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Horner et al.

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(54) **SPRAYER SYSTEM**

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B05B 7/12 (2006.01)

(52) **U.S. Cl.** **239/417.3**; 239/310; 239/315; 239/316; 239/311; 239/312; 239/407; 239/419; 239/419.5; 239/428.5; 239/432; 239/433; 239/391; 239/525; 239/530; 239/532; 239/450; 239/536; 239/590.3; 239/601; 239/DIG. 23

(58) **Field of Classification Search** 239/310, 239/315, 316, 311, 312, 407, 419, 419.5, 239/428.5, 433, 432, 390, 391, 525, 530, 239/532, 450, 536, 590.5, 590, 601, 597, 239/598, 581.1, 565, 754; 169/15
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,134,545 A * 5/1964 Armond 239/312
3,961,754 A 6/1976 Kuhns et al.
3,980,238 A * 9/1976 Adiletta 239/590.3
4,071,195 A 1/1978 Kuhns et al.
4,277,030 A 7/1981 Hechler, IV
4,925,106 A 5/1990 Maas et al.
5,160,093 A * 11/1992 Battaglia 239/444
5,556,032 A * 9/1996 Varrichione 239/279
5,678,765 A * 10/1997 Dobbs et al. 239/333
5,975,434 A * 11/1999 Douglas 239/553.3
6,347,752 B1 2/2002 Davidson et al.
6,378,789 B1 * 4/2002 Seaman et al. 239/443
6,676,041 B1 * 1/2004 McLoughlin et al. 239/565

* cited by examiner

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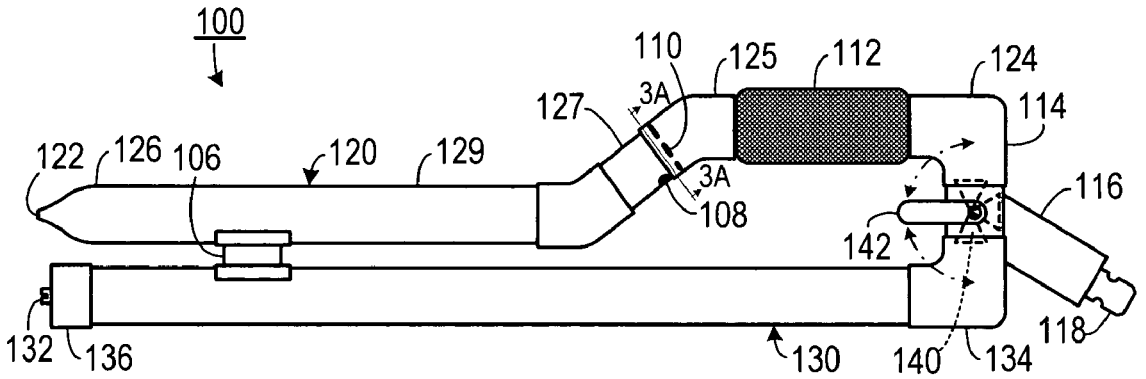
(57) **ABSTRACT**

A chemical sprayer system includes a three-way valve that includes an inlet port coupled to a fluid source, a first outlet port in fluid communication with a first elongated fluid passage, a second outlet port in fluid communication with a second elongated fluid passage, and a control. The control allows a user to place the three-way valve into one of a first ON state in which the first outlet port is in fluid communication with the inlet port, a second ON state in which the second outlet port is in fluid communication with the inlet port, and an OFF state in which substantially no fluid is allowed to exit the inlet port. The first elongated fluid passage terminates in a nozzle adapted for spraying foam. The second elongated fluid passage terminates in a nozzle adapted for spraying liquids.

