United States Patent [19]

Kah, Jr.

[11] **3,797,740**

[45] **Mar. 19, 1974**

[54] **FLUID DISTRIBUTION SYSTEM OPERATED BY PRESSURE SIGNAL**

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[21] Appl. No.: **220,358**

[52] **U.S. Cl.** **239/11,** 239/66, 137/119

[51] **Int. Cl.** **B05b 17/04**

[58] **Field of Search** 239/11, 71, 76, 66; 169/8, 169/9; 137/84

[56] **References Cited**

UNITED STATES PATENTS

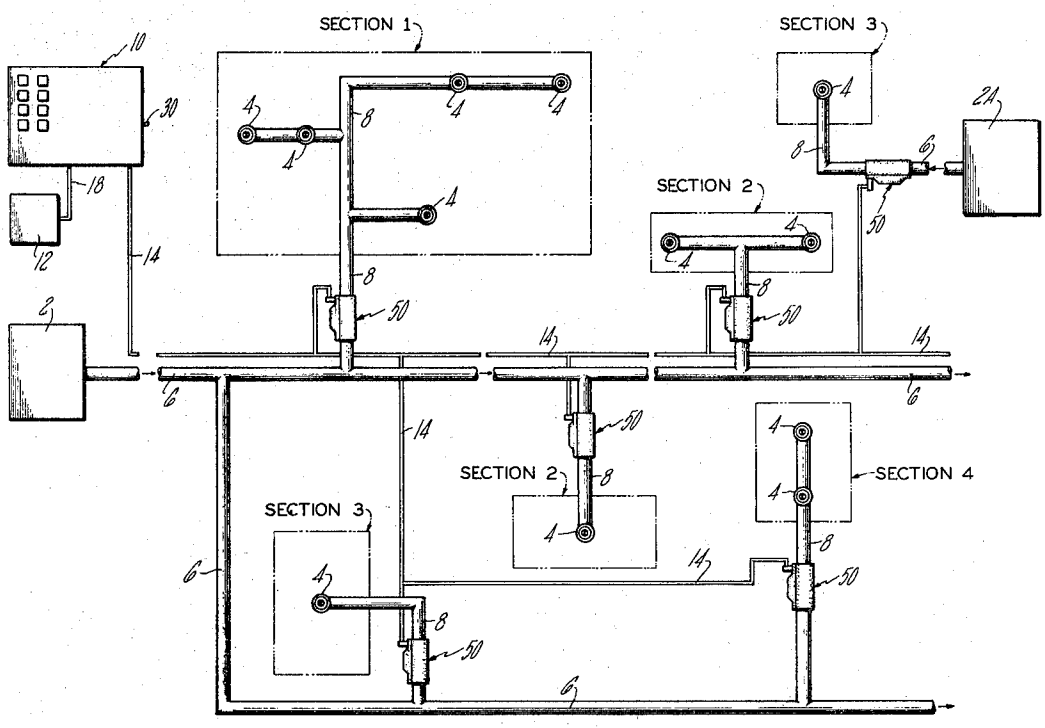
1,038,060	9/1912	Zint	239/66
2,674,490	4/1954	Richards	239/66
3,372,708	3/1968	Hotchkin	239/66
3,519,016	7/1970	Kah Jr. et al.	239/66
3,578,245	5/1971	Brock	239/66
3,635,237	1/1972	Kah, Jr.	239/66
3,386,460	6/1968	Dean	239/69
3,400,891	9/1968	Mattwell	239/69

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Attorney, Agent, or Firm—Jack N. McCarthy

[57] **ABSTRACT**

A sprinkler system has a plurality of sprinklers connected to a main water supply. A control system includes main flow control valve units for controlling water flow to said sprinklers, said valve units being controlled by pressure signals of predetermined values from a pressure signal control means. Each valve unit includes a manually actuated valve and a pressure actuated valve.

