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(54) **APPARATUS, SYSTEM, AND METHOD FOR DISPENSING FLUID INTO PLANT PROTECTION DEVICES**

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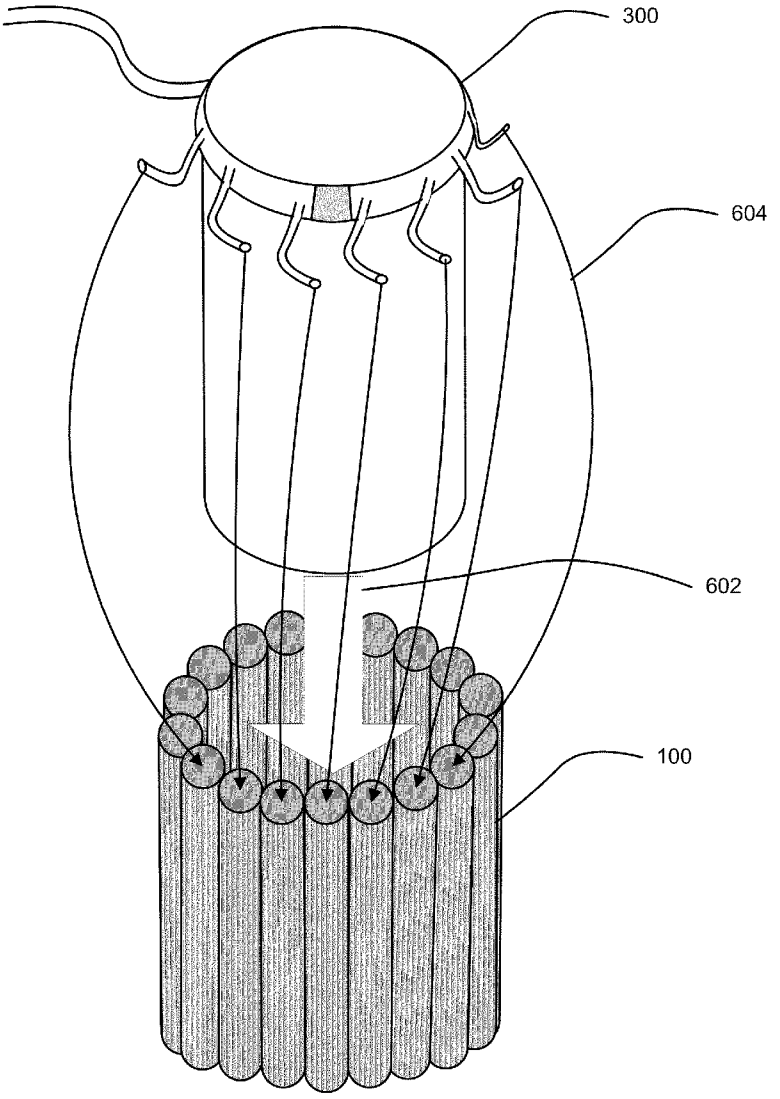
(52) **U.S. Cl.** **141/1**; 141/238

(57) **ABSTRACT**

An apparatus, system and method for dispensing fluid into plant protection devices. A plant protection device has a plurality of flexible longitudinal tubes configurable to surround and protect a plant. A rigid, substantially cylindrical structure with a bottom end and a top end is provided to support the tubes during filling. A manifold is connected to the top end of the cylindrical structure and includes at least an inlet port that is configured to receive fluid into the manifold. A plurality of outlet ports are connected to the manifold and are configured to dispense fluid simultaneously out of the plurality of the outlet ports into the plurality of longitudinal tubes of the plant protection device.



