



US 20090052990A1

(19) **United States**

(12) **Patent Application Publication**
Richardson

(10) **Pub. No.: US 2009/0052990 A1**

(43) **Pub. Date: Feb. 26, 2009**

(54) **UNDERGROUND IRRIGATION SYSTEM**

Publication Classification

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(51) **Int. Cl.**
E02B 13/00 (2006.01)
(52) **U.S. Cl.** **405/43**

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(57) **ABSTRACT**

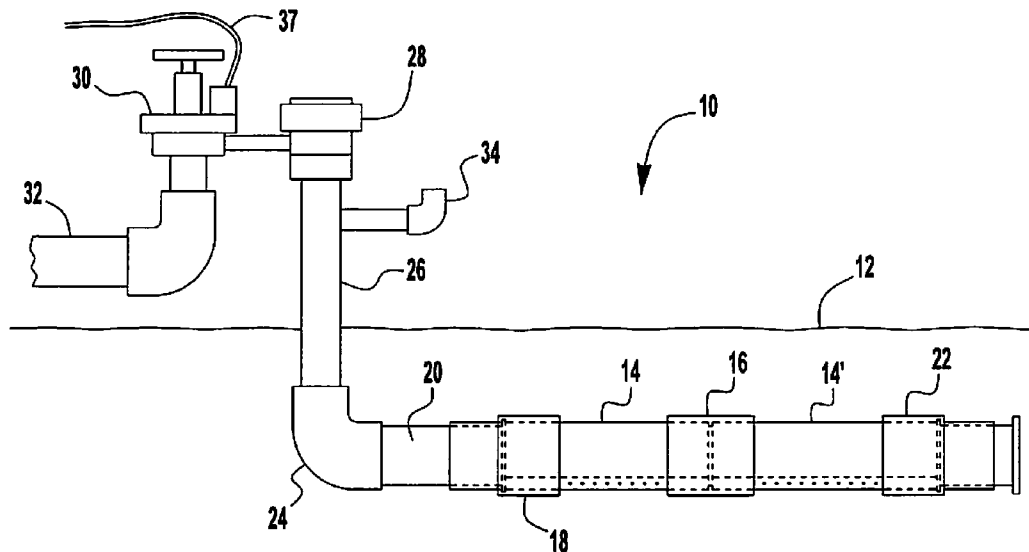
According to the present invention, an irrigation system pipe system **10** for aerating and watering a tract of land includes a first irrigation pipe section **14** having first and second isolated flow channels **34**, **36**, extending between the inlet and outlet ends **14a**, **14b** of the pipe section **14**, the second flow channel **36** having a plurality of openings formed therethrough; a second irrigation pipe section **14'** having first and second isolated flow channels **34'**, **36'**, extending between the inlet and outlet ends **14a'**, **14b'** of the pipe section **14'**, the second flow channel **36'** having a plurality of openings **38** formed therethrough; and coupling means **16** for interconnecting the first and second irrigation pipe sections **14**, **14'** so that water flowing through the first flow channels **34**, **34'** and through the second flow channels **36**, **36'** can flow between the first and second flow channels of the first and second irrigation pipe sections.