19 Claims, 9 Drawing Figures



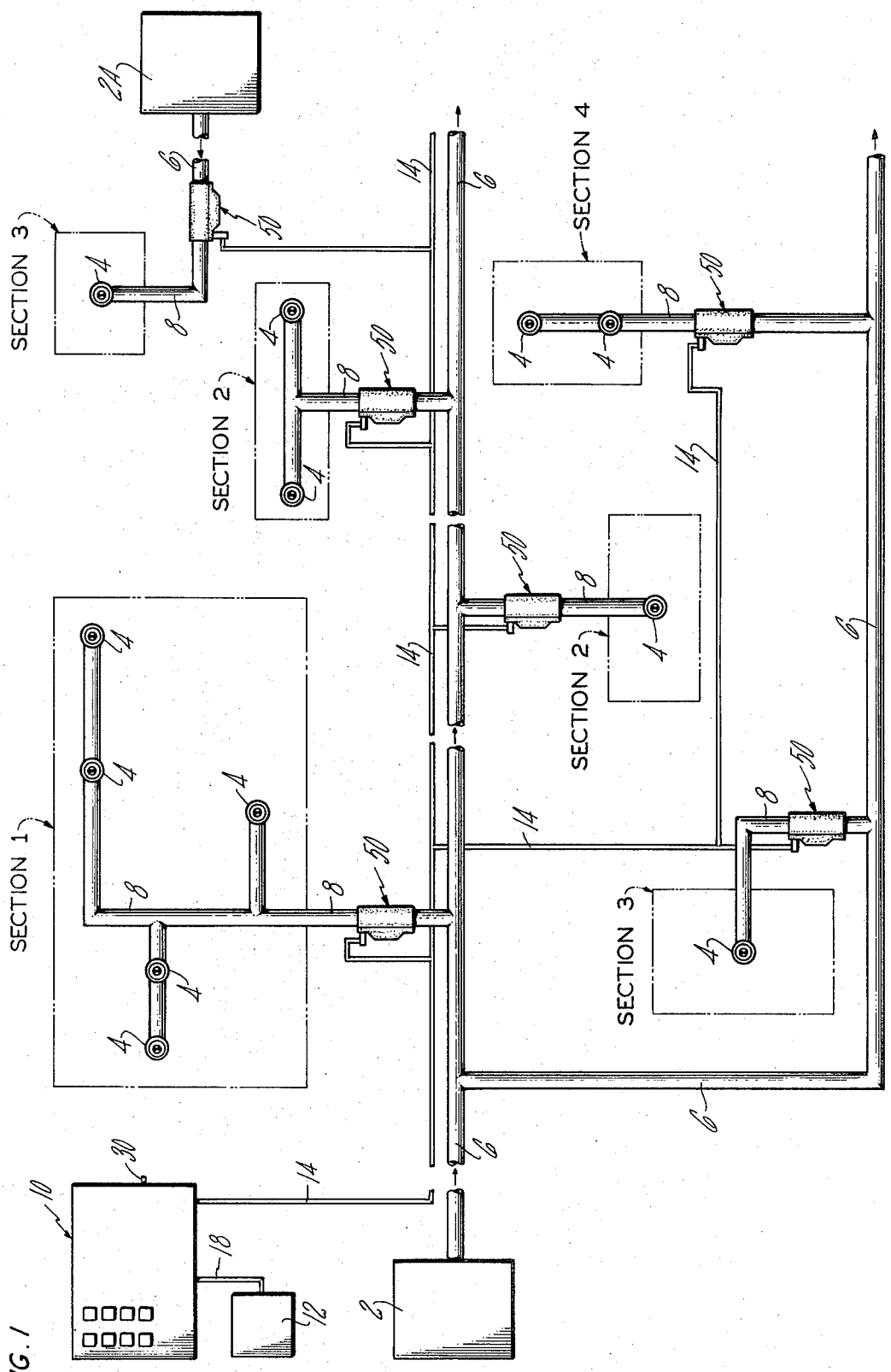
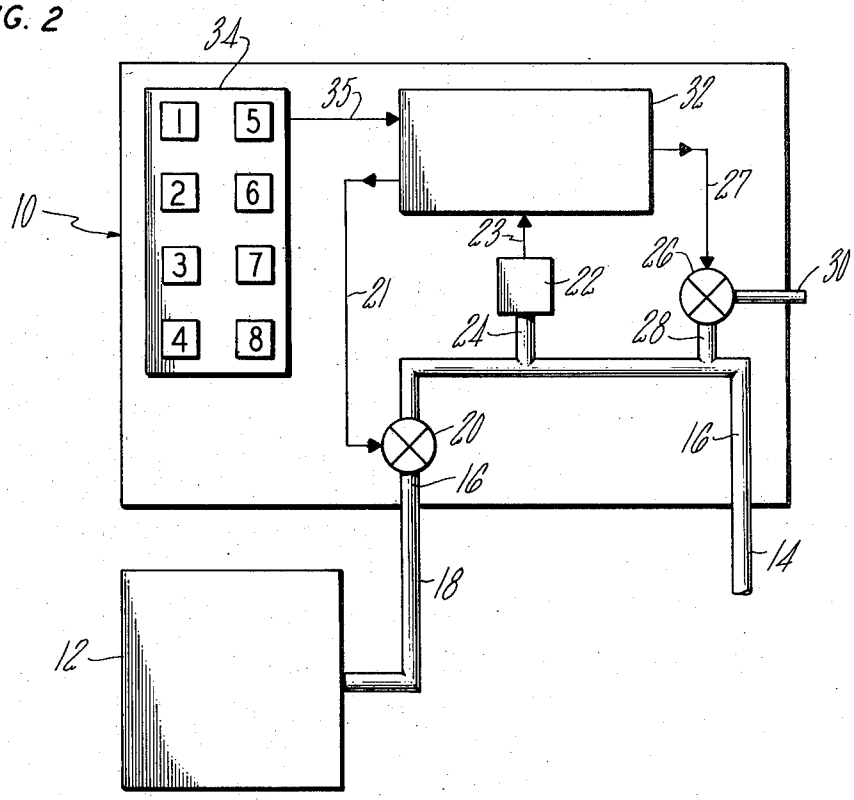