12 Claims, 2 Drawing Sheets



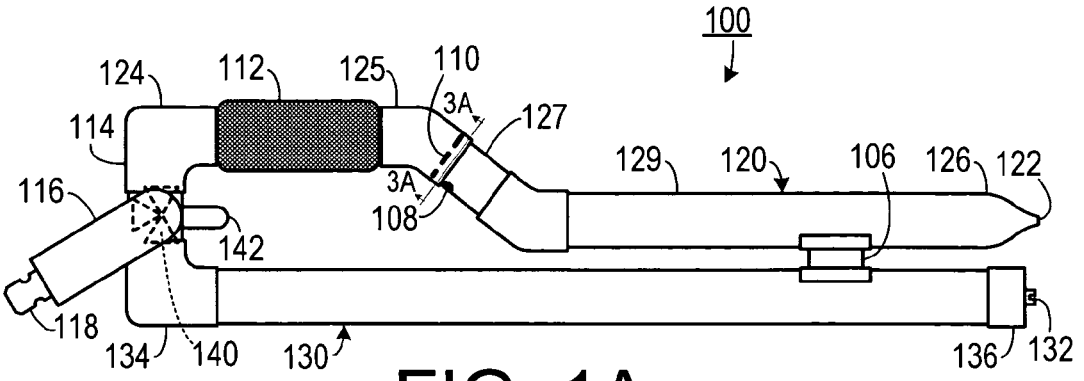


FIG. 1A

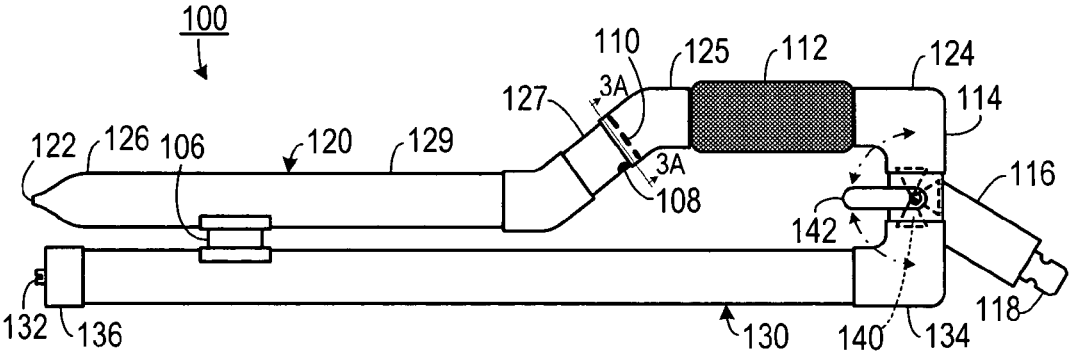


FIG. 1B

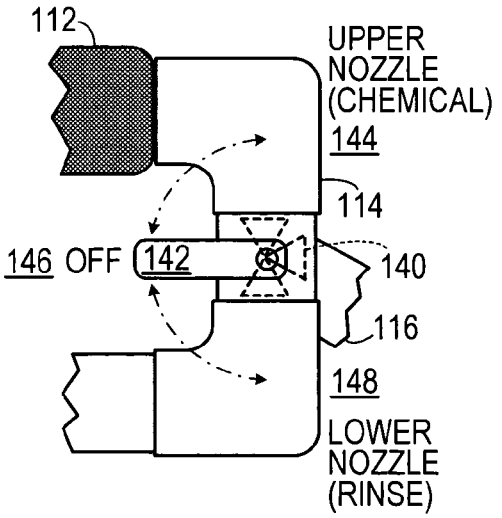


FIG. 2

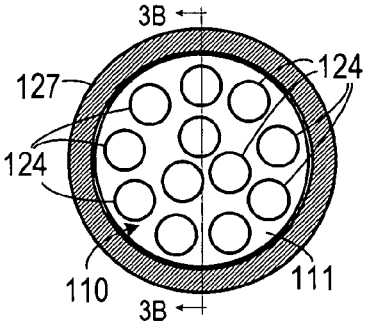


FIG. 3A

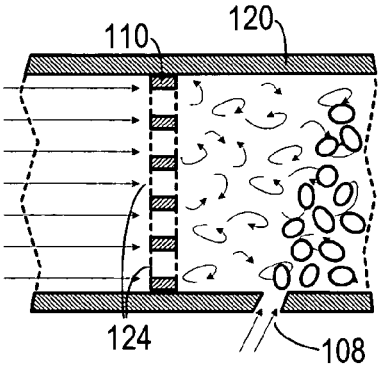


FIG. 3B

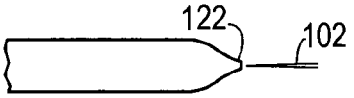


FIG. 4A

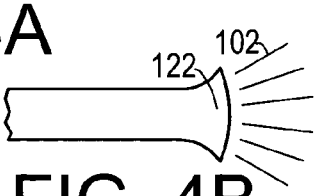


FIG. 4B

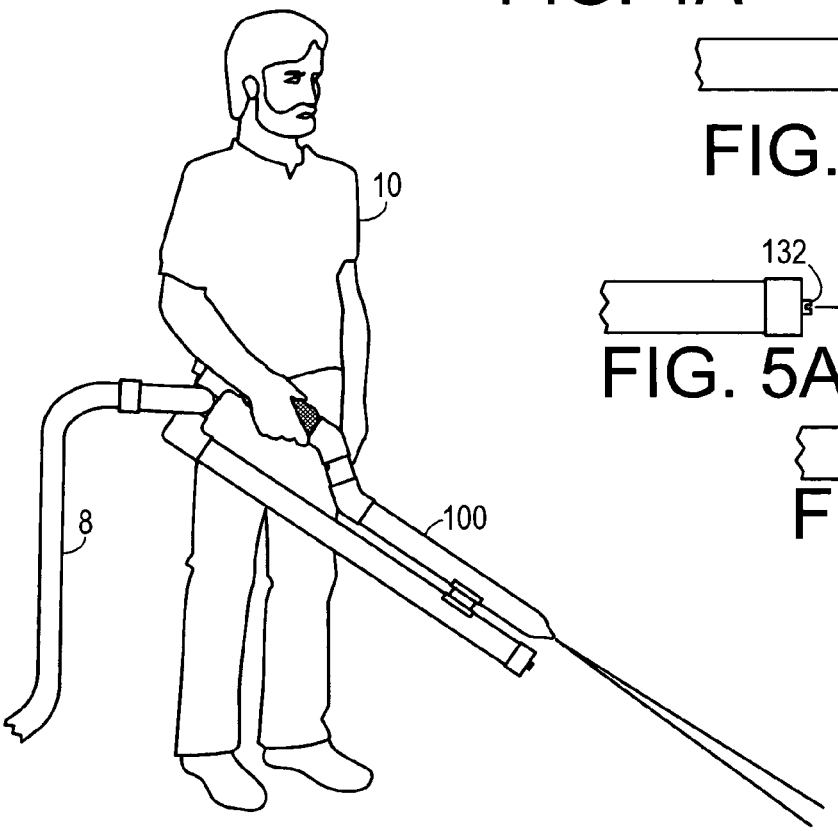


FIG. 6

FIG. 5A

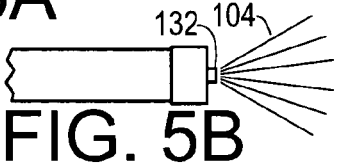


FIG. 5B

SPRAYER SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to sprayers and, more specifically, to a system for spraying chemicals.

2. Description of the Prior Art

Floor cleaning and sanitation is critical in such industries as food service and production. One method of floor cleaning and sanitation includes cleaning the floor with a mop and a bucket filled with a detergent/water mixture. The floor is then rinsed with water, which is subsequently mopped up and disposed in the bucket. A sanitizer/water mixture is then applied with the mop to kill remaining microbes. This method is time consuming, strenuous for large floor surfaces and introduces the possibility of cross-contamination between the steps involved when the same mop is used for each step.

Typical operations, such as supermarket meat cutting facilities, employ central chemical proportioning systems to provide cleaning chemicals to users. Such systems include a detergent input, a sanitizer input, a water-only bypass and an output that is connectable to a hose. A plurality of valves allows a user to select between various combinations being delivered to the hose for subsequent spraying on the floor, these include: detergent/water (for cleaning), water only (for rinsing) and sanitizer/water (for sanitizing).

Typically, the user initially applies water only spray through a spray nozzle to remove gross soils, then the user applies the water/detergent combination through a foaming wand coupled to the hose. The user then turns off the detergent/water feed from the proportioning system, scrubs the floor with a stiff-bristle broom and then resets the proportioning system for rinsing with water. At this point, the user has to replace the foaming wand with a spray nozzle, similar to a typical garden spray nozzle. The user then rinses with water, driving the foam into a floor drain. Next the user resets the proportioning system to receive the sanitizer/water combination and applies the sanitizer to the floor either through a spray nozzle or through a foaming wand.

Existing systems have the disadvantage of requiring the user to bend over to hold the foaming wand and the spray nozzle close to the floor. This can cause discomfort and the possibility of back strain. Also, the spray nozzle and foaming wand both have a circular spray pattern, which gives rise to the possibility of cross contamination of items (such as food and equipment) placed above floor level. Furthermore, existing systems also require the user to change between a foaming wand and a spray nozzle, which is inconvenient and time consuming.