(21) Appl. No.: **12/254,563**

(22) Filed: **Oct. 20, 2008**

(30) **Foreign Application Priority Data**

Apr. 23, 2007 (US) PCT/US2007/067211



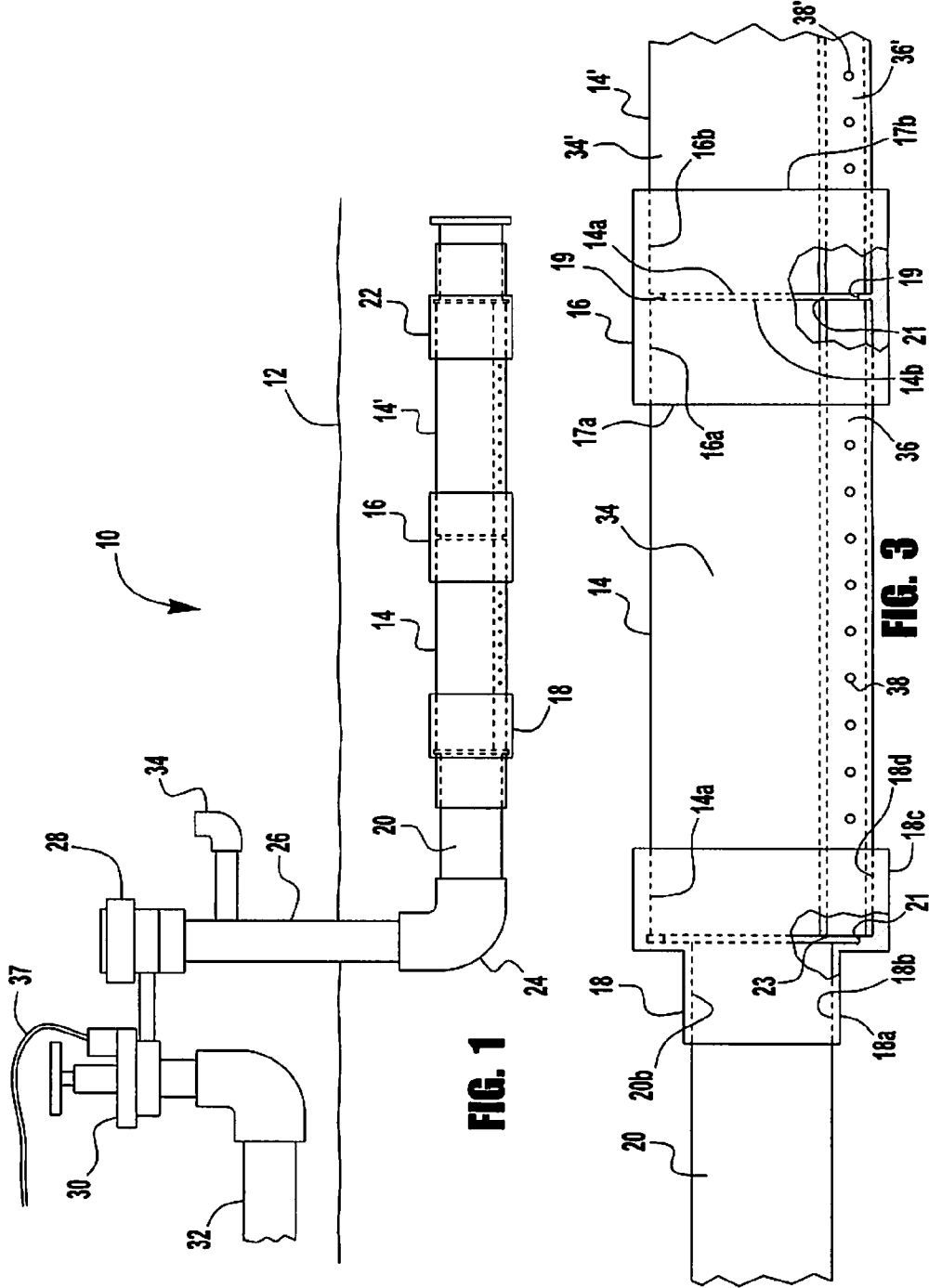
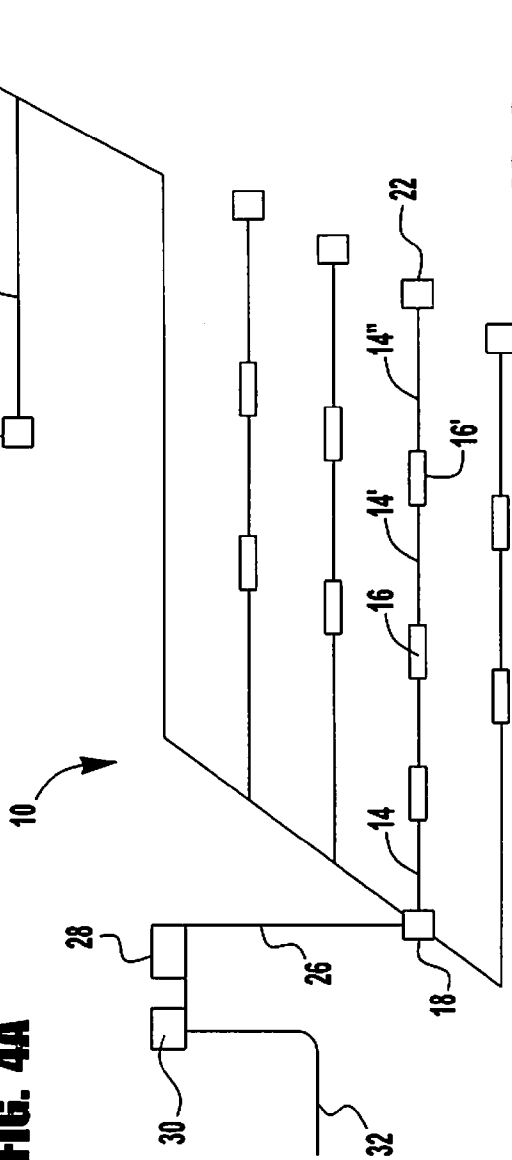
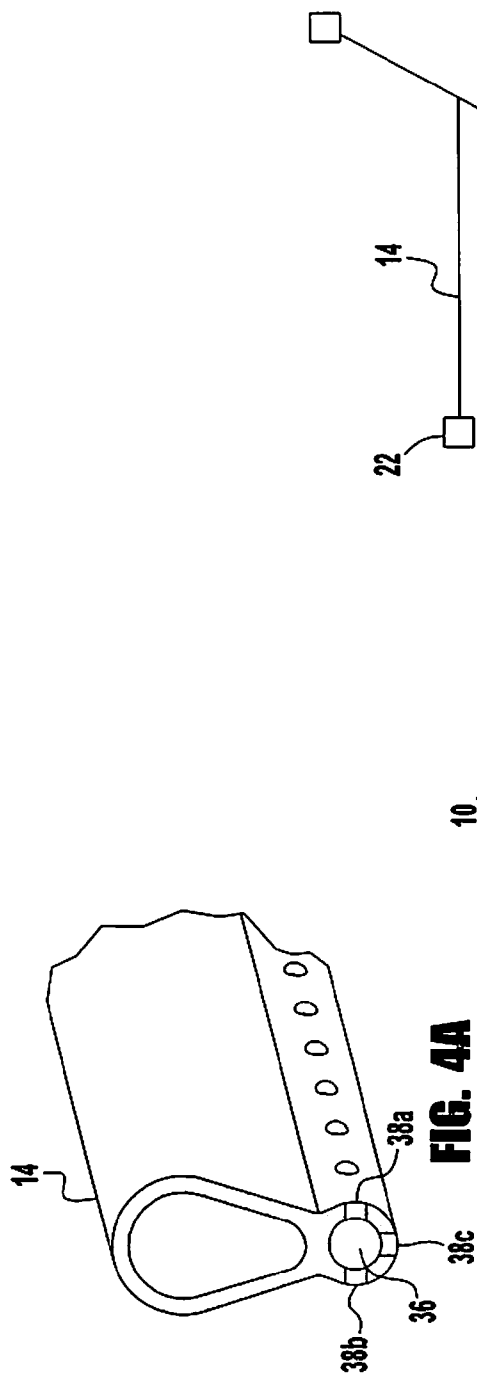
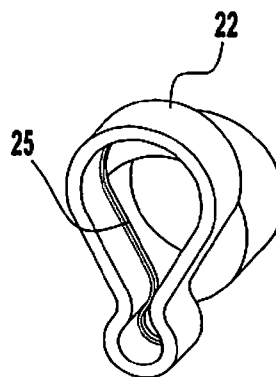
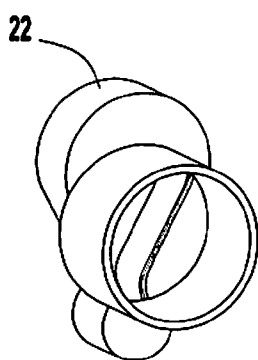
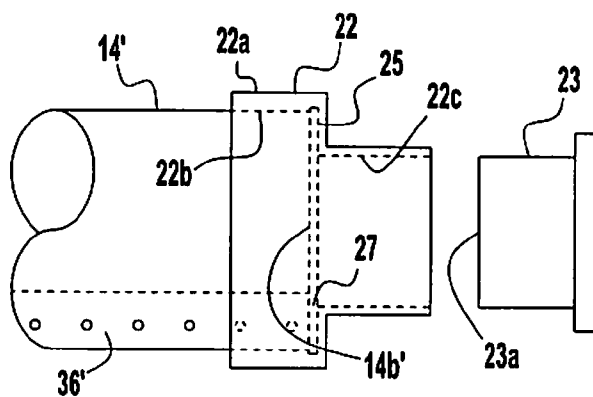
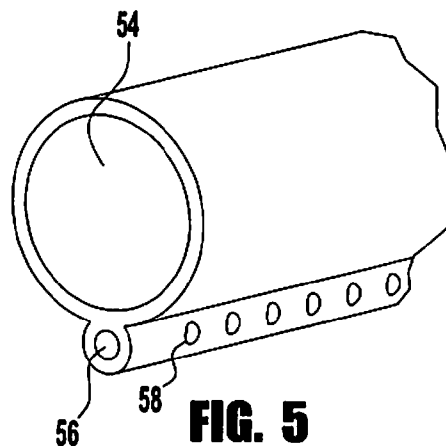
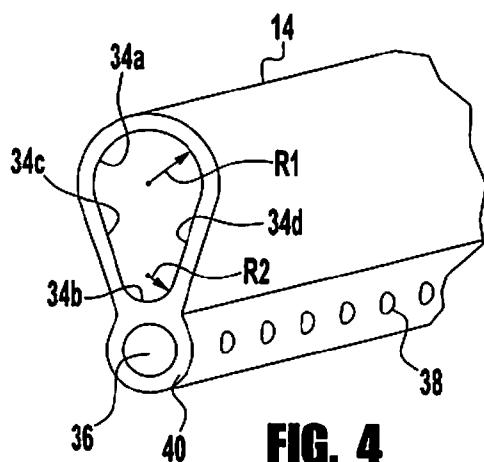