FIG. 1

FIG. 2



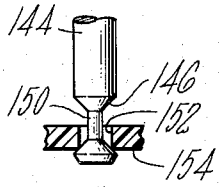


FIG. 4

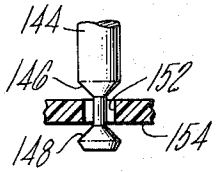


FIG. 5

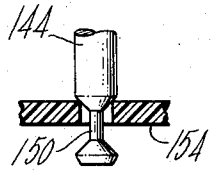


FIG. 6

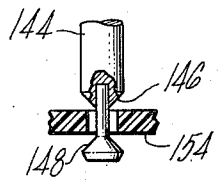


FIG. 7

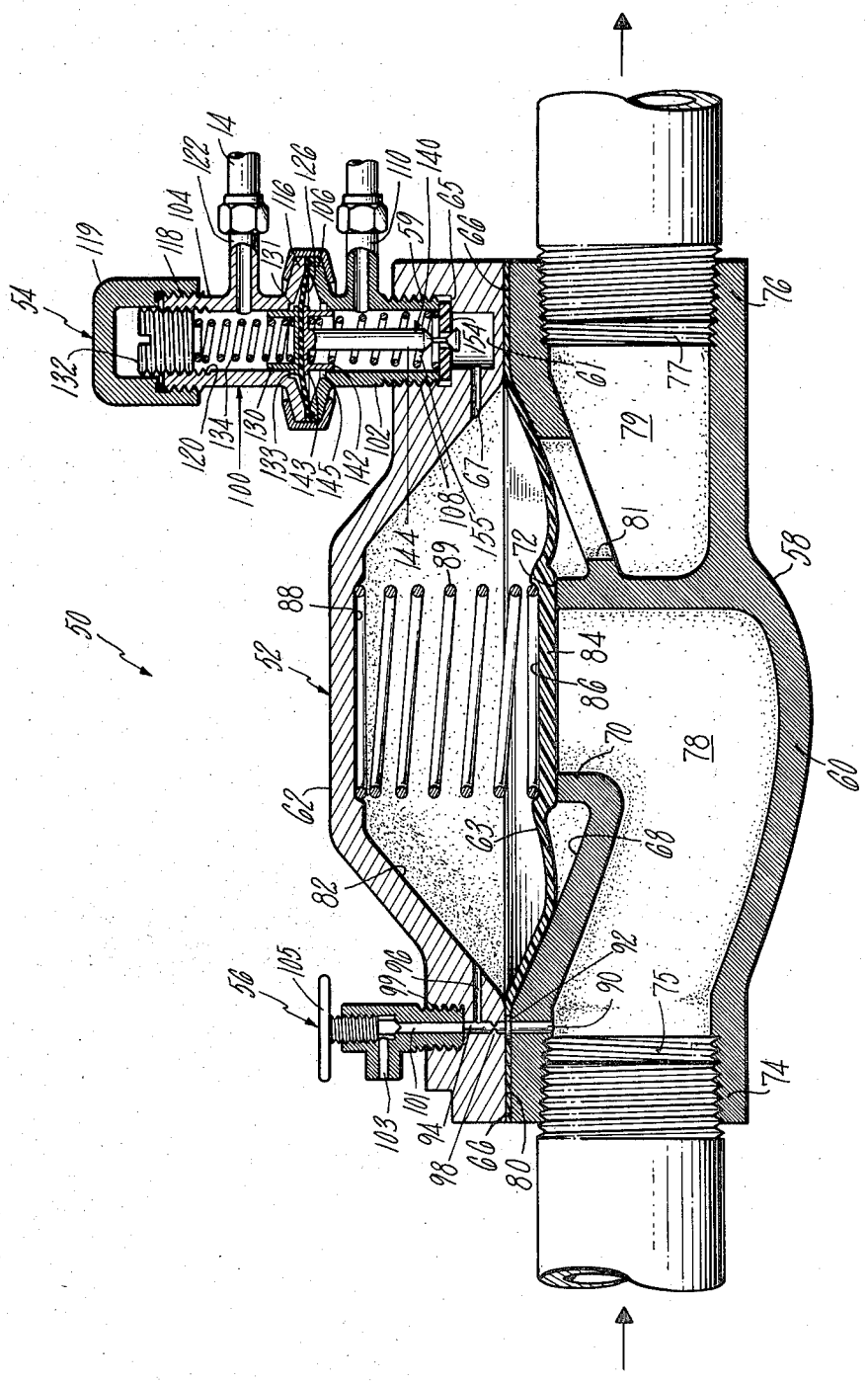

50
52
54
56
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60
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116
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144
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154
155

FIG. 3

FIG. 8

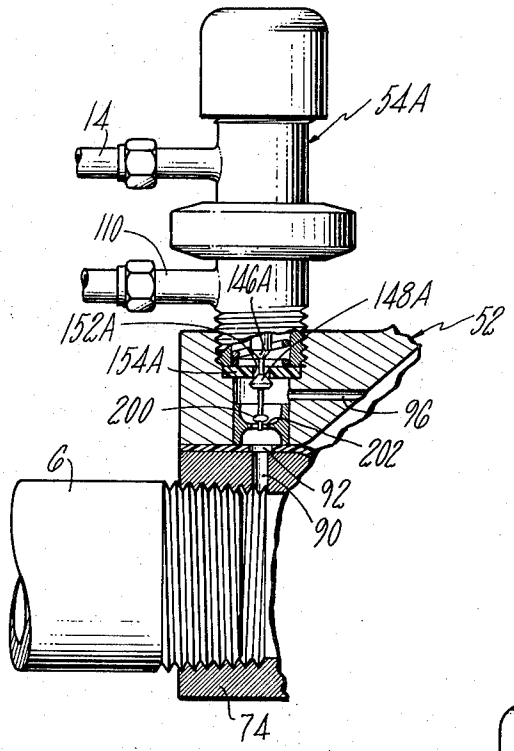
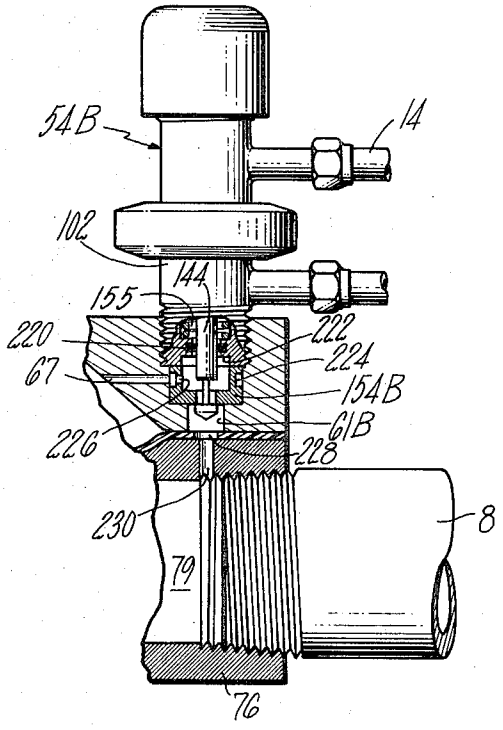

