent from a remote rinse control valve, airflow pressurizes a branch circuit controlling a rinse water solenoid valve that enables waterflow through the second hydraulic circuit. Concurrently, airflow is preempted from the pinch air block valve by closure of the normally-open valve in the rinse control valve-relay, preventing airflow therethrough, which thence causes closure of the pinch air block valve and prevention of exhaust from the pinch valve control circuit. The pinch valve is thus pressurized and actuates to cease the first hydraulic circuit by clamping the slurry hose. The rinse cycle is now enabled.

Switching between blast and rinse cycles is effective immediately by an operator or pilot switching the remote rinse control valve. Pressure potential at both the first and second hydraulic circuits is uninterrupted. Pressure within the pneumatic circuit is uninterrupted. Only throughflow is ceased or enabled, thereby enabling immediate switching between blast and rinsing cycles.

Release of the deadman remote control handle ceases blast operations—the main control valve-relay switches airflow to the normally-open port whereby the pinch valve is immediately actuated to cease throughflow of the first hydraulic circuit and airflow is not fed via the normally-closed port to actuate the main blast air inlet valve thereby disabling the pneumatic circuit.

Thus has been broadly outlined the more important features of the present improved wet abrasive blast machine with remote control rinse cycle so that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

Objects of the present improved wet abrasive blast machine with remote control rinse cycle, along with various novel features that characterize the invention are particularly pointed out in the claims forming a part of this disclosure. For better understanding of the improved wet abrasive blast machine with remote control rinse cycle, its operating advantages and specific objects attained by its uses, refer to the accompanying drawings and description.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures

FIG. **1** is a schematic view of a preferred embodiment utilizing a pneumatic control circuit.

FIG. **2** is a schematic view of a control circuit disposed to actuate a blast cycle.

FIG. **3** is a schematic view of the control circuit disposed to actuate a rinse cycle.

FIG. **4** is a schematic view of the control circuit disposed to in an "off" configuration.

FIG. **5** is a schematic view of an alternate embodiment utilizing an electrical control circuit.

FIG. **6** is a rear elevation view of an example embodiment.

FIG. **7** is a front elevation view of the example embodiment.

FIG. **8** is a detail view of an inlet panel disposed upon the rear of the example embodiment illustrating in FIG. **6**.

FIG. **9** is a detail view of an outlet panel disposed upon the front of the example embodiment illustrated in FIG. **7**.

FIG. **10** is a detail view of the internal components disposed between the panels illustrated in FIGS. **8** and **9**.

FIG. **11** is a detailed view of a blast hose nozzle with deadman remote control handle.

FIG. **12** is an elevation view of a top of the example embodiment illustrated in to FIG. **6**.

Parts List	
10	Improve wet abrasive blast machine
20	first hydraulic circuit
22	fresh water supply
24	blast pot
26	slurry hose
30	second hydraulic circuit
32	rinse shut-off valve
34	rinse water solenoid valve
34a	actuator
36	rinse water check valve
40	pneumatic circuit

-continued

Parts List	
42	compressor
44	main blast air inlet valve
44a	actuator
46	main air check valve
48	blast pressure throttling valve
50	control circuit
50a	branch circuit (deadman North)
50b	branch circuit (deadman south)
50c	branch circuit (main blast air inlet valve)
50d	branch circuit (pinch valve)
50e	branch circuit (rinse water solenoid valve)
52	air filter-regulator
54	main control valve-relay
54a	normally-open port
54b	normally-closed port
54c	actuator
56	emergency stop valve
58	pinch air block valve
58a	pinch air block valve exhaust
58b	pinch air block actuator
60	rinse control valve-relay
60a	normally-open port
60b	normally-closed port
60c	actuator
62	remote rinse control valve
70	double diaphragm fill pump
72	piston blast pump
80	slurry hose shut-off valve
82	slurry hose pinch valve
82a	actuator
84	fill pump shut-off valve
86	blast pump shut-off valve
88	fill pump check valve
90	blast pump check valve
92	grit metering valve
100	blast hose
102	nozzle
104	deadman regulator
106	deadman remote control handle
500	inlet panel
502	connection port to main blast air inlet valve
504	fill line
506	blast inlet pressure gauge
508	dump valve
509	air dump valve
510	utility line
511	cleanout aperture
512	faucet
514	outlet panel
516	blast hose attachment aperture
518a	pneumatic control line port: rinse signal
518b	pneumatic control line port: supply air
518c	pneumatic control line port: return air
520a	control line: rinse
520b	control line: supply
520c	control line: return
522	blast pressure gauge
524	hopper pressure gauge
526	emergency stop button
528	control (grit metering valve)
530	blast pump switch
532	control circuit air inlet tubing
534	remote rinse control valve switch
600	frame member
602	funnel top member
604	top aperture
606	seating stopper
608	raised top plate

DETAILED DESCRIPTION OF THE DRAWINGS

With reference now to the drawings, and in particular FIGS. **1** through **11** thereof, example of the instant improved wet abrasive blast machine with remote control rinse cycle employing the principles and concepts of the present improved wet abrasive blast machine with remote control rinse cycle and generally designated by the reference number **10** will be described.