FIG. 1

FIG. 3





UNDERGROUND IRRIGATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/745,308 filed on Apr. 21, 2006 which is incorporated herein by reference.

[0002] This application also claims the benefit of International Application No. PCT/US2007/67211 filed on Apr. 23, 2007 which is incorporated in its entirety herein by reference.

TECHNICAL FIELD

[0003] The present invention relates generally to a irrigation system, and more particularly to an underground irrigation system which will minimize use of water due and allow for continued use for long periods of time without the need for cleaning.

BACKGROUND OF THE INVENTION

[0004] Underground sprinkler systems incorporating sprinkler nozzles have long been utilized to provide irrigation water to lawns, gardens and shrubbery. The primary advantage of such sprinkler systems is their lack of visibility when the system is not operating since the pipes interconnecting the sprinkler nozzles are concealed underground and the sprinkler nozzles themselves are generally positioned flush with the surface of the ground. The nozzles utilized with underground sprinkler systems generally rise above the surface of the ground when the sprinkler is operating and return to their flush position when water flow is terminated.

[0005] Conventional underground sprinkler systems incorporating sprinkler nozzles generally exhibit a number of problems. The sprinkler heads are usually fabricated from a large number of parts which must be assembled thereby making the nozzles somewhat expensive since the manufacturing and assembling costs are quite high. The large number of parts makes the sprinkler heads susceptible to breakdown increasing the amount of maintenance required for underground sprinkler systems. Most underground sprinkler systems are difficult to partially disassemble when repairing a malfunctioning sprinkler head. Still another drawback to conventional underground sprinkler systems, is the large amounts of water such systems tend to use. The present invention is designed to alleviate these issues, since there are no sprinkler heads to construct or maintain. Furthermore, the entire system is underground, thereby requiring substantially less water.

[0006] Another type of underground irrigation system incorporates a pipe system that allows water to seep into the ground through a plurality of flow apertures. These underground irrigation systems are often beset with the problem of blockage from debris in the irrigation water or from surrounding soil or build up of solids in the flow apertures. Generally, high water pressures are required to keep their apertures open. When the system is turned off the apertures are subject to clogging.