14
54A
110
146A
148A
52
152A
154A
200
96
202
6
92
90
74

FIG. 9


54B
14
102
144
155
220
222
224
67
154B
61B
226
228
230
8
79
76

FLUID DISTRIBUTION SYSTEM OPERATED BY PRESSURE SIGNAL

BACKGROUND OF THE INVENTION

The invention relates generally to fluid distribution or sprinkler systems and valves included therein for irrigation purposes. Previously, pressure sequencing valves required a pressure pulsing of a fluid in the main line. See Application Ser. No. 90,732 for IRRIGATION SPRINKLER SYSTEM CONTROL EMPLOYING PILOT OPERATED, PRESSURE ACTUATED AND SEQUENCED VALVE ASSEMBLIES of Carl L. C. Kah, Jr., filed Nov. 18, 1970 now continuing Application Ser. No. 222,600, filed Feb. 1, 1972, now U.S. Pat. No. 3,747,620.

SUMMARY OF THE INVENTION

It is a primary object of the invention to provide a sprinkler system for irrigating with control of sprinklers or sprinkling sections by flow control valves which can be selectively signaled open or closed by a tube pressure signal separate from the main flow system.

Another object of the invention is to provide a pressure signal control means which will direct proper signal levels to the sprinkler system to irrigate the desired sections.

In accordance with the invention, a main flow control valve unit is provided which is responsive to a desired pressure signal, the main flow control valve unit including a pressure actuated valve which can be changed to be responsive to different desired pressure signals.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic view of a portion of a sprinkler system showing a main water conduit and supply, and a pressure signal tube with pressure signal control means.

FIG. **2** is a schematic view of the pressure signal control means showing a pressure signal source and a pressure signal controller.

FIG. **3** is a sectional view of the main flow control valve unit.

FIG. **4** shows the closed position of the valve surfaces of the pressure actuated valve at a low pressure signal.

FIG. **5** shows the open position of the valve surfaces of the pressure actuated valve at an actuating pressure signal.

FIG. **6** shows the closed position of the valve surfaces of the pressure actuated valve at a high pressure signal.

FIG. **7** is a view showing the valve surfaces formed by a plurality of parts.

FIG. **8** is a modification of the main flow control valve unit.

FIG. **9** is another modification of the main flow control valve unit.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a portion of a sprinkler system is shown with a main water supply **2** and **2A** connected to a plurality of sprinkler units **4** by main water conduits **6** and branch conduits **8**. A main flow control valve unit **50** is located in each branch conduit **8** between the main conduit **6** and the sprinkler unit **4** or sprinkler units **4** connected to each branch. The sprinkler unit **4** or sprinkler units **4** of each branch conduit

8 are referred to as a watering "section" of the total area being irrigated. A "section" can be serviced by one or more branch conduits **8**. The main flow control valve units **50** are selectively controlled; that is, signaled "open" or "closed," to direct water to a specific "section" by selected pressure signals. When more than one branch conduit **8** is used for a "section," the cooperating main flow control valve units **50** are all adjusted to open for the same selected pressure signal. The selected pressure signals are delivered to the main flow control valve units **50** by a pressure signal tube **14** from a pressure signal control means **10**.

While many different "sections" can be used in a sprinkler system, in the system described, eight "sections" are used; therefore, eight different selected pressure signals are needed for opening the units **50**. For the system described, the eight "open" pressure signals selected are 10 psi, 20 psi, 30 psi, 40 psi, 50 psi, 60 psi, 70 psi and 80 psi. It is to be understood that a main flow control valve unit **50** can be open for a small range of pressures, for example, the unit **50** which has 50 psi for its selected pressure signal for opening it, may be open for a few psi on either side of 50 psi; for example, 47 psi to 53 psi. It is only necessary that each unit **50** having a selected "open" pressure signal for opening, will be closed when each other unit having other selected "open" pressure signals is open. While a 10 psi separation is used between signal pressure levels, other values can be used if desired, such as 20 psi. The greater value would insure better control isolation of unit selection.

The pressure signal control means **10** shown, FIG. **2**, has a passageway **16** therein having an inlet end and an outlet end. The inlet end is connected to an inlet line **18** from pressure source **12** and the outlet end is connected to a pressure signal tube **14**. In the device disclosed having eight "open" pressure signals from 10 psi to 80 psi, the pressure source must be at least 80 psi. A pressurizing solenoid valve **20** is located in the passageway **16**. A pressure sensing transducer **22** is connected to the passageway **16** by a short passageway **24** and a pressure reducing solenoid valve **26** is connected to the passageway **16** by a short passageway **28**. A dump line **30** is also connected to the valve **26**.