Therefore, there is a need for spray system that allows the user to apply chemicals to a floor that reduces bending over by the user. There is also a need for spray system that can change from a foaming mode to a spray mode without requiring the user to change or switch a nozzle for a foaming wand. There is also a need for spray system that concentrates the spray close to the floor. There is also a need for spray system that has a substantially flat spray pattern, rather than a circular pattern.

SUMMARY OF THE INVENTION

The disadvantages of the prior art are overcome by the present invention which, in one aspect, is a chemical sprayer system that includes a three-way valve, a first elongated fluid passage and a second elongated fluid passage. The three-way valve includes an inlet port, that is capable of being coupled to a fluid source, a first outlet port, a second outlet port, and a three-state control that allows a user to place the three-way valve into one of a plurality of states. The plurality of states includes: a first ON state in which the first outlet port is in fluid communication with the inlet port, a second ON state in which the second outlet port is in fluid communication with the inlet port, and an OFF state in which substantially no fluid is allowed to exit the inlet port to either the first outlet port or the second outlet port. The first elongated fluid passage has a first proximal end and an opposite first distal end. The first proximal end is in fluid communication with the first outlet port. The first distal end terminates in a first nozzle, which is adapted for spraying foam. The second elongated fluid passage is spaced apart from and is substantially parallel to the first elongated fluid passage. The second elongated fluid passage has a second proximal end and an opposite second distal end. The second proximal end is in fluid communication with the second outlet port. The second distal end terminates in a second nozzle, which is adapted for spraying liquid phase fluids.

In another aspect, the first elongated fluid passage includes a first parallel portion, spaced apart from the second elongated fluid passage at a first distance, a second parallel portion, spaced apart from the second elongated fluid passage at a second distance that is less than the first distance and a transverse portion connecting the first parallel portion to the second parallel portion. A disk that defines a plurality of holes passing therethrough is disposed transversely to the transverse portion. An air intake is defined by the transverse portion and is disposed downstream from the disk.

In yet another aspect, the invention is a method of making a chemical sprayer. A first elongated passage is adapted for generating foam and is placed in fluid communication with a first outlet port of a three-way valve. A second elongated passage, adapted for spraying a liquid, is placed in fluid communication with a second outlet port of a three-way valve so that the second elongated passage is substantially parallel to the first elongated passage.

These and other aspects of the invention will become apparent from the following description of the preferred embodiments taken in conjunction with the following drawings. As would be obvious to one skilled in the art, many variations and modifications of the invention may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWINGS

FIG. **1**A is a side elevational view of one embodiment of the invention.

FIG. **1**B is a side elevational view of the embodiment of the invention shown in FIG. **1**A, showing the opposite side from that shown in FIG. **1**A.

FIG. **2** is a detail of the valve portion of the embodiment shown in FIG. **1**B.

FIG. **3**A is a cross sectional view of the first elongated fluid passage taken along line **3**A—**3**A in FIG. **1**.

FIG. **3**B is a cross sectional view of the first elongated fluid passage taken along line **3**B—**3**B in FIG. **3**A.

FIG. **4**A is a side view of the nozzle portion of the first elongated fluid passage.

FIG. **4**B is a top view of the nozzle portion of the first elongated fluid passage.

FIG. **5**A is a side view of the nozzle portion of the second elongated fluid passage.

FIG. **5**B is a top view of the nozzle portion of the second elongated fluid passage.

FIG. **6** is a perspective view of a person using one embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

A preferred embodiment of the invention is now described in detail. Referring to the drawings, like numbers indicate like parts throughout the views. As used in the description herein and throughout the claims, the following terms take the meanings explicitly associated herein, unless the context clearly dictates otherwise: the meaning of "a," "an," and "the" includes plural reference, the meaning of "in" includes "in" and "on."

As shown in FIGS. **1**A, **1**B and **2**, one embodiment of the invention is a sprayer system **100** that includes a three-way valve **140** having an inlet port, a first outlet port, a second outlet port. The three-way valve **140** is coupled to a three-state control **142** that allows the user to place the three-way valve into one of three states: a first ON state **144**, a second ON state **148** and an OFF state **146**. In the first ON state **144**, the first outlet port is in fluid communication with the inlet port. In the second ON state **148**, the second outlet port is in fluid communication with the inlet port. In the OFF state **146**, substantially no fluid is allowed to exit the inlet port to either the first outlet port or the second outlet port. The inlet port of the three-way valve **140** is coupled to a fluid source **116**, which may include a quick-connect **118** that allows quick coupling and de-coupling of the sprayer system **100** to a hose.