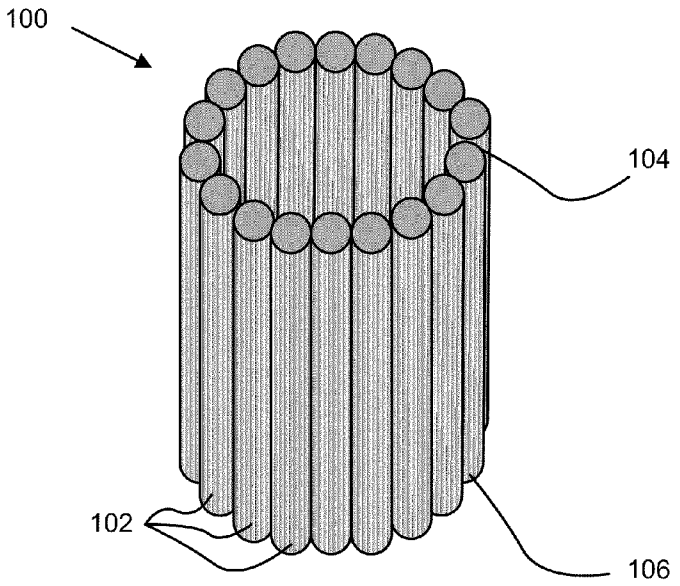


FIG. 1

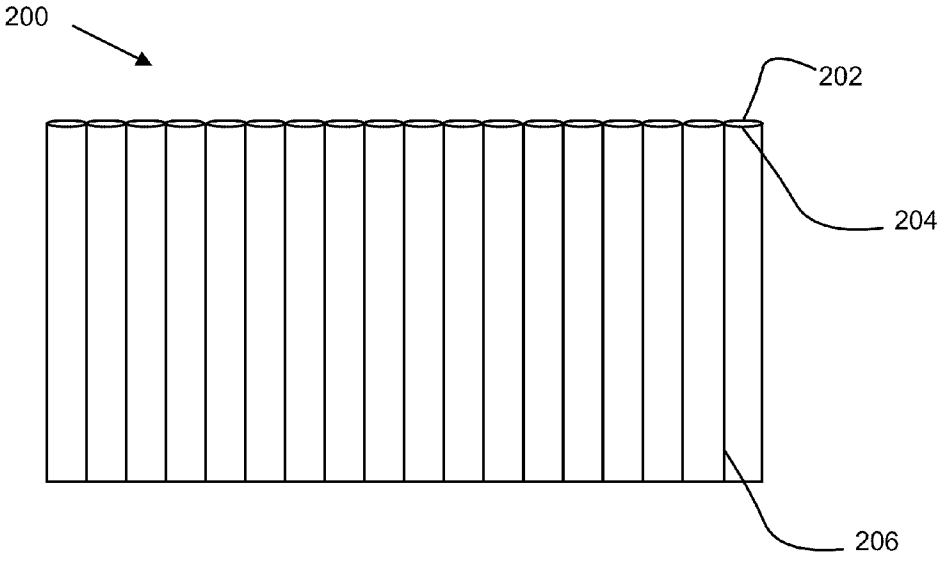


FIG. 2

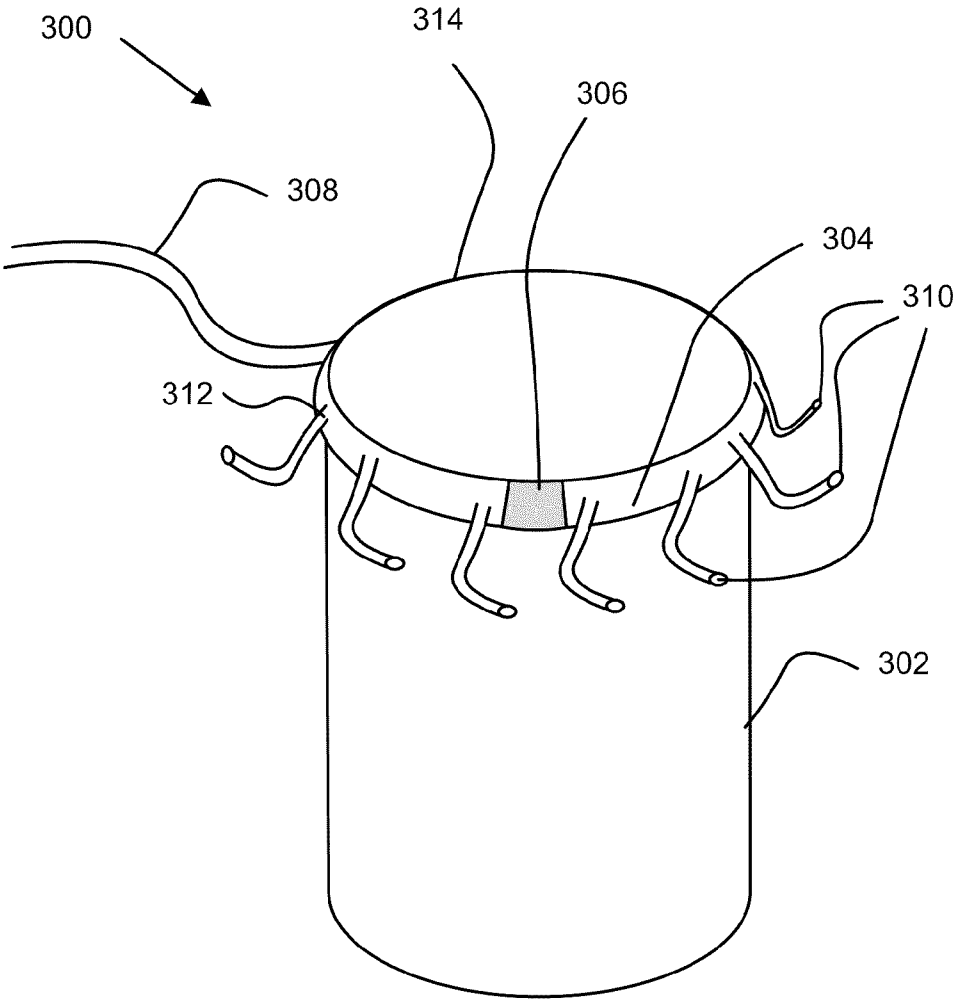


FIG. 3

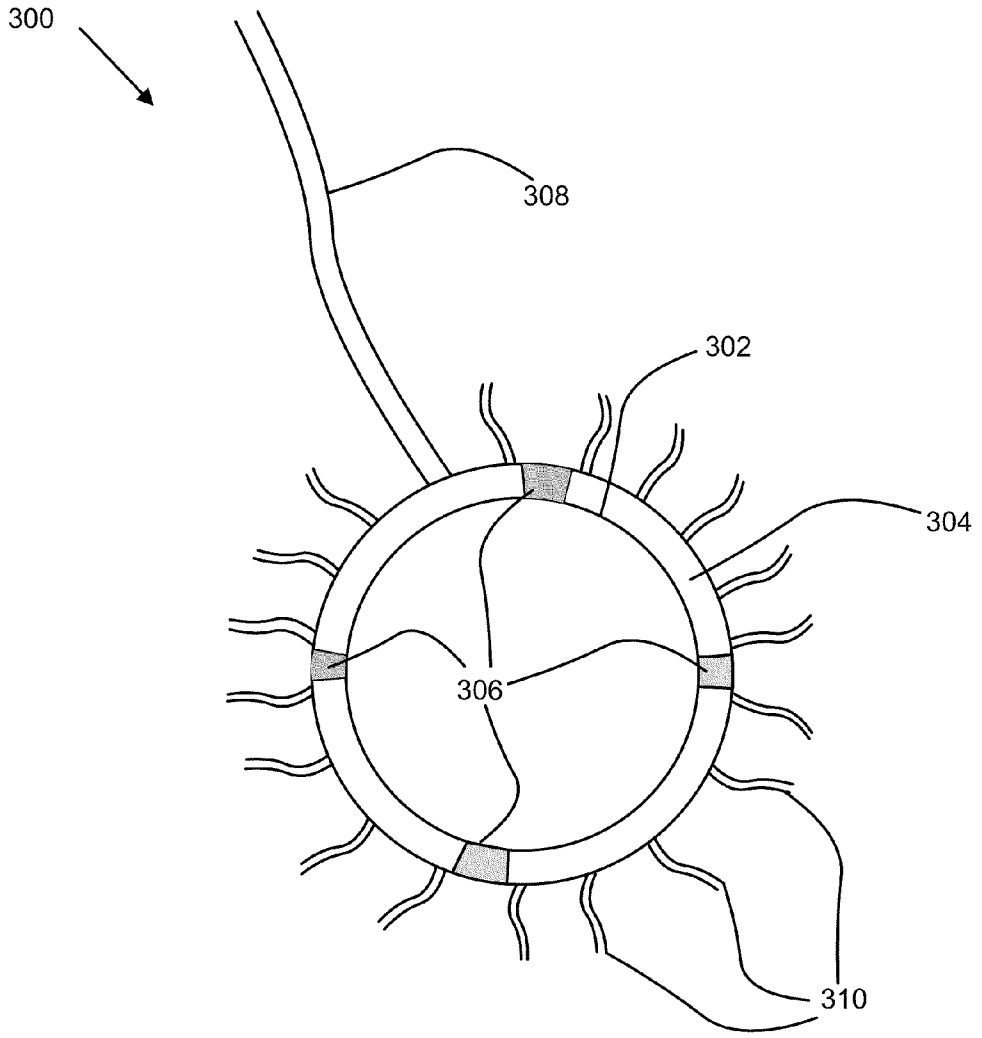


FIG. 4

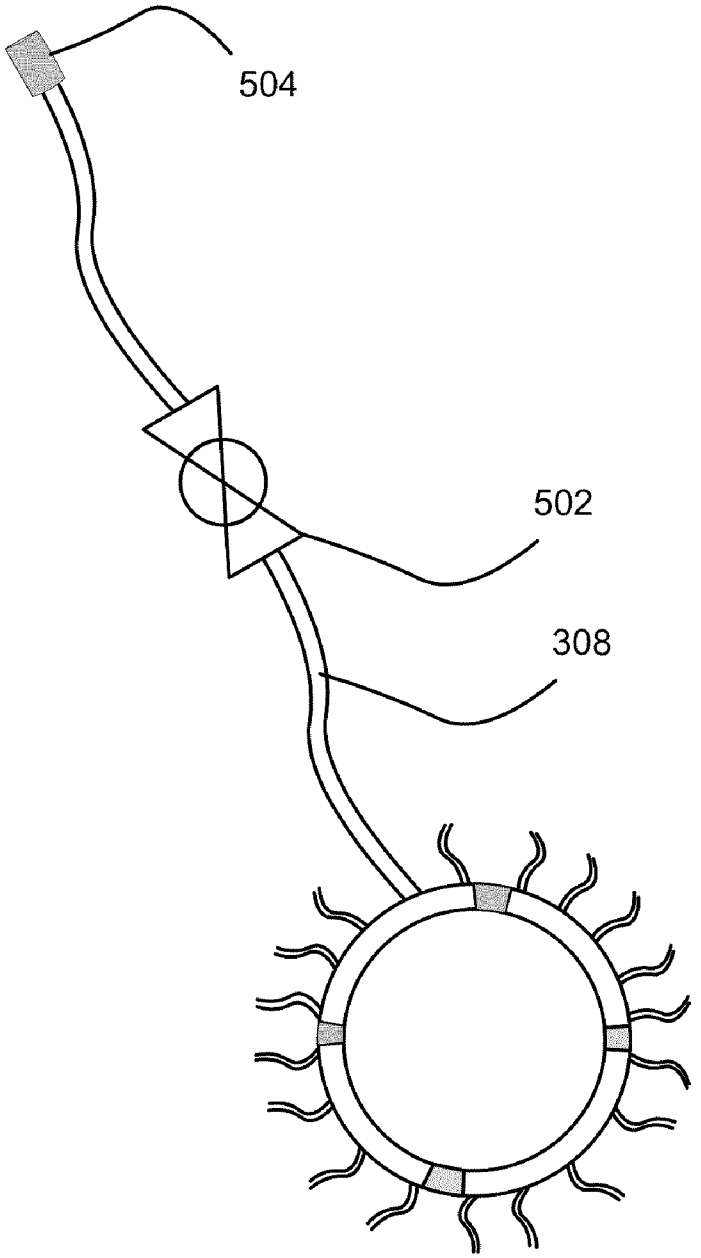


FIG. 5

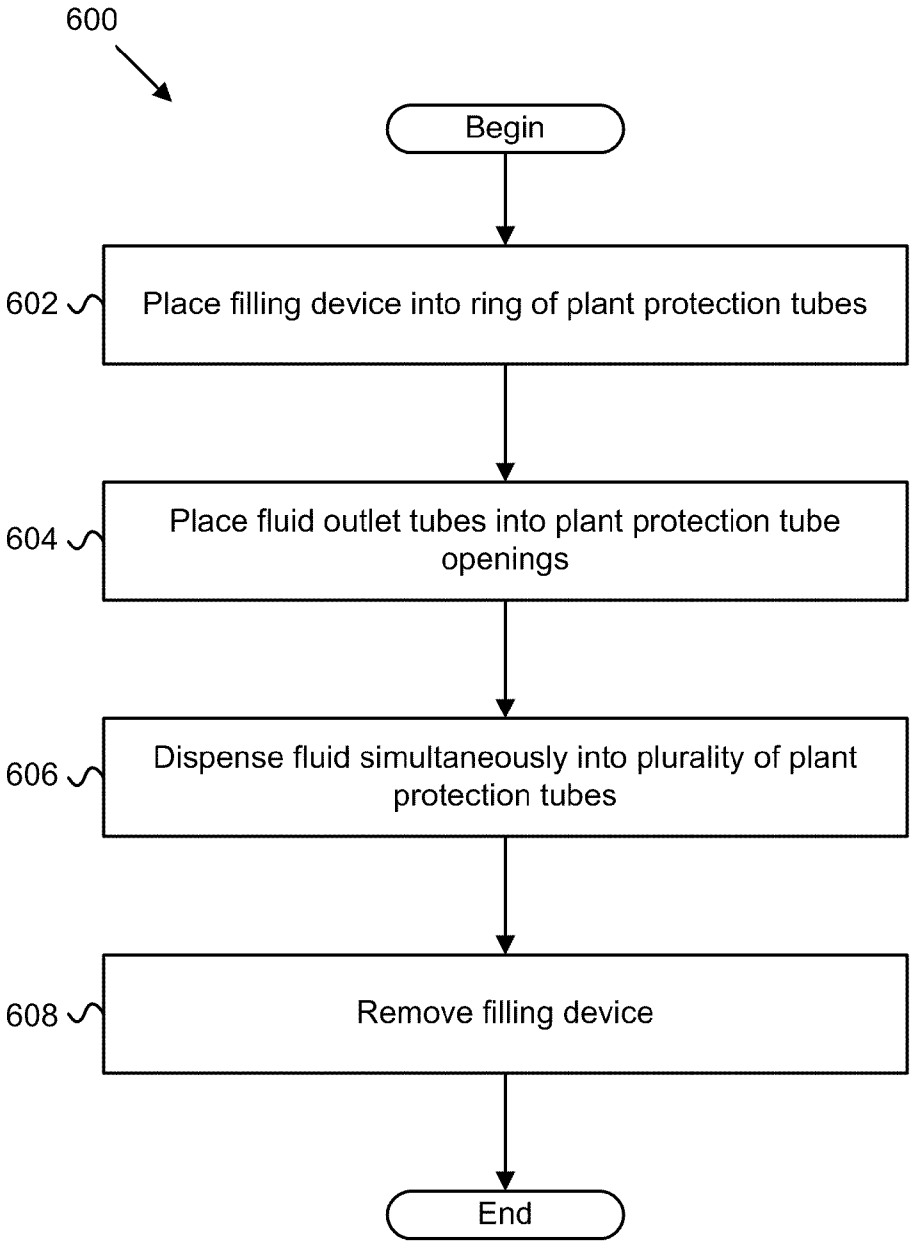

600
Begin
602
Place filling device into ring of plant protection tubes
604
Place fluid outlet tubes into plant protection tube openings
606
Dispense fluid simultaneously into plurality of plant protection tubes