An electrical signal tube pressure controller **32** receives an electrical output signal on line **23** from the pressure sensing transducer **22** which is representative of the pressure in the signal tube **14**, and an electrical signal on line **35** from an electrical signal producing device **34** which is representative of the pressure desired in signal tube **14**. The electrical signal producing device **34** can be a simple power supply and a voltage dividing resistance network. "Section" selection button switches are provided for selecting the desired output voltage signal which represents a desired "open" pressure signal or level in the signal tube **14**. The eight output electrical signals in the device shown, for the eight selection buttons numbered **1** to **8**, are representative of pressures equal to 10 psi, 20 psi, 30 psi, 40 psi, 50 psi, 60 psi, 70 psi and 80 psi, pressures usable in the signal tube **14** for placing different valve units **50** in an "open" position.

The electrical signal tube pressure controller **32** compares the selected output signal on line **35** from the electrical signal producing device **34** with the signal on line **23** from the pressure sensing transducer **22** which is representative of the actual pressure in signal tube **14**. If the two signals are the same, then the pressure se-

lected by the "section" selective buttons is present in the tube **14**. If the signal on line **23** is greater than the signal on line **35**, the pressure controller **32** will signal valve **26** to open from its normally closed position by connection **27**, connecting passageway **28** to dump line **30**; this will reduce the pressure in passageway **16** and therefore in signal tube **14**. When the pressure in signal tube **14** reaches the desired pressure, wherein the signal on line **23** will then be equal to that on line **35**, the valve **26** will be repositioned to its closed position.

If the signal on line **23** is less than the signal on line **35**, the pressure controller **32** will signal valve **20** to open from its normally closed position by connection **21**, opening passageway **16**. Since the pressure source **12** contains a pressure greater than the highest necessary for the control of all of the main flow control valve units **50**, the pressure in passageway **16** attempts to rise. This will increase the pressure in passageway **16** and therefore in signal tube **14**. When the pressure in signal tube **14** reaches the desired pressure wherein the signal on line **23** will then be equal to that on line **35**, the valve **20** will be repositioned to its closed position.

The electrical signal tube pressure controller **32** shown in FIG. **2** may be connected to an automatic electronic signal producing device which will provide desired electrical signals in any desired sequence and for any desired time length. This would be useful for night watering of a golf course, for example.

A simpler control of pressure in signal tube **14** which would provide the "open" pressure signals to operate the system, could be, for example, eight different pressure sources of 10 psi to 80 psi and a selector valve for directing one of the pressures to the signal tube **14**. Manual positioning of the selector valve would open the desired valve units **50**. The selector valve could be automatically positioned, if desired. A standard feed-bleed type mechanical pressure regulator could also be adjusted as desired to provide the desired signal tube actuating pressure level signals.

Each main flow control valve unit **50** (see FIG. **3**) is comprised of three main parts;

1. a main flow valve **52**,
2. a pressure actuated valve **54**, and
3. a manually actuated valve **56**.

Main flow valve **52** is formed having a housing **58** of two parts, a body **60** and a cover **62**, with a valve diaphragm **63** therebetween. Housing body **60** is comprised having on one side thereof an annular surface **66** with a dish-like surface **68** extending inwardly in a direction away from the surface **66**. The dish-like surface **68** extends inwardly to a short cylindrical section **70** which projects into said dish-like surface and terminates at an annular valve seat **72**. An inlet **74** and an outlet **76** are formed integral with part **60** at diammetrically opposed positions. A passageway **78** is formed in part **60** connecting the inlet **74** to the end of the cylindrical section **70** under said dish-like surface. A passageway **79** is formed in part **60** interconnecting the outlet **76** to an opening **81** in the surface **68**. Inlet **74** has internal threads **75** and outlet **76** has internal threads **77**.

Housing cover **62** is formed having an annular surface **80** thereon for cooperating with the annular surface **66** of the housing body **60**. A dish-like surface **82** extends away from the annular surface **80** in a direction away from the body **60**. The dish-like surface terminates in a flat circular surface at the closed end thereof. The valve diaphragm **63** is positioned with its edge between the annular surface **66** of body **60** and the annular surface **80** of the cover **62**. The center of the valve diaphragm **63** is formed having a circular section **84** which is sized to cover the annular valve seat **72**. A recess **86** is formed in the circular section of the valve diaphragm facing the cover member **62**. Aligned therewith is a recess **88** in the flat circular surface of the inner side of the cover **62**. A spring **89** is positioned therebetween to lightly bias the valve diaphragm towards a closed position against the valve seat **72**.

In an assembled main flow valve **52**, a passageway is formed between the inlet **74** adjacent the internal threads **75** to the inner dish-like surface **82** of the cover **62**. This passageway is formed by aligned passage **90**, hole **92** and passage **94** and intersecting passage **96**. Passage **90** is in body **60**, hole **92** is in diaphragm **63** and passages **94** and **96** are in cover **62**. A restriction **98** is formed in the passage **94** between the inlet **74** and passage **96**. Passage **94** extends into the center of the bottom of a threaded recess **99** in an outer surface of cover **62** for a purpose to be hereinafter described.