Referring to FIGS. **1** through **11**, a preferred embodiment of the present improved wet abrasive blast machine with remote control rinse cycle **10** is illustrated.

A schematic of the present wet abrasive blast machine with remote control rinse cycle **10** is depicted in FIG. **1**. A prime difference between the depicted preferred embodiment and wet abrasive blast machines known in the art is use of a control circuit **50** to enable switching between the blast and rinse cycles controllable by a pilot operating the device remotely, or by a pilot engaging blast and rinse operations at a nozzle **102** of a blast hose **100**. The present invention **10** enables the pilot to access clean water by bypassing blast pot **24** to engage the rinse cycle without having to rely on a second person to disable throughflow via the blast pot **24**, typically by manually operating a pinch valve **82** or shut-off valve **80** to disable the slurry hose **26** upstream of the blast hose **100** junction, as is currently seen practiced in the art.

The present improved wet abrasive blast machine with remote control rinse cycle **10**, therefore, includes a first hydraulic curcuit **20** that directs waterflow from fresh water supply **22** to blast pot **24**, slurry hose **26**, and blast hose **100**. The first hydraulic circuit **20** therefore routes waterflow from fresh water supply **22** into blast pot **24** by action of air-operated double diaphragm fill pump **70** and piston blast pump **72**. Water entered into blast pot **24** is therefore subjected to pressure by action of pumps **70**, **72** and serves to displace and convey grit particles storable interior blast pot **24** into slurry hose **26** for dispersal into an airstream generated interior to blast hose **100** by action of a pneumatic circuit **40**, as will be described subsequently. Pressure of approximately 125 to 150 psig is attained throughout the first hydraulic circuit **20**. High pressure fluid containing grit and water, or "slurry", is thus dispersible ejected from the nozzle **102** of the blast hose **100** to scour and clean surfaces, as is seen in the present state of the art. It is noted that alternative pressures are contemplated for operating the invention, and may be employed while practicing the invention. The range cited herein is not meant to be limiting. A pressure differential merely need be maintained between each of the first and second hydraulic circuits and the pneumatic circuit to ensure introduction of slurry (or water) into the blast airstream.

Introduction of slurry from slurry hose **26** into the high-pressure airstream, which is maintained in blast hose **100** by action of the pneumatic circuit **50**, is controllable by operation of slurry hose shut-off valve **80**—an isolation valve operating a full port ball valve disposed upstream of the conjunction between slurry hose **26** and blast hose **100**. In the present state of the art, this shut-off valve **80** is typically operated manually to disable throughflow of slurry into the blast hose **100** thereby to arrest grit application and scouring operations. Thus, when the slurry hose shut-off valve **80** is actuated to a closed position, the first hydraulic curcuit **20** is arrested and slurry is ceased from introduction into the blast hose **100** until the slurry shut-off valve **80** is actuated to an open position. Slurry shut-off valve **80** is therefore a throttle, disabling the first hydraulic curcuit **20** until opened manually.

In the present invention **10**, however, a pinch valve **82**, disposed downstream of slurry hose shut-off valve **80** but still upstream of blast hose **100**, operates a sliding guillotine-style valve to compress the slurry hose **26** and pinch-off throughflow of slurry therethrough. Activation and deactivation of the first hydraulic curcuit **20** is thus controllable by action of pinch valve **82**, particularly when switching between blast and rinse cycles, as will be described subsequently. Pinch valve **82** is disposed in operational communication with the control circuit **50**, as will be described subsequently, and is thus operable remotely by a user piloting the apparatus **10** at a distally located panel or by the pilot controlling blast operations at the nozzle **102** of the blast hose 100.

A second hydraulic circuit **30** is disposed connecting waterflow from fresh water supply **22** to blast hose **100** without the blast pot **24** or the slurry hose **26**, thereby bypassing the grit contained in the blast pot **24** altogether. This second hydraulic circuit **30** therefore delivers waterflow to blast hose **100** by an alternate route bypassing blast pot **24** and slurry hose **26** to introduce water into the pressurized airstream maintained in blast hose **100** by action of the pneumatic circuit **40** when active. Water is drawn from fresh water supply **22** immediately downstream of piston blast pump **72**, and forced through rinse shut-off valve **32**, a throttle; rinse water solenoid valve **34**, controllable via the control circuit; and rinse water check valve **36**, to prevent backflow; and into blast hose **100**.

Rinse water shut-off valve **32** is an instrument ball valve disposed to throttle water supply into the second hydraulic circuit **30** when necessary. Rinse water solenoid valve **34** is an air actuated solenoid valve disposed to control throughflow of water branched into the second hydraulic circuit **30** by action of piston blast pump **72**. The rinse water solenoid valve **34** engages when a pilot air signal is received at actuator **34*a*** from the control circuit **50**, fed via a normally-closed port **60*b*** disposed upon rinse control valve-relay **60** operative in the control circuit **50**, as will be described subsequently.