A first elongated fluid passage **120** has a first proximal end **124** and an opposite first distal end **126**. The first proximal end **124** is in fluid communication with the first outlet port of the three-way valve **140** and the first distal end **126** terminates in a first nozzle **122**. The first nozzle **122** is adapted for spraying foam. A second elongated fluid passage **130** is spaced apart from and substantially parallel to the first elongated fluid passage **120**. The second elongated fluid passage **130** has a second proximal end **134** and an opposite second distal end **136**. The second proximal end **134** is in fluid communication with the second outlet port of the three-way valve **140** and the second distal end **136** terminates in a second nozzle **132**. The second nozzle is adapted for spraying liquid-phase fluids, such as water. A connecting passage **114** couples the first proximal end **124** of the first elongated passage **120** to the second proximal end **134** of the second passage **130** and houses the three-way valve **140**. A spacer member **106** couples the first elongated fluid passage **120** to the second elongated fluid passage **130**, thereby providing rigidity. In one embodiment, the first elongated fluid passage **120**, second elongated fluid passage **130** and the connecting passage **114** are all made from polyvinyl-chloride (PVC) pipe. However, it is understood that many other materials may be used. For example, all of the passages may include injection molded plastic or may be fabricated from metal.

The first elongated fluid passage **120** includes a first parallel portion **125**, a second parallel portion **129** and a transverse portion **127**. The first parallel portion **125** is spaced apart from the second elongated fluid passage **130** at a first distance. The second parallel portion **129** is spaced apart from the second elongated fluid passage **130** at a second distance that is less than the first distance. The transverse portion **127** connects the first parallel portion **125** to the second parallel portion **129**. A handle portion **112** (such as a high density foam sheet or molded foam) may be disposed about at least part of the first parallel portion **125** to facilitate gripping and to provide thermal insulation.

A turbulence causing member **110** is disposed in the transverse portion **127** and an air intake **108** (such as a hole) defined by the transverse portion **127** is disposed downstream from the turbulence causing member **110**. As shown in FIG. **3**A, the turbulence causing member **110** may include a disk **111** disposed transversely to the transverse portion **127**. The disk defines a plurality of holes **124** that pass therethrough. As shown in FIG. **3**B, as a liquid **121** flows through the holes **124**, the liquid **121** becomes turbulent. Air is drawn in through the air intake **108** and mixes with the liquid **121**. If the liquid **121** includes a surfactant, then foam will be formed as air bubbles **123** are suspended in the liquid **121**.

As shown in FIGS. **4**A and **4**B, the first nozzle **122** has a fan shape so that spray **102** from the nozzle is constrained in a non-circular spray pattern. Similarly, the second nozzle **132** has a slotted shape so as to constrain spray **104** issuing therefrom to a non-circular pattern.

Use of the sprayer system **100** by a user **10** is shown in FIG. **6**. The user **10** is able to hold the sprayer by the handle **112**, with the nozzles **122** and **132** being close to the floor. The non-circular spray pattern from the nozzles **122** and **132** allows the user **10** to spray a floor without a substantial amount of liquid or foam contaminating objects that are placed above the floor. Typically, the sprayer system **100** is connected to a hose **8** that receives liquid from a chemical proportioning system (not shown) that is capable of mixing such chemicals as a detergent, a sanitizer and water. With such a configuration, the user **10** could initially spray a floor with a detergent by setting the proportioning system to a detergent and water mode and then setting the three-state control **142** to the first ON state **144**, thereby causing the resulting foam mixture to pass through the first passage **120** and spray out of the first nozzle **122**. To rinse, the user then sets the three-state control **142** to the OFF state **146** and changes the configuration of the proportioning system to allow only water to pass through the hose **8**. The user **10** then sets the three-state control **142** to the second ON state **148**, thereby causing the water to pass through the second passage **130** and spray out of the second nozzle **132**. This step may be repeated to spray a non-foaming sanitizer.

The above described embodiments are given as illustrative examples only. It will be readily appreciated that many deviations may be made from the specific embodiments disclosed in this specification without departing from the invention. Accordingly, the scope of the invention is to be determined by the claims below rather than being limited to the specifically described embodiments above.