Diammetrically opposed from said recess **99**, on the outer surface of cover **62**, a threaded recess **59** is formed having a countersunk cylindrical bottom section **61** with an annular shoulder **65** formed at their intersection. A passage **67** connects the interior of dish-like surface **82** to the cylindrical section **61**.

The manually actuated valve **56** is formed having a threaded portion to engage the threaded recess **99**. A passageway **101** extends from the lower end of the threaded portion and exits at **103**. A movable threaded valve member **105** has a lever means for turning it to open or close passageway **101** for manually operating the main flow valve **52**.

The pressure actuated valve **54** is formed having a housing **100** of two main parts, a lower body portion **102** and an upper body portion **104** with a valve actuator diaphragm **126** therebetween. Lower housing body **102** is formed of a short cylindrical section with a flange **106** at one end and being externally threaded at **108** on the other end for engagement with threaded recess **59**. A short conduit section **110** for venting fluid flow to an ambient pressure to provide an ambient pressure reference for the lower side of the diaphragm, extends radially from said short cylindrical section between said flange **106** and threaded part **108**. Upper body portion **104** is formed of a short cylindrical section with a flange **116** at one end and being externally threaded at **118** on the other end. This end of the cylindrical section is also internally threaded at **120**. A short conduit section **122** extends radially from said short cylindrical section between flange **116** and threaded part **118** and is connected to the signal pressure tube **14** for a purpose to be hereinafter described.

In an assembled pressure actuated valve **54**, flange **106** is positioned adjacent flange **116** with the outer edge of diaphragm **126** being held therebetween. While flanges **106** and **116** can be held together by any means desired, a circular clamp is shown positioned over the ends of the flanges. A bead is formed on one side of the circular outer edge of the diaphragm which fits in a small recess on the face of flange **106**. The mating surface of each flange is formed having an angular countersunk face to permit movement of the center part of said diaphragm in an axial direction for a predeter-

mined distance with respect to said short cylindrical section in a manner to be hereinafter described.

A cylindrical cup-like member **130** is positioned within the short cylindrical section of upper body portion **104** with its bottom against diaphragm **126** while an adjusting screw **132** is located threadably engaging the internally threaded section **120** of the upper body portion **104.** In order to limit upward movement of said cup-like member **130,** an outer cylindrical flange **133** extends outwardly from the bottom thereof for engagement with a recess **131** in the flange **116.** A spring **134** is positioned between the inside of cup-like member **130** and the bottom of adjusting screw **132.** A protective cap **119** has internal threads which engage the external threads **118** of the upper body portion **104.** An O-ring seal is provided to prevent leakage therefrom.

A valve member **140** is positioned in the short cylindrical section of the lower housing body **102** and is formed having a cup-like member **142** with its bottom against diaphragm **126** and with a valve stem **144** extending therefrom away from the diaphragm. The free end of valve stem **144** is formed having two valve surfaces **146** and **148** thereon spaced by a connecting pin **150** (see FIGS. **4, 5,** and **6**). The two surfaces can be formed on an integral stem as shown in FIG. 4 through FIG. **6,** or can be formed by the use of a plurality of parts, as shown in FIG. **7.** In operation, the valve surfaces **146** and **148** are positioned to engage the upper and lower edges of an opening **152** in a washer **154** to provide the valving action. In order to limit downward movement of said cup-like member **142,** an outer cylindrical flange **143** (see FIG. 3) extends outwardly therefrom for engagement with a recess **145** in the flange **106.**

When the pressure actuated valve **54** is mounted on the main flow valve **52,** the washer **154** is positioned against the shoulder **65** and the external threads **108** on the short cylindrical section of lower housing body **102** threadably engage the threaded recess **59.** The end of the lower housing body **102** engages the outer side face of the washer **154** fixedly mounting it in position and sealing it with cover **62.** A spring **155** is positioned between the inside of cup-like member **142** and the washer **154** adjacent the lower housing body **102.** In this mounted position, the free end of the valve stem **144** is positioned with the surface **146** above washer **154,** connecting pin **150** through opening **152,** and surface **148** below washer **154** in cylindrical section **61.** The travel distance between recess **131** and **145** is made greater than the seating distance between valve faces **146** and **148** so that they will be movable between a lower closed position and an upper closed position. While the cup **130,** diaphragm **126** and cup **142** need not be fixed together in view of the action of springs **134** and **155,** they can be made as a unit if desired and fixed together by any means desired.

In assembling the valve stem **144** and washer **154** if an integral stem is used, as shown in FIGS. **4** through **6,** it is necessary that a resilient material be used for the washer since the assembly is made by pushing the free end of the valve stem **144** through the opening **152** until the connecting pin **150** is in the opening. If a valve stem **144** is used as formed in FIG. **7,** the washer **154** can be placed against the valve surface **146** and the member on which surface **148** is formed can then be fixed with respect to the main part of the stem.

Main flow valve **52** is opened when the opening or port **152** of pressure actuated valve **54** is open because this port **152** is designed to have approximately four times a larger flow area than the restriction **98** which is feeding pressure from the main valve inlet **74** to the cavity above the valve diaphragm **63.** Thus at any time port **152** is opened, fluid pressure is dumped from above the main valve diaphragm **63** faster than it can be pressurized through restriction **98.** Inlet line pressures then force diaphragm **63** up, against spring **89,** opening the main valve.