High-pressure ejection of water from the blast hose **100** nozzle **102** absent grit particles is therefore enabled for use in a rinse cycle. Throughflow of water bypassing blast pot **24** is thus controllable via control of the rinse water solenoid valve **34**. Peculiar to this invention **10**, switching between blast cycles and rinse cycles is enabled remotely, even directly from the nozzle **102** of the blast hose **100**, by action of a control circuit **50**, as will be described subsequently, while maintaining active operation of pumps **70**, **72** and, as discussed below, compressor **42**.

The pneumatic circuit **40** is configured to control throughflow of pressurized air through the blast hose **100**. Air is introduced into the pneumatic circuit **40** by action of compressor **42** and is passed to blast hose **100** through main blast air inlet valve **44**, main air check valve **46**, and blast pressure throttling valve **48**. The main blast air inlet valve **44** includes an air activated solenoid to control actuating and de-actuating the main blast airstream. In the present invention **10**, action of the main blast air inlet valve **44** is controllable remotely, from a panel **500** and/or from the nozzle **102** of the blast hose **100** by a pilot operating the device **10**. Airflow diverted from a normally-closed port **54*b*** upon a main control valve-relay **54** maintains the main blast air inlet valve **44** in an open condition whereby the blast airstream is enabled to vent via the blast hose nozzle. Throughflow of the blast airstream in the pneumatic circuit is thus controllable by controlling the main blast air inlet valve **44**.

In an embodiment of the present invention **10**, a portion of airflow introduced into the pneumatic circuit **40** is fed upstream of the main blast air inlet valve **44** to feed the control circuit **50** which, in this embodiment, functions pneumatically, as will be explained hereinbelow.

The control circuit **50** enables remote switching between the first and second hydraulic circuits **20**, **30** and cessation of the first and second hydraulic circuits **20**, **30** and the pneumatic circuit **40** by remote control. Air is branched from the pneumatic circuit **40** to pneumatically control pinch valve **82**, rinse control valve-relay **60**, rinse water solenoid valve **34**, and main blast air inlet valve **44**, by manual action effected remotely at a deadman remote control handle **106**, disposed at the nozzle **102** of the blast hose **100**, and/or at controls disposed upon panel **500**, as will be discussed hereinbelow. A pilot is therefore enabled to control cycling between a rinse cycle and a blast cycle manually remotely, and/or at the nozzle **102** of the blast hose **100**, without the need of a second (or other) party to operate the pinch valve **82** or slurry shut-off valve **80** directly. The pilot may also cease blasting and rinsing altogether while maintaining pressure within the system to enable immediate resumption of blasting and/or rinsing when the deadman remote control handle **106** is re-engaged, as will be described subsequently.

Discussing now the first hydraulic circuit **20**, water is drawn from fresh water supply **22**, typically a water storage vessel or tank disposed in open communication with the first and second hydraulic circuits **20**, **30**. Water is pumped into the blast pot **24** by action of air operated double diaphragm pump **70** and piston blast pump **72**. Water is thus pressurized to approximately 125 to 150 psig within blast pot **24** (alternative pressures are contemplated as within the scope of the invention). Grit, essentially non-soluble particles of varying size (most often sand-sized silicates), additional to or stored within blast pot **24**, is thus conveyed under pressure in the waterflow to slurry hose **26**. It should be noted that other-sized particles and materials are contemplated as within scope of the art.

Water pumped to blast pot **24** is pumped through a series of valves to prevent backflow to the water supply. Fill pump shut-off valve **84** and blast pump shut-off valve **86** are full port ball valves and serve as isolation valves enabling manual shut-off of waterflow into blast pot **24** and the first and second hydraulic circuits **20**, **30** when necessary. A fill pump check valve **88** and blast pump check valve **90** prevent reverse flow of water or contaminants into the double diaphragm fill pump **70** and the piston blast pump **72** respectively. Water pumped to blast pot **24** is also metered through the grit metering valve **92** to control the outlet grit mixture volume. This maintains one-directional, regulated flow of fluid through the first hydraulic circuit **20**.

Water pumped into the blast pot **24** therefore conveys grit to the slurry hose **26** under pressure at approximately 125 to 150 psig (or other pressure, so long as such pressure exceeds the pressure operative in the blast hose). Grit is thus conveyed at pressure as a slurry into the blast hose **100** via the slurry hose shut-off valve **80** and pinch valve **82**. Pinch valve **82**, an air-actuated sliding guillotine-style valve that controls introduction of the slurry into the blast airstream for disbursement through the blast hose **100** during blast cycle operations, is disposed in operational communication with the control circuit **50**, as will be described subsequently.