What is claimed is:

1. A chemical sprayer system, comprising:

a. a three-way valve including an inlet port, that is capable of being coupled to a fluid source, a first outlet port, a second outlet port, and a three-state control that allows a user to place the three-way valve into one of a plurality of states, including: a first ON state in which the first outlet port is in fluid communication with the inlet port, a second ON state in which the second outlet port is in fluid communication with the inlet port, and an OFF state in which substantially no fluid is allowed to exit the inlet port to either the first outlet port or the second outlet port;

b. a first elongated fluid passage having a first proximal end and an opposite first distal end, the first proximal end in fluid communication with the first outlet port, the first distal end terminating in a first nozzle, the first nozzle adapted for spraying foam;

c. a second elongated fluid passage, spaced apart from and substantially parallel to the first elongated fluid passage, having a second proximal end and an opposite second distal end, the second proximal end in fluid communication with the second outlet port, the second distal end terminating in a second nozzle, the second nozzle adapted for spraying liquid phase fluids:

d. a first parallel portion, spaced apart from the second elongated fluid passage at a first distance;

e. a second parallel portion, spaced apart from the second elongated fluid passage at a second distance, the second distance being less than the first distance; and

f. a transverse portion connecting the first parallel portion to the second parallel portion.

2. The chemical sprayer of claim **1**, further comprising a connecting passage that couples the first proximal end of the first elongated passage to the second proximal end of the second passage and that houses the three-way valve.

3. The chemical sprayer of claim **1**, further comprising a spacer member that couples the first elongated fluid passage to the second elongated fluid passage.

4. The chemical sprayer of claim **1**, wherein the first nozzle has a fan shape so that spray from the first nozzle is constrained in a non-circular spray pattern.

5. The chemical sprayer of claim **1**, wherein the second nozzle has a slotted shape so that spray from the second nozzle is constrained in a non-circular spray pattern.

6. The chemical sprayer of claim **1**, further comprising:

a. a turbulence causing member disposed in the transverse portion; and

b. an air intake defined by the transverse portion and disposed downstream from the turbulence causing member.

7. The chemical sprayer of claim **6**, wherein the turbulence causing member comprises a disk disposed transversely to the transverse portion, the disk defining a plurality of holes passing therethrough.

8. A chemical sprayer system, comprising:

a. a three-way valve including an inlet port, that is capable of being coupled to a fluid source, a first outlet port, a second outlet port, and a three-state control that allows a user to place the three-way valve into one of a plurality of states, including: a first ON state in which the first outlet port is in fluid communication with the inlet port, a second ON state in which the second outlet port is in fluid communication with the inlet port, and an OFF state in which substantially no fluid is allowed to exit the inlet port to either the first outlet port or the second outlet port;

b. a first elongated fluid passage having a first proximal end and an opposite first distal end, the first proximal end in fluid communication with the first outlet port, the first distal end terminating in a first nozzle, the first nozzle adapted for spraying foam, the first elongated fluid passage including:

i. a first parallel portion, spaced apart from the second elongated fluid passage at a first distance;

ii. a second parallel portion, spaced apart from the second elongated fluid passage at a second distance, the second distance being less than the first distance;

iii. a transverse portion connecting the first parallel portion to the second parallel portion;

iv. a disk disposed transversely to the transverse portion, the disk defining a plurality of holes passing therethrough; and

v. an air intake defined by the transverse portion and disposed downstream from the disk;

c. a second elongated fluid passage, spaced apart from and substantially parallel to the first elongated fluid passage, having a second proximal end and an opposite second distal end, the second proximal end in fluid communication with the second outlet port, the second distal end terminating in a second nozzle, the second nozzle adapted for spraying liquid phase fluids; and

d. a connecting passage that couples the first proximal end of the first elongated passage to the second proximal end of the second passage and that houses the three-way valve.

9. The chemical sprayer of claim **8**, further comprising a spacer member that couples the first elongated fluid passage to the second elongated fluid passage.

10. The chemical sprayer of claim **8**, wherein the first nozzle has a fan shape so that spray from the first nozzle is constrained in a non-circular spray pattern.

11. The chemical sprayer of claim **8**, wherein the second nozzle has a slotted shape so that spray from the second nozzle is constrained in a non-circular spray pattern.

12. The chemical sprayer of claim **8**, wherein the first elongated passage, the second elongated passage and the connecting passage each comprise PVC pipe.

* * * * *