[0007] A system of underground irrigation is needed which will minimize use of water due to the lack of evaporation and

also permit its continued use for long periods of time without the need to clean the flow apertures through the walls of the irrigation pipes.

ASPECTS AND SUMMARY OF THE INVENTION

[0008] It is an aspect of the present invention to provide simple and inexpensive apparatus for watering an area of soil.

[0009] It is also another aspect of the present invention to provide an improved underground irrigation system incorporating improved irrigation piping that is economical and can be installed at relatively low cost and with a minimum of digging.

[0010] Another aspect of the present invention is to provide an improved underground irrigation system incorporating improved irrigation piping for irrigation or watering whereby the water seeps into the soil adjacent to the conduit without the need for any adjustment or modification of the conduit.

[0011] Another aspect of the present invention is to provide an improved underground irrigation system incorporating an improved irrigation piping that both waters and aerates the soil adjacent the irrigation piping of the system.

[0012] According to the present invention, an irrigation system pipe system for aerating and watering a tract of land is characterized by: a first irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the pipe section, the second flow channel having a plurality of openings formed therethrough; a second irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the pipe section, the second flow channel having a plurality of openings formed therethrough; and coupling means for interconnecting the first and second irrigation pipe sections so that water flowing through the first flow channels and through the second flow channels can flow between the first and second flow channels of the first and second irrigation pipe sections.

[0013] Further according to the present invention, the coupling means is a coupling sleeve having an inlet end adapted to firmly and securely receive the outlet end of a pipe section; an outlet end adapted to firmly and securely receive the inlet end of a pipe section; and a ridge formed within coupling to engage and space the outlet end of the pipe section from the inlet end of pipe section.

[0014] Still further according to the present invention, an inlet coupling is attached to the inlet end of the pipe, the inlet coupling has an inlet opening section adapted to firmly and securely receive an outlet end of a water inlet pipe; and an outlet opening section to firmly and securely receive an inlet end of irrigation pipe.

[0015] Yet further according to the present invention, an inlet coupling has a ridge projecting into the interior of coupling enough to firmly separate the ends and of the inlet pipe and the irrigation pipe and form a flow passage so that water flowing through the inlet pipe into first flow channel can flow into the second flow channel.

[0016] Also according to the present invention, an outlet end coupling has an inlet opening attached to the outlet section of irrigation pipe; and an outlet opening receiving a plug to close the outlet section of irrigation pipe.

[0017] Further according to the present invention, the outlet coupling has a ridge disposed at the intersection of the inlet opening and the outlet opening so that the ridge firmly separate the end of plug and the outlet end of pipe and creates a flow passage between the outlet end and the end of plug.

[0018] Still further according to the present invention, the inlet pipe is connected to an anti-siphon valve device and flow controller for operating the irrigation pipe system.

[0019] Also according to the present invention, the irrigation piping, the inlet coupling, the coupling sleeve and the outlet coupling are constructed of a material selected from the group including polyvinyl chloride, polyethylene, or other plastic material.

[0020] Further according to the present invention, the plurality of openings formed through the second flow channel are evenly spaced from each other and the openings can include holes located along opposite sides of the second flow passage and along the bottom of the flow passage.

[0021] Also according to the present invention, the first flow channels are larger than the second flow channels of the first and second irrigation pipe sections.

[0022] According to the present invention, a method for aerating and watering a tract of land, comprises the steps of: providing a first irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the pipe section, the second flow channel having a plurality of openings formed therethrough; providing a second irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the pipe section, the second flow channel having a plurality of openings formed therethrough; and interconnecting the first and second irrigation pipe sections so that water flowing through the first flow channels and through the second flow channels can flow between the first and second flow channels of the first and second irrigation pipe sections.

[0023] Further according to the present invention, the method comprises the steps of: firmly and securely receiving the outlet end of pipe section into an inlet end of coupling sleeve; firmly and securely receiving the inlet end of pipe section; and spacing the outlet end of the pipe section from the inlet end of pipe section so that water can flow from the first flow channels and through the second flow channels.

[0024] Still further according to the present invention, the method comprises the steps of: firmly and securely receiving an outlet end of a water inlet pipe into an inlet opening of inlet coupling; firmly and securely receiving an inlet end of irrigation pipe in an outlet opening of coupling; and separate the ends of the inlet pipe and the irrigation pipe so that water can flow from the first flow channel into the second flow channel.

[0025] Also according to the present invention, the method comprises the steps of attaching an outlet end coupling having an inlet opening to the outlet section of irrigation pipe; and receiving a plug in outlet opening to close the outlet section of irrigation pipe.

[0026] Still further according to the present invention, the method comprises the steps of separating the ends of the irrigation pipe and an end of plug so that water can flow from the first flow channel into the second flow channel.

[0027] Further according to the present invention, the method comprises the steps of connecting the inlet pipe to an anti-siphon valve device and flow controller for operating the irrigation pipe system.

[0028] Yet further according to the present invention, the method comprises the step of constructing the irrigation piping, the inlet coupling, the coupling sleeve and the outlet coupling of a material selected from the group including polyvinyl chloride, polyethylene, or other plastic material.

[0029] Also according to the present invention, the method comprises the step of evenly spacing the plurality of openings formed through the second flow channel are from each other.

[0030] Still further according to the present invention, the method comprises the step of forming the first flow channels larger than the second flow channels.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The structure, operation, and advantages of the present invention will become further apparent upon consideration of the following description taken in conjunction with the accompanying figures (Figs.). The figures are intended to be illustrative, not limiting.