The second hydraulic circuit **30** draws water downstream of piston blast pump **72** through a branch circuit bypassing the blast pot **24** to provide water absent grit for application during the rinse cycle. Water fed into the second hydraulic circuit **30** is controlled by action of rinse water solenoid valve **34**, an air-actuated solenoid valve that enables on-off control of the second hydraulic circuit **30** by enabling and disabling throughflow of water therethrough. Reverse flow of water to the rinse water solenoid valve **34** is controlled by action of rinse water check valve **36** preventing backflow therethrough. The second hydraulic circuit **30** may also be shut-off by manual action at the rinse water shut-off valve **32**, an isolation valve installed upstream from the rinse water solenoid valve **34** to disable waterflow through the second hydraulic circuit **30** when necessary and thereby throttle the second hydraulic circuit **30**.

Blasting operations are controlled by a blast airstream instated by the pneumatic circuit **40**. Air is supplied via action of compressor **42**, pressurizing airflow to approximately 100 to 125 psi. Air supply is forced through main blast air inlet valve **44**, main air check valve **46**, and blast pressure throttling valve **48** to blast hose **100**. Main blast air inlet valve **44** is an air-actuated solenoid valve providing on-off control of the main blast airstream. Main blast air inlet valve **44** engages when receiving an air pilot control signal from normally-closed port **54***b* of the main control valve-relay **54** operational within the control circuit **50**, as will be described subsequently.

In the preferred embodiment set forth herein, the control circuit **50** is pneumatically operated throughout, to control diversion of airflow to effectuate valve configurations required to sustain the blast cycle, the rinse cycle, and cessation of both blast and rinse cycles. However, electrical operation to control the same valve configurations is contemplated as within scope of this invention whereby airflow of the control circuit **50** is diverted between said valve configurations by means of electrical switching, as will be described subsequently in presentation of an alternate embodiment hereinbelow.

In the preferred embodiment, then, air is fed through the control circuit **50** upstream of the main blast air inlet valve **44**. This branched pneumatic circuit supplies a pilot air signal to control actuation of main blast air inlet valve **44**, rinse water solenoid valve **34**, rinse control valve-relay **60**, and pinch valve **82**, by a pilot operating the apparatus **10**. Air is drawn from the pneumatic circuit **40** and routed into the control circuit **50** through instrument an air filter-regulator **52**, to regulate air pressure within the control circuit **50**, filter particulates, and remove moisture via an internal moisture separating spin filter and condensate drain with automatic float valve. Normal pressure within the control circuit **50** is typically set at around 75 to 100 psig. Alternative ranges of pressure are contemplated as within scope of the present invention.

Main control valve-relay **54** functions as the main on-off control for the blast air cycle and is controlled by diversion of airflow via the deadman remote control handle **106**. Main control valve-relay **54** is a five-port, four-way pneumatic air pilot controlled valve with one normally-closed and one normally-open port. When the deadman remote control handle **106** is squeezed (or, in alternate embodiments contemplated as within scope of this invention, switched to an "on" position) airflow is diverted through branch circuit **50***a*, through the emergency stop valve (configured to prevent airflow therethrough when depressed by manual action thereat) and into the main control valve-relay **54**. When the main control valve-relay **54** receives the air pilot signal from the deadman remote control handle, airflow is switched through normally-closed port **54***b*, thus pressurizing branch circuit **50***b*, which actuates actuator **44***a* upon the main blast air inlet valve **44**, thereby enabling throughflow of air in the pneumatic circuit.

Simultaneously, air is directed in parallel through the rinse control valve-relay **60**, a five-port, four-way pneumatic air pilot controlled valve having one normally-open port **60***a* and one normally-closed port **60***b*. When the remote rinse control valve **62**, manually operable by the pilot, is disposed in an "off" configuration, airflow is directed through normally-open port **60***a* of the rinse control valve-relay **62** which enters pinch air block valve **58** and is exhausted when the main control valve-relay **54** is running through the normally-closed port **54***b*. Exhaustion of the pinch air block valve **58** effectuates exhaustion of air pressure from branch circuit **50***a* thereby de-actuating actuator **82***a* releasing the pinch valve **82**. Thus, slurry is enabled throughflow for blasting.

The rinse cycle is enabled when remote rinse control valve **62** is switched to an "on" position. Remote rinse control valve **62** is a three-way "L" port diverter valve, with two separated fluid connections with a common center port. When the remote rinse control valve **62** is turned to the "on" position, airflow is diverted to activate actuator **60***c* which thence switches throughflow through the remote rinse control valve **62** to the normally-closed port **60***b*. Airflow then travels along branch circuit **50***b* to actuate rinse water solenoid valve **34** to enable throughflow of water through the second hydraulic circuit **30**. When airflow is diverted through normally-closed port **60***b*, normally-open port **60***a* is thence closed whereby absence of pressure deactivates pinch air block valve **58**, causing closure thereat. When the pinch air block valve **58** is closed, pressure in branch circuit **50***a* is maintained, actuator **82***a* is actuated, and pinch valve **82** is thereby engaged to prevent throughflow of slurry into the blast hose.

Referring particularly now to FIG. **2**, an overview of the control circuit **50** in a blast configuration will be described. In the blast configuration, the first hydraulic circuit **20** is operative and the pneumatic circuit **40** is operative whereby slurry is produced at pressure for surface scouring operations. The second hydraulic circuit **30** is ceased at rinse water solenoid valve **34**.

