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FIBER LIQUID TREATMENT SYSTEM

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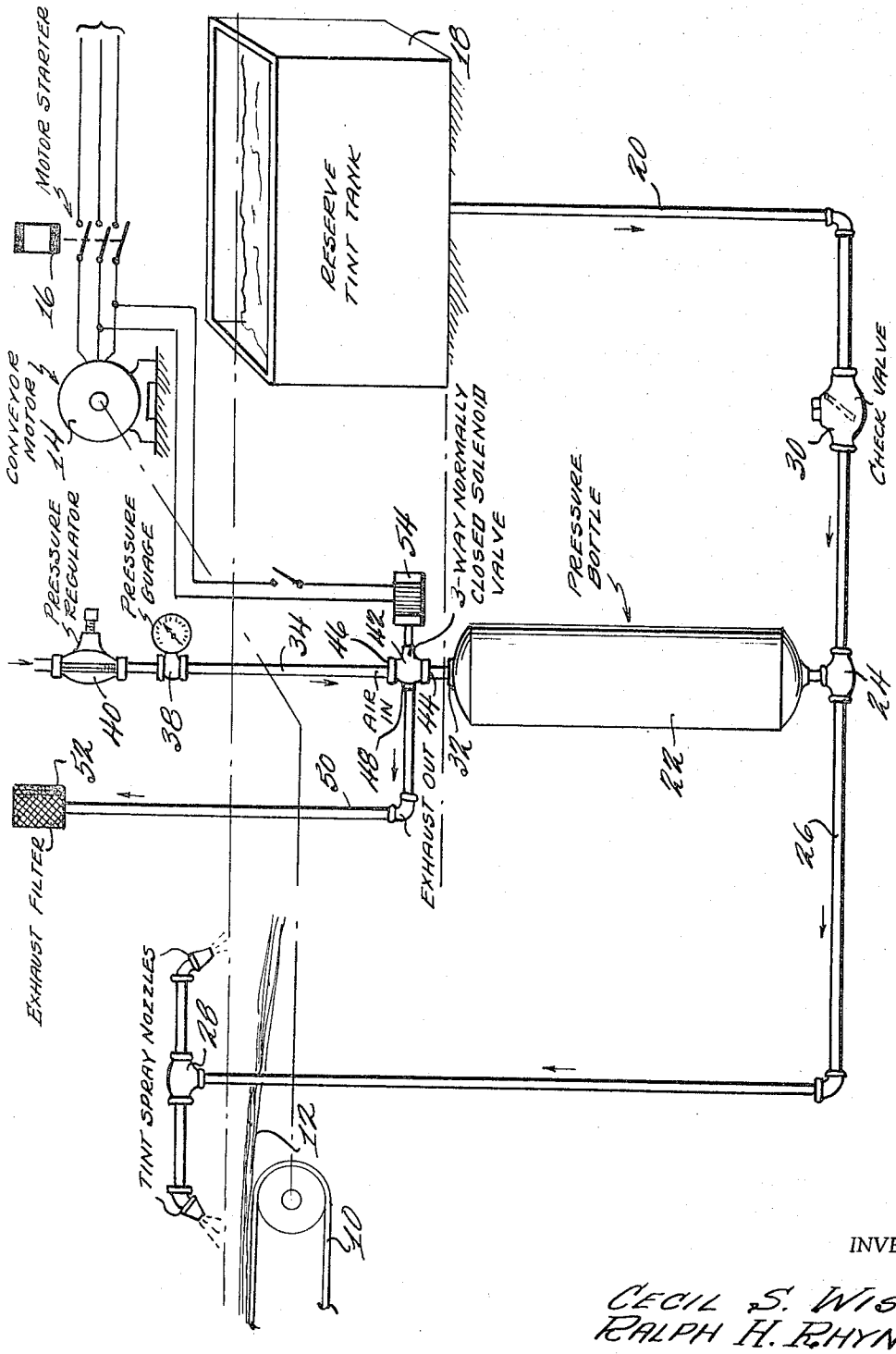

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FIBER LIQUID TREATMENT SYSTEM

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This invention relates to textile processing and more particularly to an improved system for effecting liquid treatment of textile fibers.

In the textile industry various solutions are often applied to fibers during stages of the manufacture of completed articles. These solutions have traditionally included tints, oils, anti-static solutions and the like, and one preferred method of applying these solutions has been by atomization. Generally, this has been accomplished by pumping the liquid to be applied to a spray nozzle where it is combined with air under pressure and atomized adjacent the textile fibers. It has been found that the use of air causes small droplets of the liquid to be borne throughout the processing area causing contamination of the air, unwanted coloration of other fibers, equipment and personnel, and consequent economic loss.