608
Remove filling device
End

FIG. 6

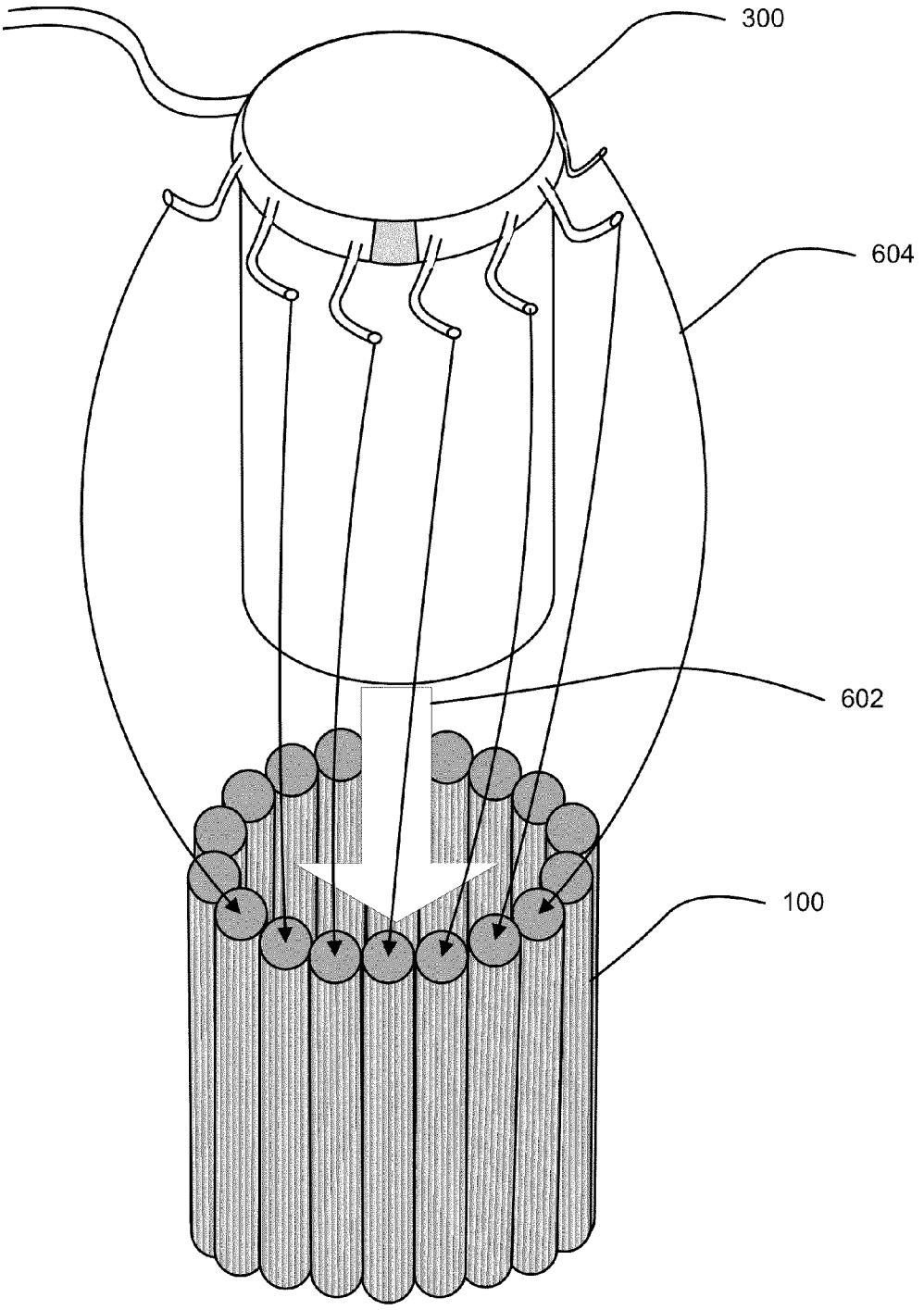


FIG. 7

APPARATUS, SYSTEM, AND METHOD FOR DISPENSING FLUID INTO PLANT PROTECTION DEVICES

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Patent Application No. 61/099,275 entitled "Apparatus, System, and Method for filling plant protection devices" and filed on Sep. 23, 2008 for Susan Kohler, which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to plant protection devices and plant protection enclosures and more particularly relates to efficiently filling plant protection devices and enclosures with fluid.

[0004] 2. Description of the Related Art

[0005] In some climates devices are needed for encapsulating or covering growing plants and vegetation to protect the plants from the elements. In particular, garden variety plants are particularly vulnerable to fluctuations in temperature. Exposure to extreme temperatures or weather conditions can quickly result in the death of plants, or a lower harvest yield.