As shown specifically in FIG. **2**, air is drawn upstream of the main blast air inlet valve **44** and fed through air filter-regulator **52** to maintain pilot signal pressure of

approximately 75 to 100 psig. Alternative pressures are contemplated as within scope of the invention. Air is passed through deadman regulator **104** to deadman remote control handle **106**. Because the deadman remote control handle **106** is engaged (or switched to an "on" position in alternate embodiments contemplated consistent with this invention), airflow is diverted diagrammatically north (see FIG. **2**) into control branch circuit **50***a*. Airflow in branch circuit **50***a* flows through emergency stop valve **56** and instates switching of airflow through normally-closed port **54***b* in the main control valve-relay **54** by actuating actuator **54***c*. Airflow is thus diverted into branch circuit **50***c* which, diverted diagrammatically south (see FIG. **2**) instates actuator **44***a* and opens main blast air inlet valve **44** thereby enabling throughflow of the blast airstream in the pneumatic circuit **40**. Airflow diverted north in branch circuit **50***c* (see FIG. **2**) is arrested at the rinse control valve relay **60** normally-closed port **60***b*, which is closed.

Simultaneously, air coming from the air filter-regulator **52** is drawn in parallel through rinse control valve-relay **60** normally-open port **60***a*, thereby engaging pinch air block valve **58**, which opens. Since airflow through the main control valve-relay **54** is being directed through normally-closed port **54***b*, airflow into the pinch air block valve **58** is exhausted through pinch valve exhaust **58***a*, which pinch valve exhaust **58***a* is otherwise shut off when airflow through the main control valve-relay **54** is operating through the normally-open port **54***a*. Air is thus exhausted from branch circuit **50***d* whereby actuator **82***a* is de-actuated and pinch valve **82** is rendered open.

Because remote rinse control valve is in the "off" position, airflow directed diagrammatically south (see FIG. **2**) upstream of the deadman remote control handle **106** is prevented from pressurizing rinse control valve-relay **60** via branch circuit **50***b* to switch airflow through normally-closed port **60***b*. Therefore, rinse water solenoid valve **34** is disengaged and throughflow of water through the second hydraulic circuit **30** is prevented. Thus, the blast cycle is operative; the first hydraulic curcuit **20** and the pneumatic circuit **40** enable blasting of slurry at pressure for surface cleaning and scouring operations.

Discussing now FIG. **3**, a configuration of the control circuit **50** in a rinse cycle configuration will now be described.

In the rinse cycle, the control air pilot signal is configured to engage pinch valve **82**, maintain main blast air inlet valve **44** open, and maintain rinse water solenoid valve **34** open. Airflow is again directed upstream of main blast air inlet valve **44** into the control circuit **50** as set forth above in the previous description of FIG. **2**. Airflow passes through air filter-regulator **52**, as previously described, and pressure is stepped down to approximately 75 to 100 psig. (Alternative pressures are contemplated as within scope of the invention.) In the rinse configuration, the deadman remote control handle **106** is squeezed (or disposed in the "on" position) enabling airflow diagrammatically north into branch circuit **50***a* (see FIG. **3**). However, to instate the rinse cycle, the pilot engages the remote rinse control valve **62** to the "on" position. Airflow directed diagrammatically south (see FIG. **3**) into the remote rinse control valve **62** is enabled passage therethrough, and thus flows through branch circuit **50***b* to actuate switching of airflow through rinse control valve-relay **60** by opening normally-closed port **60***b* and closing normally-open port **60***a*. As a result, airflow through rinse control valve-relay **60** ceases through normally-open port **60***a*, thereby disengaging pinch air block valve **58**, which therefore reverts to a closed position. This seals off branch circuit **50***d*, and maintains pressure therein, whereby actuator **82***a* remains actuated and pinch valve **82** is therefore maintained closed effectively ceasing throughflow within the first hydraulic circuit **20**.

Because airflow through main control valve-relay **54** is operative through normally-closed port **54**, air flows diagrammatically south (see FIG. **3**) within branch circuit **50***c* to actuate actuator **44***a*, thereby allowing airflow within the pneumatic circuit **40**. Concurrently, air flows diagrammatically north (see FIG. **3**) to the rinse control valve-relay, currently disposed with normally-closed port **60***b* now open, whereby airflow is directed down branch circuit **50***e* to actuate rinse water solenoid valve **34** whereby waterflow through the second hydraulic circuit **30** is enabled. The rinse cycle is thereby ii enabled as water, flowing through the second hydraulic circuit **30**, is fed to the blast hose and ejected via the blast airstream through the pneumatic circuit **40** without introduction of slurry, which is maintained at the pinch valve **82**. Switching between blast and rinse cycles, therefore, is as simple as moving the remote rinse control valve **62** between respective "on" and "off" positions, and may therefore by effected without disabling the compressor **42**, or pumps **70**, **72**. Further, no need of throttling the slurry hose is required as the air pilot signal is automatically routed to activate pinch valve **82**, and rinse water solenoid valve **34**, while maintaining blasting operations by continuing to activate main blast air inlet valve **44**.