[0032] Certain elements in some of the figures may be omitted, or illustrated not-to-scale, for illustrative clarity. The cross-sectional views may be in the form of "slices", or "near-sighted" cross-sectional views, omitting certain background lines which would otherwise be visible in a "true" cross-sectional view, for illustrative clarity.

[0033] In the drawings accompanying the description that follows, often both reference numerals and legends (labels, text descriptions) may be used to identify elements. If legends are provided, they are intended merely as an aid to the reader, and should not in any way be interpreted as limiting.

[0034] FIG. 1 is a schematic view of the irrigation pipe system incorporating irrigation pipe in accordance with the present invention;

[0035] FIG. 2 is a schematic illustration of an irrigation pipe system incorporating the irrigation pipe and principles of the present invention;

[0036] FIG. 3 is a detailed side view of several interconnected sections of irrigation pipe in accordance with the present invention;

[0037] FIG. 4 is a three-dimensional view of a section of irrigation pipe in accordance with the present invention;

[0038] FIG. 4a is a three-dimensional view of a section of irrigation pipe showing the placement of the watering holes in accordance with the present invention;

[0039] FIG. 5 is an alternative embodiment of a section of irrigation pipe in accordance with the present invention;

[0040] FIG. 6 is a detailed side view of an end irrigation pipe coupling and a plug assembly adapted for mounting onto an end of a section of irrigation pipe in accordance with the present invention;

[0041] FIG. 7 is an outer three dimensional end view of an end irrigation pipe coupling adapted for mounting onto an end of a section of irrigation pipe in accordance with the present invention; and

[0042] FIG. 8 is an opposite inner three dimensional end view of the end irrigation pipe coupling shown in FIG. 7 adapted for mounting onto an end of a section of irrigation pipe in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0043] FIG. 1 illustrates the basic components of an irrigation pipe system **10** which is preferably buried below ground surface **12** to any desired depth such as for example, 5 cm to 50 cm. The depth of the irrigation pipe system **10** preferably corresponds to the depth of the roots of the agricultural growth which is being irrigated. As shown in FIG. 2, the irrigation pipe system **10** can be laid out in any desired configuration as discussed in more detail herein after.

[0044] The primary components of the irrigation pipe system 10, as shown in FIG. 1, can include an irrigation pipe section 14, an irrigation pipe section coupling 16 adapted for connecting two irrigation pipe sections 14 and 14' together as shown in FIGS. 1 and 3, an irrigation pipe section inlet end coupling 18 adapted for connecting an irrigation pipe section 14 to a conventional inlet pipe 20, and an irrigation pipe section outlet end coupling 22 adapted for closing an end of a length of interconnected irrigation pipe section 14'.

[0045] In a typical installation, as shown in FIG. 1, the irrigation pipe system 10 is connected from inlet pipe 20, through an elbow coupling 24 to a standing pipe 26 which can project above ground level. The end of standing pipe 26 can be connected to an anti-siphon valve device 28 disposed above the pipe sections 14. The anti-siphon valve device 28 can be connected to a flow controller 30 which allows for either automatic or manual operation of the irrigation pipe system 10. The flow controller 30 is connected a source of water, typically a city water line having a water pressure of about 40 to 60 pounds per square inch (psi) through piping 32. The flow controller 30 can be operated with wires 33. Also, if desired, a fertilizer injector pipe 34 can be provided for injecting fertilizer directly into the irrigation pipe system 10.

[0046] The lengths and sizes of the components of the irrigation pipe system 10 can be of any desired dimensions. For example, the inlet pipe 20 which is attached to an inlet end coupling 18 and serves as the initial passageway for the water entering irrigation pipe system 10, is not necessarily of any desired length. A length of irrigation pipe section 14, according to the present invention, can be of any desired length, i.e., 3 meters. However, the specific length can vary depending on the particular application.

[0047] Referring to FIG. 4, there is illustrated a 3-dimensional, perspective view of an irrigation pipe section 14 according to the present invention. Irrigation pipe section 14 includes first and second, isolated, independent and separate flow channels 34, 36. The first flow channel 34 can have any desirable cross sectional shape, such as for example, an upper section wall 34a formed generally as a semi-circle having a radius R_1 , a lower section wall 34b formed generally as a semi-circle having a radius R_2 , which is less than R_1 . The semi-circular cross sectional walls 34a and 34b are connected by sidewalls 34c and 34d. In an exemplary pipe section 14, the radius R_1 of upper section wall 34a can be between approximately 1 cm to about 15 cm and the sidewalls can be approximately 0.5 cm to about 7.0 cm preferably between about 1.0 inches and 2.0 inches.

[0048] Flow channel 34 distributes water throughout the pipe system 10 and ultimately to the second flow passage or channel 36. The flow channel 36 has a plurality of holes 38 through the sidewall 40 that function to send out, spray or mist water there through externally to the soil adjacent the pipe system 10.

[0049] The second flow channel 36 is preferably of a circular cross-section and can have a diameter of between approximately 1 cm to about 1.3 cm. The second flow passage 36 includes a plurality of holes or openings 38 extending through the wall 40 of the flow passage. Holes or openings 38 can have a diameter of between approximately 0.015 cm and 0.2 cm and preferably between about 0.1 cm and 0.15 cm.