[0006] To solve this problem, conventional devices have been used to protect plants during their initial stages of growth. For example, a protective covering may be placed on or around plants in the early spring or late fall to protect against harsh temperatures and frost. Over time, numerous devices have been utilized to protect plants from extreme temperatures, including items of various shapes, sizes, and materials. One particular form of device that has proven to be particularly useful in protecting plants is a double walled thermal protective covering. One embodiment of such a device has been marketed under the trademark "Wall-O-Water."

[0007] Double walled thermal protective coverings typically include a plurality of tubes manufactured from flexible plastic sheeting and fastened together longitudinally to form a ring or cone-like structure for surrounding a growing plant. Rigidity may be imparted to the structure by filling each individual tube with water or some other fluid. The tubes may be oriented in various configurations to form side walls of a cylinder or truncated cone which is then used to surround a growing plant. Double walled thermal protective coverings have proven particularly useful in protecting plants, because the thermal properties of the fluid used to fill the tubes can provide desirable insulating results. For example, an aqueous solution of plain water can provide protection against the cold because heat can be stored in the water during the day and subsequently released in the evening as the water cools.

[0008] However, conventional double walled thermal protective coverings have proven difficult to use because filling each tube of the device is time consuming and tedious and requires a great deal of stooping or bending over. Further, users have found it difficult to set up the device and fill the individual tubes, because the tubes tend to collapse unless supported in some way, such as being held by a second user. Often the device collapses after a number of the tubes have been filled, but before enough of the tubes have been filled to support the device. This typically results in the fluid already added to some of the tubes spilling out, thereby causing the process to be repeated.

[0009] The present invention has been developed in response to these shortcomings in the art, and in particularly in response to the need for a more efficient and simpler way to fill and use double walled thermal protective coverings.

SUMMARY OF THE INVENTION

[0010] The present invention has been developed in response to the present state of the art, and in particular, in response to the problems and needs in the art that have not yet been fully solved by currently available fluid dispensing devices. Accordingly, the present invention has been developed to provide an apparatus, system, and method for filling plant protection devices that overcome many or all of the above-discussed shortcomings in the art.

[0011] In one embodiment, the apparatus for filling plant protection devices with a fluid includes a circular manifold comprising at least one inlet port, wherein the inlet port is configured to receive fluid into the manifold. The apparatus also includes a plurality of outlet ports spaced around the circular manifold and connected to the manifold, the outlet ports configured to dispense fluid simultaneously from the manifold out each of the plurality of outlet ports into a plant protection device.

[0012] In a further embodiment, the apparatus includes a rigid, substantially cylindrical structure with a bottom end and a top end, wherein the cylindrical structure is configured to support the plant protection device during filling. In some embodiments, the circular manifold is connected around the top end of the cylindrical structure. In a further embodiment, the apparatus includes one or more fasteners that fasten the manifold to the top end of the cylindrical structure

[0013] In one embodiment, the outlet ports each comprise a flexible cylindrical tube configured to transport fluid to the plant protection device. In a further embodiment, the apparatus includes a plurality of port connectors that secure the outlet ports to the manifold.

[0014] In some embodiments, the apparatus includes an inlet control valve that selectively controls the flow of fluid into the manifold. In further embodiments, that apparatus includes one or more outlet port valves that selectively control the flow of fluid out of one or more of the outlet ports. In yet a further embodiment, each of the plurality of outlet ports is connected to a corresponding independent outlet port valve such that the flow of fluid through each outlet port may be independently controlled by its corresponding outlet port valve.

[0015] A system of the present invention is also presented for filling plant protection devices with a fluid. The system substantially includes all of the embodiments described above with regard to the apparatus. In one embodiment, the system includes a plant protection device comprising a plurality of longitudinal tubes configurable to surround and protect a plant, each longitudinal tube having an opening configured to receive a fluid into the longitudinal tube. The system may also include a rigid, substantially cylindrical structure with a bottom end and a top end and a manifold connected to the top end of the cylindrical structure. The manifold includes at least an inlet port and is configured to receive fluid into the manifold. The system may also include a plurality of outlet ports connected to the manifold and configured to dispense

fluid simultaneously out of the plurality of the outlet ports into the plurality of tubes of the plant protection device.

[0016] In one embodiment, the system also includes a fluid source hose connected to the inlet port, the hose configured to provide fluid to the manifold.

[0017] A method of the present invention is also presented for matching a single user with a plurality of publishers. The method in the disclosed embodiments substantially includes the steps necessary to carry out the functions presented above with respect to the operation of the described apparatus and system. In one embodiment, the method includes placing a plant protection device filling apparatus in proximity with a plant protection device. The plant protection device includes a plurality of longitudinal tubes configurable to surround and protect a plant, wherein each longitudinal tube has an opening configured to receive a fluid into the longitudinal tube. The plant protection device filling apparatus includes various embodiments including those described above with regard the system and apparatus of the present invention.

[0018] In one embodiment, the method includes placing each of the plurality of outlet ports into a corresponding opening of a longitudinal tube of the plant protection device and dispensing fluid simultaneously through each of the outlet ports into the longitudinal tubes of the plant protection device.

[0019] In a further embodiment, presenting a plurality of publishers includes filtering the plurality of publishers to match criteria specified by the user. In another embodiment, the method includes receiving a payment from the user. The method may also include remitting a payment to the selected publishers.

[0020] Reference throughout this specification to features, advantages, or similar language does not imply that all of the features and advantages that may be realized with the present invention should be or are in any single embodiment of the invention. Rather, language referring to the features and advantages is understood to mean that a specific feature, advantage, or characteristic described in connection with an embodiment is included in at least one embodiment of the present invention. Thus, discussion of the features and advantages, and similar language, throughout this specification may, but do not necessarily, refer to the same embodiment.

[0021] Furthermore, the described features, advantages, and characteristics of the invention may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize that the invention may be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments of the invention.