Discussing now FIG. **4**, the control circuit **50** in an off configuration will now be described.

When deadman remote control handle **106** is released (or otherwise switched to an "off" configuration) airflow within branch circuit **50***a* is ceased. Resultantly, pressure at the main control valve-relay **54** reverts airflow to normally-open port **54***a*, directing airflow into branch circuit **50***d* to actuate actuator **82***a* which engages pinch valve **82** thereby sealing off the first hydraulic curcuit **20** at the slurry hose **26**. Since the remote rinse control valve **62** is disposed in the "off" configuration, airflow is prevented from action interior to branch circuit **50***b*, whereby airflow through rinse control valve-relay **60** reverts to normally-open port **60***a*. This configuration therefore prevents airflow into branch circuit **50***c*, thereby preventing actuation of rinse water solenoid valve **34** whereby the second hydraulic circuit **30** is impeded. Airflow is thus directed via normally-open port **60***a* to the pinch air block valve **58**, which is caused to open. Because airflow from the main control valve-relay **54** is active through the normally-open port **54***a*, airflow through the pinch air block valve **58** is not exhausted but, instead, diverted into branch circuit **50***d*, thereby actuating actuator **82***a* and pinch valve **82**. Since airflow through normally-closed port **54***b* is likewise prevented, airflow is preempted from branch circuit **50***c* whereby actuator **44***a* is de-actuated and the main blast air inlet valve **44** is rendered closed. Thus, all circuits **20**, **30**, and **40**, are effectively ceased when a pilot releases the deadman remote control handle **106** (or otherwise switches it to an "off" position). It should be noted, however, that pumps **70**, **72** and compressor **42** are still active whereby engagement of the deadman remote control handle **106** may immediately start up blasting operations again.

The emergency stop valve **56** enables emergency cessation of blast operations. The emergency stop valve **56** is a normally-open valve when positioned in the "run" position. Depression of a detent effectuates closure off the valve **56** and isolates air returning from the deadman remote control handle **106** to prevent pressurizing the actuator **54***c* on the main control valve-relay **54**. Simultaneously, air is exhausted from the emergency stop valve **56** to the main control valve-relay **60**, which causes the main control valve-relay **60** to disengage, preventing the air signal to main blast air inlet valve **44** and thereby ceasing blast operations.

As shown in FIG. **5**, an alternate embodiment utilizing electrical means of controlling the main control valve-relay **54** and the rinse control valve-relay **60** is contemplated.

In this alternate embodiment, branch circuits **50***a* and **50***b* are essentially rendered via electrical circuits and switches in lieu of directed airflow pressurizing to actuators **54***c*, **60***c* to switch configurations of normally-open ports **54***a*, **60***a*, and normally-closed ports **54***b*, **60***b*. In such an embodiment, however, the remaining components of the control circuit **50** are substantially similar, and the first hydraulic circuit **20**, the second hydraulic circuit **30**, and the pneumatic circuit **40** remain the same.

In this alternate embodiment, switching is effected electrically. Thus, when the deadman remote control handle **106** is actuated, a contact (not shown) enables conduction of current in now-electric branch circuit **50***a* to switch airflow interior to the main control valve-relay **54**. Likewise, when the remote rinse control valve-relay **62** is moved to the "on" position, contacts (not shown) enable conduction of current through now-electric branch circuit **50***b* to effect switching of airflow through normally-closed port **60***b* interior to the rinse control valve-relay **60**.

FIG. **6** illustrates a rear elevation view of an example embodiment of the present improved wet abrasive blast machine with remote control rinse cycle reduced to practice. In this example embodiment, dual systems are disposed in tandem mounted side-by-side to frame member **600**. For convenience and clarity of enumeration, only one of the dual systems will be described herein, however it is to be understood that like parts identified in the drawings with like reference characters are therefore described in all instances, even when referred to in the singular.

Blast pot **24** is disposed mounted to frame member **600** to enable portability of the present embodiment. Funnel top member **602** enables filling of blast pot **24** with grit (shown in greater detail in, and discussed hereinbelow with reference to, FIG. **12**). Aperture **511** enable access to blast pot **24** interior for blast pot cleanout. Inlet panel **500** (shown in greater detail in FIG. **8**) includes connection port **502** for the main blast air inlet valve **44**. Fill line **504** carries water from the high-volume, low pressure double diaphragm fill pump **70**, disposed behind inlet panel **500**, to fill blast pot **24** (see FIG. **10**). Blast inlet pressure gauge **504** shows active pressure at the main blast air inlet valve **44** from supply air when connection port **502** is interconnected with a compressor (not shown) and air is conveyed to the main blast air inlet valve **44**. Air dump valve control **509** enables depressurization of the supply-side before disconnecting the compressor (not shown) from the connection port **502** to main blast air inlet valve **44**.