It is, therefore, an object of this invention to provide an efficient system for applying liquid to fibrous material during the manufacture of textiles that will not cause undue fogging of the manufacturing area.

It is a further object of this invention to provide a system for supplying a spray of liquid to an intermittently advancing conveyor surface having means responsive to the operation of the conveyor to replenish the liquid supply during non-operating periods.

It is yet another object of this invention to provide a device for spraying fluid under pressure without employing mechanical pumping means.

These and other objects of this invention will appear and be more thoroughly set forth in the following detailed explanation in which specific reference is made to the attached drawing in which an embodiment of the novel fluid spraying system is shown, not to limit the scope of the invention in any way, but in order that the principles thereof might be more easily understood.

In the drawing:

The figure is a generally diagrammatic view illustrating a preferred embodiment of the novel fluid spraying system.

A conveyor **10** adapted to carry material such as fibers **12** through various processing stations is shown being operable with power supplied to a conventional electric motor **14**. This conveyor motor may be controlled by any conventional manner, such as automatic timing, work condition responsiveness or manual control. A conventional electromagnetic motor starter **16** is illustrated.

The novel fluid spraying system associated with the conveyor **10** comprises a reserve tank **18** for containing the fluid to be used over an extended period of system operation. A suitable conduit **20** is connected at one end to the tank **18** near the bottom thereof, and at the other end to a T fitting **24** provided in the bottom of a pressure bottle **22**.

A conduit **26** is connected to the remaining leg of the T **24**, extends to a point adjacent the conveyor **10** and terminates in a sprayer **28** which may be of the reaction type or of any suitable design to allow fluid to be sprayed therefrom and directed onto the material moving by on the conveyor **10**. As shown, a check valve **30** is interposed in the line **20** to effectively preclude flow in the direction proceeding from the bottle **22** to the tank **18**.

According to the preferred embodiment of the present invention, the upper end **32** of the pressure bottle **22** is

located at a level substantially even with the bottom of the reserve tank **18** and the spray head **28** is positioned above the upper liquid level of the reserve tank **18** for purposes more fully set forth hereinafter.

A pressure line **34** is in communication with the upper end **32** of the bottle **22**, the pressure line being connected to a supply of gas, preferably air, under pressure. The air may be most inexpensively supplied from the general manufacturing plant compressed air source, or from compressed air cylinders or the like.

Interposed in the line **34** is a conventional pressure gage **38** and pressure regulator **40**. A three port two-position solenoid operated valve **42** is connected in the line, **34** between the gage-regulator assembly **38**, **40** and the pressure bottle **22**. As shown, a first port **44** of the valve communicates with the bottle **22**, a second port **46** communicates with the pressure source, and the third port **48** communicates through a conduit **50** to an exhaust filter **52**.

A solenoid **54** associated with the valve **42** is preferably connected to the conveyor motor **14** in a manner such that the solenoid is energized, by or when the conveyor motor is operated, to move the valve **42** from a first position wherein the bottle **22** is in communication with the exhaust conduit **50**, to a second position wherein the bottle **22** is in communication with the pressure source (not shown). When the conveyor motor **14** is stopped and the solenoid **54** is deenergied, the valve returns to the first position thereof.

In the operation of the system to apply tint to fibers travelling on the conveyor **10**, a quantity of tint solution is placed in the tank **18**. With the conveyor motor off, the valve **42** is in its first position so that tint solution flows down through the conduit **20**, through the T **24** and into the bottle **22**. Under gravity feed the tint solution rises in the bottle, filling it. By having the upper end of the sprayer **28** above the maximum level of tint solution in the tank **18**, the tint solution is not inadvertently discharged from the sprayer **28** during gravity fill of the bottle **22**.

When the conveyor motor starts, as when it is desired to tint a quantity of fabric or fibers on the conveyor, the solenoid **54** is energized as explained above, thereby switching the valve **42** to its second position, connecting the bottle to the supply of air under pressure and closing off the exhaust line **50** to atmosphere. The air under pressure then acts downwardly on the upper surface of the tint solution in the bottle **22** forcing solution out through the T **24**, through the conduit **26** and out of the sprayer **28** onto the material passing by on the conveyor **10**. The magnitude of the pressure employed is generally quite low so that no problem is created by air dissolving in the solution to be sprayed. The exact pressure used will depend on the desired spraying volume and force.