[0022] These features and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

[0024] FIG. **1** is a perspective view illustrating one embodiment of a double walled thermal protective covering in ring form for use in accordance with the present invention;

[0025] FIG. **2** is a perspective view of a double walled thermal protective covering in flattened form for use in accordance with the present invention;

[0026] FIG. **3** is a perspective view of one embodiment of an apparatus for filling plant protection devices in accordance with the present invention;

[0027] FIG. **4** is a top view of one embodiment of an apparatus for filling plant protection devices in accordance with the present invention;

[0028] FIG. **5** is a top view of one embodiment of an apparatus for filling plant protection devices with a control valve in accordance with the present invention;

[0029] FIG. **6** is a schematic block diagram illustrating one embodiment of a method for filling plant protection devices in accordance with the present invention; and

[0030] FIG. **7** is a perspective view illustrating one embodiment of a method for filling plant protection devices in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0031] Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

[0032] Furthermore, the described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided, such as examples of materials, devices, structures, components, etc., to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

[0033] The schematic flow chart diagrams included herein are generally set forth as logical flow chart diagrams. As such, the depicted order and labeled steps are indicative of one embodiment of the presented method. Other steps and methods may be conceived that are equivalent in function, logic, or effect to one or more steps, or portions thereof, of the illustrated method. Additionally, the format and symbols employed are provided to explain the logical steps of the method and are understood not to limit the scope of the method. Although various arrow types and line types may be employed in the flow chart diagrams, they are understood not to limit the scope of the corresponding method. Indeed, some arrows or other connectors may be used to indicate only the logical flow of the method. For instance, an arrow may indicate a waiting or monitoring period of unspecified duration between enumerated steps of the depicted method. Additionally, the order in which a particular method occurs may or may not strictly adhere to the order of the corresponding steps shown.

[0034] FIG. **1** is a perspective view illustrating one embodiment of a double walled thermal protective covering **100** in ring form for use in accordance with the present invention. As depicted the double walled thermal protective covering includes a plurality of longitudinally organized tubes **102** that are configured to be filled with a fluid, such as water, such that upon being filled, the fluid filled tubes cause rigidity in the structure **100** thereby allowing the structure **100** to be self supporting. Although, the depicted structure **100** is in ring form, other shapes of the structure are contemplated, including but not limited to, cone shapes, pyramid shapes, cubic shapes, etc.

[0035] Typically, the tubes **102** are sealed on the bottom end **106** and are left open on the top end **104** to allow for access on the top end **104** to add fluid and to allow for the thermal expansion and contraction of fluid inside the tubes. In some embodiments, the tubes **102** may be completely sealed and/or may be provided with an access valve or other access point, such as a hole, to allow the transfer of fluid into the tubes **102**.

[0036] FIG. **2** is a perspective view of a double walled thermal protective covering **200** in flattened form for use in accordance with the present invention. Prior to being filled with water, the double walled thermal protective covering **200** is typically flexible and non-rigid such that it can be flattened, folded and easily transported. Once fluid is added to the tubes **100**, the structure **200** takes the form of that for which it was designed.

[0037] In one embodiment, the outside walls **202** and inside walls **204** may be joined together by heat sealing, adhesives, or other similar means to form the tubes **102** that complete the structure **200**. In some embodiments, spaces may be left between the sealings **206** of the tubes such that fluid can flow between the disparate tube structures **102** thereby causing the fluid level in each tube to remain substantially equivalent. For example, during a heat sealing or other adhesion process, a gap or portion between two tubes **102** may be left unsealed, such that fluid may flow through the gap from one tube into another.

[0038] FIG. **3** is a perspective view of one embodiment of an apparatus **300** for filling plant protection devices **100**, **200** in accordance with the present invention. The apparatus **300** includes a rigid longitudinal substantially cylindrical structure **302** with a bottom end and a top end. In accordance with the present invention, substantially cylindrical means that the structure need not be exactly round or elliptical at the top and bottom.

[0039] In some embodiments, the cylindrical structure **302** may be implemented in various different shapes and cross-sections, including but not limited to substantially square, rectangular, circular, elliptical, diamond shapes as will be recognized by one of skill in the art. Further, substantially cylindrical does not mean that the sides of the structure **302** are limited to being perfectly vertical. Rather, the sides of the structure **302** may be constructed such that the sides are somewhat slanted such as in a pyramid-type structure. Preferably, the structure **302** is configured to match the shape of a plant protection device **100**, **200** that it will be used to fill. For example, if the plant protection device **100**, **200** includes a substantially circular ring of longitudinal tubes **102**, then the structure **302** is preferably provided in with a substantially circular cylindrical shape.

[0040] Typically, the structure **302** is constructed of a diameter size that is slightly smaller than that of the plant protection device **100**, **200** such that the structure can fit within and help support the plant protection device **100**, **200** as it is being filled with fluid. Of course, in other embodiments, the structure **302** may be configured with a diameter that is slightly larger than the plant protection device **100**, **200** such that the plant protection device fits within the structure **302**. In such an embodiment, additional structure may be desired to help support the plant protection device **100**, **200** as it is being filled. For example, clips, fasteners, or an interior suspended portion of the structure **302** may be used to support the plant protection device **100**, **200** as it is being filled.

[0041] In various embodiments, the structure **302** may be constructed from a number of materials such as plastic, wood, or metal as will be recognized by those of skill in the art. Preferably, the material is substantially rigid such that if the apparatus **300** is placed on its bottom end, the structure **302** is self-supporting.

[0042] Furthermore, the structure **302** is preferably designed to substantially match the size of the plant protection device **100**, **200** with which it will be used. If the plant protection device **100**, **200** is placed around the structure **302**, the structure maybe utilized to provide support for the plant protection device tubes **102** as they are being filled such that the plant protection device **100**, **200** does not tip over or collapse, thereby spilling the contents of the plant protection tubes **102**. Preferably, the structure **302** is provided with opening at the top and/or bottom such that the apparatus **300** may be placed over and around a plant as a plant protection device **100**, **200** is being filled with fluid. This allows the plant protection device to be in position around the plant upon filling the plant protection device **100**, **200** with fluid.