The valve member **140** of the pressure actuated valve **54** of a given main flow control valve unit **50** is assembled with the springs **134** and **155** keeping valve seat **148** closed when the pressure delivered by tube **14** above diaphragm **126** is below the opening pressure (see FIG. **4**), placing valve seat **148** in an "open" position while keeping valve seat **146** in an "open" position when the pressure above diaphragm **126** is at the selected "open" pressure signal (see FIG. **5**), and placing valve seat **146** in a closed position when the pressure above diaphragm **126** is above the "open" pressure signal (see FIG. **6**). To accomplish this, it is necessary that spring **155** be sized to exert a bias against diaphragm **126** that will require the maximum "open" signal pressure and an adjusted minimum force of spring **134** to keep both valve seats **146** and **148** open. Then for each other pressure actuated valve **54** of a given main flow control valve unit the spring **134** is sized or adjusted, using the threaded adjustment screw **132,** to exert a bias against the diaphragm **126** to permit the desired pressure signal to press the valve seat **148** open and place the valve **54** in an open position when the desired "open" pressure signal is reached. The valve seat **146** is pressed down to place the valve **54** in a closed position for signal pressures higher than the adjusted "open" level.

In the modification of the main flow control valve unit **50,** shown in FIG. **8,** the pressure actuated valve **54** as shown in FIG. **3,** is moved to the left side of the main flow valve **52.** The manually actuated valve **56** is moved to another location not shown. This pressure actuated valve is numbered **54A.** The construction of the pressure actuated valve **54A** is identical to that of valve **54** of FIG. **3** with the addition of a valve member **200** on a rod extending from the bottom of the valve stem **144.** The valve member **200** is sized to cooperate with the restricted opening **202.** As the pressure actuated valve **54A** moves between its operating positions, the valve member **200** cooperates with the restricted opening **202** in the following manner:

1. When the valve seat **148A** is closed against the opening **152A** in the washer **154A** at a low pressure signal, the valve member **200** is located above the restricted opening **202** to permit flow to pass from the inlet **74** to the area above the diaphragm **63** through connecting passage **96** to pressurize it, and close the main flow valve **52.**

2. When the valve seat **148A** is moved to an open position by a pressure signal, the valve seat **146A** remains open, and the valve member **200** is located in the restricted opening **202,** inhibiting flow from passing from the inlet **74** to the area above the diaphragm **63** of the main valve. The volume above the main valve diaphragm is at this time vented to atmospheric pressure through passage **96,** open pressure actuated valve **54,** opening **152A,** and tube **110.** This opens main flow

valve **52**. The closing of the restricted opening **202** limits its flow from the main line through the dump line.

3. When the valve seat **146A** is closed against the opening **152A** in the washer **154A** at a higher pressure signal, the valve member **200** is located below the restricted opening **202** to permit flow to pass from the inlet **74** to the area above the diaphragm **63** to pressurize it and close the main flow valve **52**.

In the modification of the main control valve unit **50**, shown in FIG. **9**, the pressure actuated valve **54** is changed in the following manner and is numbered **54B**. The construction of the pressure actuated valve **54B** is identical to that of valve **54** of FIG. **3**, except that the stem **144** has a seal member **220** held thereagainst by an inwardly extending flange member **222** extending from the inner side of lower housing body **102**. The spring **155** abuts the flange member **222**. The washer **154B** is formed as a cup with an annular groove **224** around its outer surface which is located therein to insure meeting with passage **67** to provide connection therebetween. Holes **226** connect the annular groove **224** to the interior of the cup. The cylindrical section **61B** is connected to the passageway **79** by an opening **228** in diaphragm **63** and opening **230** in the outlet **76**. When the pressure actuated valve **54B** moves to its open position, the area above the diaphragm **63** is connected to the lower pressure passageway **79** causing the main valve **52** to open. By venting the fluid from above the main valve diaphragm back into the main valve discharge line overboard flow is eliminated out of conduit section **110** except for possibly some seal member **220** leakage. Conduit **110** provides only an ambient reference for one side of diaphragm **126** of pressure actuated valve **54**.

I claim:

1. In combination, a fluid supply means, at least two fluid distribution units, conduit means extending from said fluid supply means to each distribution unit, separate valve means in each conduit means for controlling flow to each distribution unit, each valve means having a pressure actuated control means, signal fluid pressure means, a single signal tube for carrying a signal fluid pressure to both pressure actuated control means, said signal tube being connected between said signal fluid pressure means and both of said pressure actuated control means.

2. A combination as set forth in claim **1** wherein each pressure actuated control means is actuated by a different pressure level, and said signal fluid pressure means has means for varying the pressure level in said single signal tube including said two different pressure levels.

3. A combination as set forth in claim **1** wherein said fluid distribution units are sprinkler units.

4. A combination as set forth in claim **1** wherein said fluid supply means comprises a first fluid supply and a second fluid supply, said conduit means comprising a first conduit connecting said first fluid supply to one fluid distribution unit and a second conduit connecting said second fluid supply to another fluid distribution unit, a valve means being in each first and second conduit.

5. A combination as set forth in claim **1** wherein second valve means are located along said signal tube, a signal tube pressure control means being connected to said second valve means for controlling the pressure in said single signal tube at a plurality of different pressure levels for use in actuating each pressure actuated valve means.

6. A combination as set forth in claim **1** wherein the pressure actuated control means of each valve means includes a pressure responsive means responsive to a predetermined pressure signal for placing said valve means in an open or closed position, said pressure responsive means being biased in a direction to close said valve means by first spring means when the pressure in the signal tube is below that pressure signal necessary for opening said valve means, said pressure responsive means being biased in a direction to open said valve means by a second spring means and a predetermined pressure signal in the signal tube for opening said valve means, and said valve means being biased in a direction to close said valve means against the first spring means by the second spring means and the pressure in the signal tube when it is greater than that required for opening the valve means.