[0050] As shown in FIG. 4A, the holes 38 can include holes 38a and 38b located along opposite sides of the second flow passage 36. It is also within the terms of the present invention for the holes 38 to include holes 38c located along the bottom

of the flow passage 36 either alone or in combination with holes 38a and 38b in one or along opposite sides of the flow passage 36. The holes 38 can be separated from each other between approximately 12 cm and 60 cm and preferably between about 25 cm and 40 cm. The holes 38 in flow passage 36 spray or mist water externally to the soil adjacent the pipe system 10. While the holes are illustrated as being evenly spaced, it is within the terms of the invention to size them and space them as desired.

[0051] While irrigation pipe section 14 is illustrated with the first flow channel 34 having a larger cross section than second flow channel 36, it is within the terms of the present invention for the relationship of either the first or the second flow channels 34,36 to be larger than the other.

[0052] The primary consideration is for the first flow channel 34 to have a larger flow area than the area of all of the through holes 38. In that way the pressure in the first flow channel 34 will remain greater than the pressure in the second flow channel 36 because the volume of water being sprayed out from the holes 38 in the second flow channel will never be enough to reduce the volume of water flowing through the first flow channel 34 so that the pressure in the second flow channel will be greater than the pressure in the first flow channel. Still, for most uses, it is anticipated that the first flow channel 34 will have a larger cross section than the second flow channel 36. Moreover, the particular cross section shape of the first and second flow channels 34,36 can be any desired shape as long as the flow requirements are met.

[0053] As seen in FIG. 5, there is an alternative embodiment of pipe 14 wherein the cross-section of the larger flow channel 54 is circular. The smaller passage 56 is essentially the same as flow passage 36 in FIG. 4.

[0054] Referring to FIG. 3, irrigation pipe sections 14 and 14' can be interconnected with a coupling sleeve 16. The coupling sleeve 16 has a first inner surface 16a opening to an inlet end 17a and a second inner surface 16b opening to an outlet end 17b. Both the first and second inner surfaces 16a and 16b have the same shape as the outer surface of irrigation pipes 14, 14' and are sized so that the inlet or outlet end of irrigation pipes 14, 14' are firmly and securely received within either end 17a or 17b of the coupling sleeve 16 as shown in FIG. 3.

[0055] As seen in FIG. 3, coupling sleeve 16 has a ridge 19 with a width of about 0.2 to about 0.5 cms at the intersection of the first and second inner surfaces 16a and 16b. Ridge 19 is formed around the interior surface of the coupling sleeve 16 so that the inner surfaces 16a and 16b of the coupling sleeve are not in contact with each other. The ridge 19 preferably projects into the interior of the coupling sleeve 16 a distance equal to or less than the thickness of the tubing. That is, the ridge 19 is constructed so that it does not extend into the interior of coupling 16 enough to completely block the flow passages 36 and 36'. Preferably, the ridge 19 projects into the interior of coupling sleeve 36 enough to firmly separate the outlet end 14b and the inlet end 14a' of the irrigation pipes 14 and 14', respectively, being interconnected but not enough to close the flow passages 36 and 36'. As discussed in more detail below, the ridge 19 separates the outlet end 14b and the inlet end 14a' of the two interconnected irrigation pipes 14 and 14' so that water flowing through the larger flow channels 34 and 34' of the two irrigation pipes can flow through the flow passage 21 formed between the outlet end 14b and inlet end 14a' and into the smaller flow channels 36 and 36' of each of the two interconnected pipes.

[0056] The pipe irrigation system 10 incorporates as many pipe sections 14, 14' and coupling sleeves 16 as required, depending on the size of the area of the tract of land to be irrigated and aerated.

[0057] The pipe irrigation system 10 has an inlet coupling 18 which is attached to the inlet end 14a of the pipe 14. Inlet coupling 18 has an inlet opening section 18a with a first inner surface 18b having the same shape as the outer surface of a water inlet pipe 20 and is sized so that an outlet end 20b of inlet pipe 20 is firmly and securely received within inlet opening section 18a, as shown in FIG. 3. The specific size of the outer surface of a water inlet pipe 20 and outlet end 20b of inlet pipe 20 is in accordance with the specific specifications required by the builder or government regulations.

[0058] Inlet coupling 18 has an outlet opening section 18c with a second inner surface 18d having the same shape as the outer surface as the inlet section 14a of irrigation pipe 14. The second inner surface 18d of outlet opening section 18c is sized so that an inlet end 14a of irrigation pipe 14 is firmly and securely received within outlet opening 18c of the inlet coupling sleeve 18.

[0059] As seen in FIG. 3, inlet coupling sleeve 18 has a ridge 21 that is substantially identical to the ridge 19 in coupling 16. The ridge 21 is disposed at the intersection of the first and second inner surfaces 18b and 18d and formed around the second inner surface 18d so that the outlet end 20b of supply pipe 20 engages the ridge 21 and is prevented from moving into the outlet opening section 18c. In addition, the ridge 21 is constructed so that it does not extend into the interior of coupling 18 enough to completely block the flow passage 36 of pipe 14. Preferably, the ridge 21 projects into the interior of coupling sleeve 18 about the thickness of the pipe walls and enough to firmly separate the outlet end 20b of inlet pipe 20 and the inlet end 14a of pipe 14 but not enough to close the flow passage 36. As discussed in more detail below, the ridge 21 separates the outlet end 20b and the inlet end 14a of the inlet pipe 20 and the irrigation pipe 14 so that water flowing from the inlet pipe 20 into the larger flow channel 34 can flow through the flow passage 23 formed between the outlet end 20b and the inlet end 14a and into the smaller flow channel 36 of the interconnected pipe 14.