[0043] The apparatus **300** includes a manifold **304** connected to the top end **314** of the structure **302**. In one embodiment, the manifold **304** is a tube-like or hose-like structure that is fastened around the circumference of the top end **314** of the structure **302**. The manifold **304** is typically configured to receive fluid through at least one inlet port **308**. The manifold **304** is preferably constructed from a water-tight material such as rubber or plastic sufficient for directing the flow of a fluid. Of course, one of skill in the art will recognize the various materials that are suitable for this type of manifold application.

[0044] As depicted, the manifold **304** may be fastened in place by the use of hose clamps **306** or other types of fastening devices. In one embodiment, the fasteners **306** may be integrated into the rigid structure **302** such that the structure includes tabs or other devices that may be used to fasten the manifold **304**. For example, in one embodiment, the rigid structure **302** may be constructed from a type of semi-malleable or malleable metal, and protruding tabs may be provided to extend from the top of the structure **302** such that the manifold **304** may be placed around the circumference of the structure **302**, and the tabs bent down around the manifold **304** to hold the manifold **304** in position.

[0045] In other embodiments, the manifold **304** may be integrated directly into the rigid structure **302** such that a manifold **304** is formed by molding metal, plastic, or the like, to create a tubular cavity around the circumference of the top end **314** of the structure **302**. The tubular cavity may then be utilized as a manifold **304** in accordance with the present invention. In still further embodiments, a manifold **304** maybe fastened using other types of fasteners know to those of skill in the art such as glue, clamps, clips, plastic welds, and the like.

[0046] Of course, in some embodiments, the manifold **304** need not surround the entire circumference of the structure **302**, but may be configured to connect to only a portion or portions of the structure **302**. For example, in one embodiment, the manifold **304** may configured in a "C" like shape with the ends of the manifold capped. In such as embodiment, the C-like structure of the manifold **304** may be sufficient to connect the manifold **304** to the rigid structure **304** by connecting the manifold **304** around the exterior of the structure **302**. In other embodiments, it is contemplated that the manifold may be attached to the interior of the structure **302** or may be suspended from the top end **314** of the structure **302**.

[0047] In one embodiment, an inlet port **308** is configured to receive fluid from an outside source, such as a garden hose, and to provide the fluid to the manifold **304**. The inlet port **308** is preferably a tube-like structure and may be provided with a connector or other device for easily connecting to the outside fluid source. For example, the inlet port **308** may be provided with a threaded connector for easily connecting to the end of a conventional garden hose or spigot.

[0048] The manifold **304** is connected to a plurality of outlet ports **310** connected to the manifold **304**. The outlet ports **310** are typically tube or hose-like structures configured to dispense fluid simultaneously out each of the plurality of outlet ports **310** such that the plant protection tubes **102** may be filled at substantially the same rate. In one embodiment, the outlet ports **310** may be integrated with the manifold **304** as single structure. In a preferable embodiment, the outlet ports **310** are connected to the manifold **304** via hose connectors **312** or the like. In a common embodiment, connectors are provided to connect the outlet ports **310** to the manifold by sliding the outlet ports **310** onto the connector and allowing friction to secure the outlet ports **310** in position. In various embodiments, barbs, glue, or other fastening structures may be utilized to further secure the outlet ports **310** to the manifold **304** if needed. As will be recognized by those of skill in the art, adapters and connectors for connecting tubes and hoses together are well known in the art. Such adapters and connectors may be utilized in accordance with the present invention to connect each outlet port **310** to the manifold **304**.

[0049] The outlet ports **310** are configured to dispense fluid provided from the inlet port **308** via the manifold **304**. The outlet ports **310** are preferably equally sized such that the flow rate of fluid out each outlet port **310** is substantially equal to the flow rate out each of the other outlet ports **310**. Because there may be numerous outlet ports provided, the outlet ports **310** are sized somewhat smaller than the manifold **304** and inlet port **308** to ensure adequate flow and pressure through the outlet ports **310**. In various embodiments, one or more of the outlet ports **310** may be configured with an outlet valve such that the fluid flow rate may be controlled or shut off for each of the outlet ports **310**. For example, if one outlet port **310** is damaged, it may be desirable to shut off just that outlet port **310**. In another example, it may be desirable to match the flow rate through each of the outlet ports **310** such that tubes **102** of the plant protection device **100**, **200** are filled at substantially the same rate.

[0050] Preferably, the number of outlet ports **310** provided on the apparatus **300** is equal to the number of plant protection tubes **102** provided with the plant protection device **100**, **200**. This allows a one-to-one match of outlet ports **310** to plant protection tubes **102** such that all of the plant protection tubes **102** may be filled simultaneously. Of course, other embodiments are contemplated where there are more or less outlet ports **310** than plant protection tubes **102**.

[0051] FIG. **4** is a top view of one embodiment of an apparatus for filling plant protection devices in accordance with the present invention. As depicted, the apparatus includes a rigid longitudinal substantially cylindrical structure **302** for supporting the apparatus **300** and for helping to support plant protection devices **100**, **200** as they are being filled with fluid. A manifold **304** is depicted around the circumference of the apparatus **300**, the manifold attached to the structure **302** by a plurality of hose clamps **306**. Fluid is provided to the manifold **304** via an inlet port **308** and fluid is dispensed from the manifold **304** via a plurality of outlet ports **310**. In one embodiment, the plurality of outlet ports **310** may be circumferentially spaced around the exterior of the structure **302**.

[0052] FIG. **5** is a top view of one embodiment of an apparatus **300** for filling plant protection devices **100**, **200** in accordance with the present invention. In one embodiment of the present invention, the inlet port **308** or manifold **304** may be connected to a control valve **502** for controlling the flow of fluid into the apparatus **300**. Preferably, the control valve **502** is configured to be manipulated by a user to shut off the flow of fluid to the apparatus **300** as well as selectively limit the amount of fluid that is flowing to the apparatus. Such a selective control valve **502** may be utilized to control the rate at which the tubes **102** are filled as well as allow for efficiently moving from one plant protection device **100**, **200** to another without having to access a main control valve or other fluid control device.

[0053] Those of skill in the art will recognize that numerous types of control valves **502** may be utilized in accordance with the present invention including but not limited to ball valves, butterfly valves, gate valves, needle valves, and the like.