FIG. **7** illustrates a front elevation view of the example embodiment shown in FIG. **6**. Dump valve **508** enables manual emptying of blast pot **24**. Utility line **510** draws water from the water source (not shown) for manual release and use (such as when washing hands, for example) at faucet **512**. Outlet panel **514** (shown in greater detail in, FIG. **9**) includes blast hose attachment aperture **516** for interconnection of the blast hose **100**. Pneumatic control line ports **518***a*, **518***b*, and **518***c* enable interconnection with pneumatic lines **520***a*, **520***b*, and **520***c*, respectively, enabling relay of the air pilot control signal from the deadman remote control handle **100** to instantiate the control circuit **50**, as will be described subsequently (see FIG. **11**) to activate and deactivate the rinse control valve-relay **60** to engage the rinse cycle when the remote rinse control valve **62** is opened.

Blast pressure gauge **522** shows pressure in the blast stream and hopper pressure gauge **524** shows the pressure inside blast pot **24**. Emergency stop button **526** activates emergency stop valve **56** to disable blast operations when engaged. Control **528** enables manual control of grit metering valve **92** to selectively control concentration of grit entering slurry hose **26**. Blast pump switch **530** enables immediate manual deactivation of blast pump **72**.

FIG. **10** is a detailed view of the internal components disposed between the inlet panel **500** and the outlet panel **514**.

High volume, low pressure, double diaphragm fill pump **70** feeds water from the supply (not shown) to blast pot **24** via water fill line **504**. Low volume high pressure piston blast pump **72** pressurizes blast pot **24** for introduction of slurry into the slurry hose **26**. Pinch valve **82** operates guillotine-style valve to pinch slurry hose **26** and cease throughflow of slurry in the first hydraulic curcuit **20** in response to air pilot signal via control circuit **50***d* (see FIGS. **2**, **3**, and **4**). Rinse water solenoid valve **34** introduces rinse water when the second hydraulic circuit **30** is activated (see FIG. **3**). Air is fed to the control circuit **50** through control circuit air inlet tubing **532** connected to the main blast air inlet valve **44**. Air passes through air filter-regulator **52** and is fed to the main control valve-relay **54** and rinse control valve-relay **60**.

FIG. **11** illustrates a detail view of the blast hose **100** nozzle **102** and deadman remote control handle **106**. Pneumatic control line **520***b* brings air pilot signal supply to deadman remote control handle **106**. Depression of deadman remote control handle **106** enables flow of supply air pilot control signal to flow through control branch circuit **50***a* (see FIGS. **2** and **3**) via pneumatic control line **520***c* (the return line) and thereby maintain actuation of actuator **44***a* controlling the blast airstream. Pneumatic control line **520***a* enables passage of air pilot control signal into control branch circuit **50***b* to actuate actuator **60***c*, and thereby initiate actuator **34***a* controlling the rinse water solenoid valve **34**, when remote rinse control valve switch **534** is turned to an "ON" position, thereby diverting airflow through remote control rinse valve **62** (see FIG. **3**). In alternate embodiments of the invention set forth herein, pneumatic control lines **520***a*, **520***b*, and **520***c* may by electrical lines disposed in circuit to effectuate switching of the relevant valves **60** and **54** electrically to manipulate the air pilot control signal to same effect (see FIG. **5**).

FIG. **12** illustrates an elevation view of the funnel top member **602**, integrated into frame member **600**, enabling easy fill of blast pot **24** with grit. Grit loaded into the funnel top member **602** falls, under the influence of gravity, under raised cover plate **608**, through top aperture **604**, interior to blast pot **24**. Top aperture **604** includes a seating stopper **606** disposed to plug said top aperture **604** from the interior of blast pot **24** when a water level forces said stopper **606** via the buoyancy force to seat into said top aperture **604**. Further, pressure instantiated interior to blast pot **24** likewise maintains the seating stopper **606** in position sealing the said top aperture **604**. Seating stopper **606**, therefore, releases closure of the top aperture **604** when both the water level interior to the blast pot **24** is below a certain level (corresponding to a height of the seating stopper) and the pressure in the blast pot is equal to or lesser than atmospheric pressure.

What is claimed is:

1. An improved wet abrasive blast machine with remote control rinse cycle enabling remote control of blasting operations between a rinse cycle and a blast cycle, said improved wet abrasive blast machine comprising:

a first hydraulic circuit communicating waterflow to a blast pot, a slurry hose, and a blast hose;

a second hydraulic circuit communicating waterflow to the blast hose to bypassing the blast pot and the slurry hose;

a pneumatic circuit communicating outflow of air through the blast hose; and

a control circuit comprising an air pilot signal directable to enable remote switching between the first and second hydraulic circuits and to cease operations of said first and second hydraulic circuits and operation of the pneumatic circuit without deactivating action of at least one pump pressurizing said first and second hydraulic circuits nor action of a compressor feeding air to the pneumatic circuit;

wherein immediate cycling between a rinse cycle and a blast cycle is controllable remotely, and by a pilot operating said blast hose, to rapidly switch between blasting and rinsing operations when actively engaged in surface cleaning.