[0060] As shown in FIG. 6, an outlet end coupling 22 can be connected to the outlet end 14b' of an irrigation pipe 14' to close off the end of the pipe. Outlet end coupling 22 is substantially identical to inlet end coupling 18 except that it receives a plug 23 to prevent water from flowing out of irrigation pipe 14'.

[0061] Outlet end coupling 22 has an inlet opening section 22a with an inner outlet surface 22b having the same shape as the outer surface as the outlet section 14b' of irrigation pipe 14'. The inner surface 22b is sized so that the outlet end 14b' of irrigation pipe 14' is firmly and securely received within inlet opening 22a.

[0062] As seen in FIG. 6, outlet coupling sleeve 22 has a ridge 25 that is substantially identical to the ridge 21 in inlet coupling 18. The ridge 25 is disposed at the intersection of the inlet inner surface 22b and the outlet inner surface 22c and formed around the inlet inner surface 22b so that the outlet end 14b' of pipe 14' engages the ridge 25. In addition, the ridge 25 is constructed so that it does not extend into the interior of coupling 22 enough to completely block the flow passage 36'. Preferably, the ridge 25 projects into the interior of coupling sleeve 22 enough to firmly separate the end 23a of plug 23 and the outlet end 14b' of pipe 14' but not enough to

close the flow passage 36'. As discussed in more detail below, the ridge 25 separates the outlet end 14b' of pipe 14' and end 23a of plug 23 so that water flowing through the larger flow channel 34' can flow through the flow passage 27 between the outlet end 14b' and the end 23a of plug 23.

[0063] FIG. 2 is a schematic view of a pipe irrigation system 10 generally including a typical installation, as shown in FIG. 1, wherein the irrigation pipe system 10 is connected through an inlet pipe 20, through an elbow coupling 24 to a standing pipe 26 which can project above ground level. The end of standing pipe 26 can be connected to an anti-siphon valve device 28 disposed above the grid of pipe sections 14, 14', 14" The anti-siphon valve device 28 can be connected to a flow controller 30 which allows for automatic or manual operation of the irrigation pipe system 10. The flow controller 30 is connected a source of water, typically a city water line having a water pressure of about 40 to 60 pounds per square inch (psi) through piping 32.

[0064] An important aspect of the present invention is the coupling sleeve 16 connecting the outlet end 14b of a first pipe 14 to the inlet end 14a' of a second pipe 14'. Coupling sleeve 16 has several purposes. First, coupling 18 connects two pieces of irrigation pipe 14 and 14'. Secondly, the coupling sleeve 16 maintains the water pressure throughout the pipe irrigation system 10, allowing water to reach the ends of pipes 14, 14', 14", which are each closed by end couplings 22, as shown in FIGS. 1 and 6. The coupling sleeves 16 have an inlet and outlet bores 16a, 16b that are sized to receive the inlet and outlet ends of pipes 14, 14', 14", etc.

[0065] Within coupling sleeves 16, water flows from first and second passages 34 and 36 in pipe 14 to first and second passages 34' and 36' in pipe 14'. The water flowing through passages 34 and 34' passes through a small flow passage or channel 21 into passages 36 and 36' (with the watering holes 38, 38') of the pipes 14 and 14' connected to the inlet and outlet openings 17a, 17b of the coupling sleeves 16.

[0066] While a single line of pipe 14 and 14' are shown, it is within the terms of the present invention to stack two or more lengths of interconnected pipes, one above the other and each connected to the same source of water so that the land is watered at different levels below the surface 12.

[0067] Also, while the present invention is described as being an underground irrigation system, it is also within the terms of the present invention to dispose the system on or above the surface 12 of the ground.

[0068] In operation, the irrigation system 10 is first installed underground by any desired means, such as cutting a trench, inserting the piping system 10 and closing the trench. Then water under pressure, such as at a pressure of between about 40 psi and about 60 psi, the typical water pressure of city water supplies, flows through the anti-siphon valve and controller 28 and 30, through the down pipe 26 and into the inlet pipe 20. The water can then flow into inlet sleeve 18, through flow channel 34, and down flow passage 23 into flow channel 36. Next the water flows through the connector sleeves 16. Note that the water flowing through system 10 forces any air to be expelled through the holes or openings 38 extending through the walls of the small flow passage 36 and into the ground for aerating the earth. The water continues to flow down the length of the irrigation pipes 14, 14', 14", etc. until it is blocked by end caps 22. The water pressure can remain constant in the flow channels 34 as long as the volume of water flowing through the openings 38 is less than the volume of water flowing through the flow channels 34.

[0069] An important aspect of the invention is the incorporation of the large and small, separate flow passages **34** and **36** which are interconnected by a flow passage **21** within the connector sleeves **16**. The water in the large flow passage **34** of the pipes **14** is always substantially at the system pressure. The water in the small flow passages **36** and **36'** is flowing out through the holes **38** into the adjacent ground and therefore, the pressure in the small passageways **36** and **36'** can be less than that in the larger flow passages **34**.

[0070] It will be understood that the present invention may have various other embodiments. For example, while the piping and coupling can be constructed of a material impervious and inert to water such as polyvinyl chloride, polyethylene, or other plastic material, it is within the terms of the present invention to construct them of other materials, such as metal.

[0071] It is also understood, of course, that while the form of the invention herein shown and described constitutes a preferred embodiment of the invention, it is not intended to illustrate all possible forms thereof. It will also be understood that the words used are words of description rather than limitation, and that various changes may be made without departing from the spirit and scope of the invention disclosed. Thus, the scope of the invention should be determined by the appended claims and their legal equivalents, rather than solely by the examples given.