[0054] As discussed above, the inlet port **308** may also be provided with a connector **504** for connecting to an outside fluid source, such as a garden hose. In some embodiments, a control valve **502** and a connector **504** may be integrated into a single device to both connect to an outside fluid source and to control the flow of fluid to the apparatus **300**.

[0055] In a typical application, a garden hose may be connected to the apparatus **300** by turning the male end of the garden hose into a threaded female end of the connector **504**. In this manner, water, or some other fluid, may be quickly and securely provided to the apparatus **300**.

[0056] FIGS. **6** and **7** illustrate one embodiment of a method **600** for filling plant protection devices **100**, **200** in accordance with the present invention. The method **600** substantially includes the embodiments described with regard to the apparatus **300**. The method **600** begins by placing **602** the filling device or apparatus **300** into a ring, or other structure, of plant protection tubes **102**. Typically, the plant protection device **100**, **200** circumferentially surrounds the apparatus **300** such that the interior wall of the plant protection device **100**, **200** rests against the exterior wall of the rigid structure **302** of the apparatus **300**. This may help support the plant protection device **100**, **200** during filling.

[0057] Next, the outlet ports **310** are placed **604** into openings in the plant protection tubes **102**. Preferably, the outlet ports **310** are long enough to reach deep enough into the plant protection tubes **102** such that structure of the plant protection tubes **102** holds the outlet ports **310** in position inside the plant protection tubes **102**.

[0058] Fluid is dispensed **606** simultaneously through the plurality of outlet ports **310** such that the plant protection tubes **102** fill with fluid at a substantially equal rate. This may help to prevent spillage or collapse of the plant protection device **100**, **200** as the plant protection tubes **102** are filled. As the plant protection tubes **102** fill with fluid, the fluid will provide increased rigidity to the plant protection device **100**, **200**, thereby allowing the plant protection to become self-supporting and free-standing.

[0059] Finally, the filling device or apparatus **300** is removed, and the plant protection device **100**, **200** is ready for use. Typically, the apparatus **300** is configured to slide out of the plant protection device **100**, **200** such that the plant protection device **100**, **200** remains in place after the apparatus **300** is removed. In some embodiments, the rigid cylindrical structure of the apparatus **300** may be place around a plant that is to be protected such that upon removal of the apparatus **300**, the plant protection device **100**, **200** is already in proper position to protect the plant.

[0060] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. An apparatus for filling plant protection devices with a fluid, the apparatus comprising:
- a circular manifold comprising at least one inlet port, the inlet port configured to receive fluid into the manifold; and
- a plurality of outlet ports spaced around the circular manifold and connected to the manifold, the outlet ports configured to dispense fluid simultaneously from the manifold out each of the plurality of outlet ports into a plant protection device.

2. The apparatus of claim **1**, further comprising a rigid, substantially cylindrical structure with a bottom end and a top end, the cylindrical structure configured to support the plant protection device during filling.

3. The apparatus of claim **2**, wherein the circular manifold is connected around the top end of the cylindrical structure.

4. The apparatus claim **3**, further comprising one or more fasteners that fasten the manifold to the top end of the cylindrical structure.

5. The apparatus of claim **1**, wherein the outlet ports each comprise a flexible cylindrical tube configured to transport fluid to the plant protection device.

6. The apparatus of claim **5**, further comprising a plurality of port connectors, the port connectors securing the outlet ports to the manifold.

7. The apparatus of claim **1**, further comprising an inlet control valve that selectively controls the flow of fluid into the manifold.

8. The apparatus of claim **1**, further comprising one or more outlet port valves that selectively control the flow of fluid out of one or more of the outlet ports.

9. The apparatus of claim **8**, wherein each of the plurality of outlet ports is connected to a corresponding independent outlet port valve such that the flow of fluid through each outlet port may be independently controlled by its corresponding outlet port valve.

10. A system for filling plant protection devices with a fluid, the system comprising:
- a plant protection device comprising a plurality of longitudinal tubes configurable to surround and protect a plant, each longitudinal tube having an opening configured to receive a fluid into the longitudinal tube;
- a rigid, substantially cylindrical structure with a bottom end and a top end;
- a manifold connected to the top end of the cylindrical structure, the manifold comprising at least an inlet port, the inlet port configured to receive fluid into the manifold; and
- a plurality of outlet ports connected to the manifold and configured to dispense fluid simultaneously out of the plurality of the outlet ports into the plurality of tubes of the plant protection device.

11. The System of claim **10**, further comprising a fluid source hose connected to the inlet port, the hose configured to provide fluid to the manifold.

12. The System of claim **10**, further comprising one or more fasteners that fasten the manifold around the top end of the cylindrical structure.

13. The system of claim **10**, wherein the outlet ports each comprise a flexible cylindrical tube configured to transport fluid to the plant protection device.

14. The system of claim **13**, further comprising a plurality of port connectors, the port connectors securing the outlet ports to the manifold.

15. The system of claim **10**, further comprising an inlet control valve that selectively controls the flow of fluid into the manifold.

16. The system of claim **10**, further comprising one or more outlet port valves that selectively control the flow of fluid out of one or more of the outlet ports.

17. The system of claim **10**, wherein the bottom end of the rigid structure comprises an opening sized to receive a growing plant.

18. A method for filling plant protection devices with a fluid, the method comprising:
- placing a plant protection device filling apparatus in proximity with a plant protection device, the plant protection device comprising a plurality of longitudinal tubes configurable to surround and protect a plant, each longitudinal tube having an opening configured to receive a fluid into the longitudinal tube, the plant protection device filling apparatus comprising
  - a circular manifold comprising at least one inlet port, the inlet port configured to receive fluid into the manifold; and
  - a plurality of outlet ports spaced around the circular manifold and connected to the manifold, the outlet ports configured to dispense fluid simultaneously from the manifold out each of the plurality of outlet ports into the longitudinal tubes of the plant protection device;
- placing each of the plurality of outlet ports into a corresponding opening of a longitudinal tube of the plant protection device; and
- dispensing fluid simultaneously through each of the outlet ports into the longitudinal tubes of the plant protection device.

19. The method of claim **17**, further comprising activating an inlet control valve to control the dispensing of fluid into the longitudinal tubes of the plant protection device.

20. The method of claim **17**, further comprising placing the plant protection device around a plant.

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