2. The improved wet abrasive blast machine with remote control rinse cycle of claim **1** wherein the air pilot signal is fed from airflow introduced into the pneumatic circuit upstream of a main blast air inlet valve.

3. The improved wet abrasive blast machine with remote control rinse cycle of claim **2** wherein the pilot air signal is configurable as airflow to pressurize and depressurize each of a plurality of actuators, said plurality of actuators comprising:

an actuator disposed actuating the main blast air inlet valve configured in operational communication within the pneumatic circuit, said actuator opening the main blast air inlet valve when pressurized by incident airflow;

an actuator disposed actuating a pinch valve upon the slurry hose configured in operational communication within the first hydraulic is circuit, said actuator closing the pinch valve when pressurized by incident airflow;

an actuator actuating a pinch air block valve configured in operational communication within the control circuit, said actuator opening said pinch air block valve when pressurized by incident airflow; and

an actuator actuating a rinse solenoid valve configured in operational communication with the second hydraulic circuit, said actuator opening said rinse solenoid valve when pressurized by incident airflow.

4. The improved wet abrasive blast machine with remote control rinse cycle of claim **3** wherein the air pilot signal is further configurable to control switching between:

at least one normally-open port and at least one normally-closed port interior to a main control valve-relay configured in operational communication in the control circuit; and

at least one normally-open and at least one normally-closed port interior to a rinse control valve-relay configured in operational communication within the control circuit.

5. The improved wet abrasive blast machine with remote control rinse cycle of claim **4** wherein airflow directed through the normally-open port in the main control is valve-relay feeds a branch circuit to pressurize the actuator controlling the pinch valve and thereby cease throughflow of slurry to the blast hose.

6. The improved wet abrasive blast machine with remote control rinse cycle of claim **5** wherein airflow directed through the normally-open port in the rinse control valve-relay feeds a branch circuit that pressurizes the actuator actuating the pinch air block valve, whereby the pinch air block valve is opened.

7. The improved wet abrasive blast machine with remote control rinse cycle of claim **6** wherein airflow through the pinch air block valve is merged into the branch circuit pressurizing the actuator controlling the pinch valve when airflow is concurrent through the normally-open port in the main control valve-relay.

8. The improved wet abrasive blast machine with remote control rinse cycle of claim **7** wherein airflow directed through the normally-closed port in the main control valve-relay feeds a branch circuit that pressurizes the actuator actuating the main blast air inlet valve and concurrently sends an air pilot signal to the normally-closed port of the rinse control valve-relay.

9. The improved wet abrasive blast machine with remote control rinse cycle of claim **8** wherein the control circuit further comprises a remote rinse control valve operable between an "off" position and an "on" position, whereby movement of the remote rinse control valve to the "on" position diverts airflow into a branch circuit to switch airflow within the rinse control valve-relay from the normally-open port to the normally-closed port whereby airflow is directable to pressurize the actuator actuating the rinse water solenoid valve and enable waterflow through the second hydraulic circuit.

10. The improved wet abrasive blast machine with remote control rinse cycle of claim **9** wherein airflow directed through the normally-closed port of the main control valve-relay and the normally-open port in the rinse control valve-relay concurrently actuates the pinch air block valve to open and wherein the pinch valve is released via exhaustion through a pinch valve exhaust, which pinch valve exhaust is otherwise closed when airflow through the main control valve-relay is configured through the main control valve-relay's normally-open port.

11. The improved wet abrasive blast machine with remote control rinse cycle of claim **10** wherein the pinch air block valve maintains pressure within the branch circuit controlling actuation of the pinch valve when said pinch air block valve is closed whereby the pinch valve is maintained closed.

12. The improved wet abrasive blast machine with remote control rinse cycle of claim **11** wherein manual action at a deadman remote control handle disposed upon a nozzle of the blast hose feeds a branch circuit that pressurizes the actuator controlling airflow through the normally-closed port of the main control valve-relay whereby manual control of the remote rinse control valve between the "on" and "off" positions therefore switches airflow through the rinse control valve-relay to control waterflow through the second hydraulic circuit and the first hydraulic circuit while maintaining operation of the pneumatic circuit.

13. The improved wet abrasive blast machine with remote control rinse cycle of claim **12** wherein release of the deadman remote control handle prevents airflow from the branch circuit pressurizing the actuator of the main control valve-relay wherein airflow reverts to the normally-open port therein, thereby ceasing pressurization of the actuator actuating the main blast air inlet valve and disabling the pneumatic circuit, whereby airflow pressurizes the actuator actuating the pinch valve to disable the first hydraulic circuit.

14. The improved wet abrasive blast machine with remote rinse cycle of claim **4** wherein switching airflow between the normally-open and normally-closed ports interior to both the main control valve-relay and the normally-open and normally-closed ports interior to the rinse control valve-relay is effectuated electrically instead of pneumatically.

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