7. A combination as set forth in claim **2** wherein said means for varying the pressure level in said single signal tube includes a first valve means for increasing the pressure in said signal tube and a second valve means for decreasing the pressure in said signal tube, means for sensing the pressure in the signal tube, means for comparing the pressure in the signal tube with a desired pressure and changing the pressure in the signal tube to obtain the desired pressure if it does not exist in the signal tube.

8. A flow control unit having an inlet and outlet, valve means for controlling flow through said unit from said inlet to said outlet, said valve means having a pressure actuated control means, said control means including a pressure responsive means responsive to a predetermined pressure signal for placing said valve means in an open or closed position, said pressure responsive means being biased in a direction to close said valve means by first spring means when the pressure on the other side of the pressure responsive means is below that pressure signal necessary for opening said valve means, said pressure responsive means being biased in a direction to open said valve means by a second spring means and a predetermined pressure signal on the other side of the pressure responsive means for opening said valve means, and said pressure responsive means being biased in a direction to close said valve means against the first spring means by the second spring means and the pressure on the other side of the pressure responsive means when it is greater than that required for opening the valve means.

9. A flow control unit as set forth in claim **8** wherein means are provided to change the tension of the second spring means to permit different predetermined pressure signals to operate said flow control unit.

10. A flow control unit as set forth in claim **8** wherein said pressure responsive means is a diaphragm.

11. A flow control unit having an inlet and outlet, first valve means for controlling flow through said unit from said inlet to said outlet, said first valve means having a first pressure responsive means responsive to inlet pressure for closing said valve means, second valve means for dumping inlet pressure from behind said first responsive means to open said first valve means, said second valve means having a second pressure responsive means responsive to a predetermined pressure signal for placing said second valve means in an open or closed position, said second pressure responsive means

being biased in a direction to close said second valve means by first spring means when the pressure on the other side of the second pressure responsive means is below that pressure signal necessary for opening said second valve means, said second pressure responsive means being biased in a direction to open said second valve means by a second spring means and a predetermined pressure signal on the other side of the second pressure responsive means for opening said second valve means, and said second pressure responsive means being biased in a direction to close said second valve means against the first spring means by the second spring means and the pressure on the other side of the second pressure responsive means when it is greater than that required for opening the second valve means.

12. A flow control unit as set forth in claim **11** wherein said second pressure responsive means is a diaphragm, a first chamber being located above said diaphragm, a second chamber being located below said diaphragm, means for directing a pressure responsive signal to said first chamber, said second chamber being connected to the atmosphere for dumping, said second valve means being located for dumping inlet pressure from behind said first pressure responsive means into said second chamber.

13. Means for directing a flow of fluid to two distribution units including, means providing a main fluid source, means providing a signal fluid pressure source, means for directing a flow of fluid from said main fluid source to one of said distribution units by a predetermined pressure signal level from said signal fluid pressure source and for directing a flow of fluid from said main fluid source to the other distribution unit by a second and different predetermined pressure signal level from said signal fluid pressure source.

14. A method of distributing fluid over an area, including

a. dividing said area into sections,
b. providing a main fluid source,
c. providing a signal fluid pressure source,
d. directing a flow of fluid from said main fluid source to different sections by a different predetermined pressure signal level from said signal fluid pressure source.

15. A flow control unit having an inlet and outlet, valve means for controlling flow through said unit from said inlet to said outlet, said valve means having a pressure actuated control means, said control means including a pressure responsive means responsive to a predetermined pressure signal for placing said valve means in an open or closed position, said pressure responsive means being biased in a direction to close said valve means by a force including first spring means when the pressure on the other side of the pressure responsive means is below that pressure signal necessary for opening said valve means, said pressure responsive means being biased in a direction to open said valve means by a force including a predetermined pressure signal on the other side of the pressure responsive means for opening said valve means, and said pressure responsive means being biased in a direction to close said valve means against the first spring means by a force including the pressure on the other side of the pressure responsive means when it is greater than that required for opening the valve means.

16. A flow control unit as set forth in claim **11** wherein passage means are provided for directing inlet pressure behind said first responsive means, third valve means in said passage means for controlling the flow therein, said third valve means being connected to said first valve means, said third valve means being placed in a closed position when said second valve means is placed in an open position and said third valve means being placed in an open position when said second valve means is placed in a closed position.

17. A flow control unit as set forth in claim **11** wherein passage means are provided for directing inlet pressure behind said first responsive means to said outlet, said second valve means being located in said passage means.

18. A combination as set forth in claim **13** wherein a single signal tube connects said signal fluid pressure source to said means for directing a flow of fluid from said main fluid source, said means providing a signal fluid pressure source including means for placing different predetermined pressure signal levels in said single signal tube.

19. A combination as set forth in claim **18** wherein one valve means controls the flow of main fluid to one of said distribution units and another valve means controls said flow of main fluid to the other distribution unit, said single signal tube being connected to both of said valve means for providing a signal fluid pressure to both of said valve means, one of said valve means being operable by one predetermined pressure signal level while the other valve means is operable by another predetermined pressure signal level, said means providing a signal fluid pressure source having means for placing said different pressure signal levels in the single signal tube.

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