1. An irrigation system pipe system for aerating and watering a tract of land, characterized by:

a first irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the pipe section, the second isolated flow channel having a plurality of openings formed there-through;

a second irrigation pipe section having first and second isolated flow channels extending between the inlet and outlet ends of the second pipe section, the second flow channel **36'** having a plurality of openings formed there-through; and

coupling means **16** for interconnecting the first and second irrigation pipe sections so that water flowing through the first flow channels and through the second flow channels can flow between the first and second flow channels of the first and second irrigation pipe sections.

2. The irrigation system pipe system of claim **1** further characterized in that the coupling means is a coupling sleeve having:

an inlet end adapted to firmly and securely receive the first and second isolated flow channels, of the outlet end of the first pipe section;

an outlet end adapted to firmly and securely receive the first and second isolated flow channels, of the inlet end of the second pipe section; and

a ridge formed within coupling sleeve to engage and space the first and second isolated flow channels of the outlet end of the first pipe section from the first and second isolated flow channels of the inlet end of the second pipe section, whereby the first and second isolated flow channels of the first pipe section are in flow communication with the first and second isolated flow channels of the second pipe section.

3. The irrigation system pipe system of claim **1** further characterized in that:

an inlet coupling is attached to the inlet end of the pipe, the inlet coupling has an inlet opening section adapted to firmly and securely receive an outlet end of a water inlet pipe; and

an outlet opening section to firmly and securely receive an inlet end of the first and second isolated flow channels of the irrigation pipe section.

4. The irrigation system pipe system of claim **3** further characterized in that the inlet coupling has a ridge projecting into the interior of coupling enough to firmly separate the ends and of the inlet pipe and the irrigation pipe and form a flow passage so that water flowing through the inlet pipe into first flow channel can flow into the second flow channel.

5. The irrigation system pipe system of claim **3** further characterized in that:

an outlet end coupling has an inlet opening attached to the outlet section of the second irrigation pipe; and

an outlet opening receiving a plug to close the outlet section of the second irrigation pipe.

6. The irrigation system pipe system of claim **5** further characterized in that the outlet coupling has a ridge disposed at the intersection of the inlet opening and the outlet opening so that the ridge firmly separate the end of the plug and the outlet end of the second irrigation pipe and creates a flow passage between the outlet end of the second irrigation pipe and the end of the plug.

7. The irrigation system pipe system of claim **1** further characterized in that the inlet pipe is connected to an anti-siphon valve device and flow controller for operating the irrigation pipe system.

8. The irrigation system pipe system of claim **1** further characterized in that the irrigation piping, the inlet coupling, the coupling sleeve and the outlet coupling are constructed of a material selected from the group comprising polyvinyl chloride, polyethylene, or other plastic material.

9. The irrigation system pipe system of claim **1** further characterized in that the plurality of openings formed through the second flow channel are evenly spaced from each other.

10. The irrigation system pipe system of claim **1** further characterized in that the openings can include holes and located along opposite sides of the second flow passage and along the bottom of the second flow passage.

11. The irrigation system pipe system of claim **1** further characterized in that the first flow channels are larger than the second flow channels of the first and second irrigation pipe sections, respectively.

12. A method for aerating and watering a tract of land, comprising the steps of:

providing a first irrigation pipe section **14** having first and second isolated flow channels extending between the inlet and outlet ends of the pipe section, the second flow channel having a plurality of openings formed there-through;

providing a second irrigation pipe section having first and second isolated flow channels, extending between the inlet and outlet ends of the second pipe section, the second flow channel having a plurality of openings formed there-through; and

interconnecting the first and second irrigation pipe sections so that water flowing through the first flow channels and through the second flow channels can flow between the first and second flow channels of the first and second irrigation pipe sections.

13. The method of claim **12** further comprising the steps of: firmly and securely receiving the outlet end of the first pipe section into an inlet end of a coupling sleeve; firmly and securely receiving the first and second isolated flow channel of the inlet end of the second pipe section into an outlet end of the coupling sleeve; and spacing the outlet end of the first pipe section from the inlet end of the second pipe section within the coupling sleeve so that water can flow from the first flow channels and through the second flow channels.

14. The method of claim **12** further comprising the steps of: firmly and securely receiving an outlet end of a water inlet pipe into an inlet opening of a coupling sleeve; firmly and securely receiving an inlet end of the first irrigation pipe section in an outlet opening of the coupling sleeve; and

separating the ends of the inlet pipe and the irrigation pipe within the coupling sleeve so that water can flow from the first flow channel into the second flow channel.

15. The method of claim **12** further comprising the steps of: attaching an outlet end coupling having an inlet opening to the outlet section of the second irrigation pipe; and

receiving a plug in an outlet opening to close the outlet section of the second irrigation pipe.

16. The method of claim **12** further comprising the step of: separating the ends of the second irrigation pipe and an end of the plug so that water can flow from the first flow channel into the second flow channel.

17. The method of claim **12** further comprising the step of: connecting the inlet pipe to an anti-siphon valve device and flow controller for operating the irrigation pipe system.

18. The method of claim **12** further comprising the step of: constructing the irrigation piping, the inlet coupling, the coupling sleeve and the outlet coupling of a material selected from the group comprising polyvinyl chloride, polyethylene, or other plastic material.

19. The method of claim **12** further comprising the step of evenly spacing the plurality of openings **38** formed through the second flow channel **36** from each other.

20. The method of claim **12** further comprising the step forming the first isolated flow channels larger than the second isolated flow channels.

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