In practice, the size of the pressure bottle **22** is chosen so that it will not become entirely depleted of fluid during any particular run of the conveyor. The bottle **22** can conveniently be an accumulator tank of the variety associated with household shallow well pumps. The check valve **30**, of course, prevents the air pressure from causing a back flow of solution to the tank **18** during the spraying portion of the cycle.

When the run is finished and the conveyor stops, the solenoid **54** is deenergized as outlined above and the valve **42** returns to its former position, thereby cutting off the air pressure and opening the exhaust conduit **50** to atmosphere through the exhaust filter **52**. Tint solution again flows from the tank **18** into the bottle **22**, displacing air outwardly through the line **50** and through the filter **52**, which effectively prevents any solution which

might be entrained in the air being exhausted from escaping into the work area.

In like manner, the spraying cycle continues in operation with the conveying cycle to operate on successive batches of articles.

Although the device has been primarily described for use in conjunction with spraying tint solution on textile fibers, it should be realized that other liquids can advantageously be sprayed using the apparatus of this invention on such diverse textile and non-textile articles as cloth, silver, rovings, yarn, non-woven textiles, felt fiber glass, synthetic fibers, mineral wool and the like.

The lack of addition of atomizing air to the solution being sprayed substantially reduces the likelihood of fog formation in the work area, and the fact that no pumps are necessary for the operation of the system substantially reduces the initial and maintenance costs thereof.

It should now be apparent that the system, as fully explained above, accomplishes the objects of the invention as set forth herein and that, although many modifications of the embodiment shown will be apparent to a person skilled in the art, all embodiments of the invention exhibiting the principles thereof should be embraced within the spirit and scope of the claims appended hereto.

What is claimed is:

1. The combination comprising: a tank adapted to receive a supply of liquid to be sprayed; a pressure bottle positioned lower than the tank adapted to receive a smaller quantity of liquid from the tank; conduit means communicating the tank to the bottle; a spray head; a check valve interposed in the conduit means and arranged to allow fluid flow only in a direction proceeding from the tank to the bottle; conduit means communicating the bottle to the spray head; conduit means connecting a source of gas under pressure to said pressure bottle; valve means interposed in the last-mentioned conduit means to selectively communicate said gas pressure source to the bottle so as to supply liquid therefrom to the sprayer, the last-mentioned valve comprising a three port, two-position valve having a first position wherein the bottle is communicated to the atmosphere and excluded from communication with the source of gas pressure so that fluid flows from the tank into the bottle displacing air from the bottle through the valve, and a second position wherein the bottle is communicated to the source of gas pressure and excluded from communication with the atmosphere so that the gas expels the liquid from the bottle and out through the sprayer; an article conveyor; an intermittently operating electric motor operatively connected to said conveyor for advancing said conveyor, valve operating means for said three port, two-position valve operatively connected in circuit with said motor to be energized when the motor operates and deenergized when the motor does not operate so that the sprayer will spray liquid as the conveyor advances due to operation of said electric motor and the liquid supply in the bottle will be replenished when the conveyor is at rest as said electric motor is inoperative.

2. The combination comprising: a tank adapted to receive a supply of liquid to be sprayed; a pressure bottle positioned lower than the tank and adapted to receive a smaller quantity of liquid from the tank; conduit means communicating the tank to the bottle; a spray head; a check valve interposed in the conduit means and arranged to allow fluid flow only in a direction proceeding from the tank to the bottle; conduit means communicating the bottle to the spray head; conduit means connecting a source of gas under pressure to said pressure bottle; valve means interposed in the last-mentioned conduit means to selectively communicate said gas pressure source to the bottle so as to supply liquid therefrom to the sprayer, the last-mentioned valve comprising a three port, two-position valve having a first position wherein the bottle is communicated to the atmosphere and excluded from communication with the source of gas pressure so that fluid flows from the tank into the bottle displacing air from the bottle through the valve, and a second position wherein the bottle is communicated to the source of gas pressure and excluded from communication with the atmosphere so that the gas expels the liquid from the bottle and out through the sprayer; a solenoid operatively connected to the three port, two-position valve and adapted to move the valve between the first and second positions in response to electric energization of the solenoid; an article conveyor; an intermittently operating electric motor for advancing said conveyor, said solenoid being operatively connected in circuit with said motor to be energized when the motor operates and deenergized when the motor does not operate so that the sprayer will spray liquid as the conveyor motor operates and the liquid supply in the bottle will be replenished when the conveyor motor is inoperative; the conveyor carrying articles; the sprayer being adjacent the conveyor and directed toward the conveyor as to spray liquid toward the conveyor and on the articles carried thereby.

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