

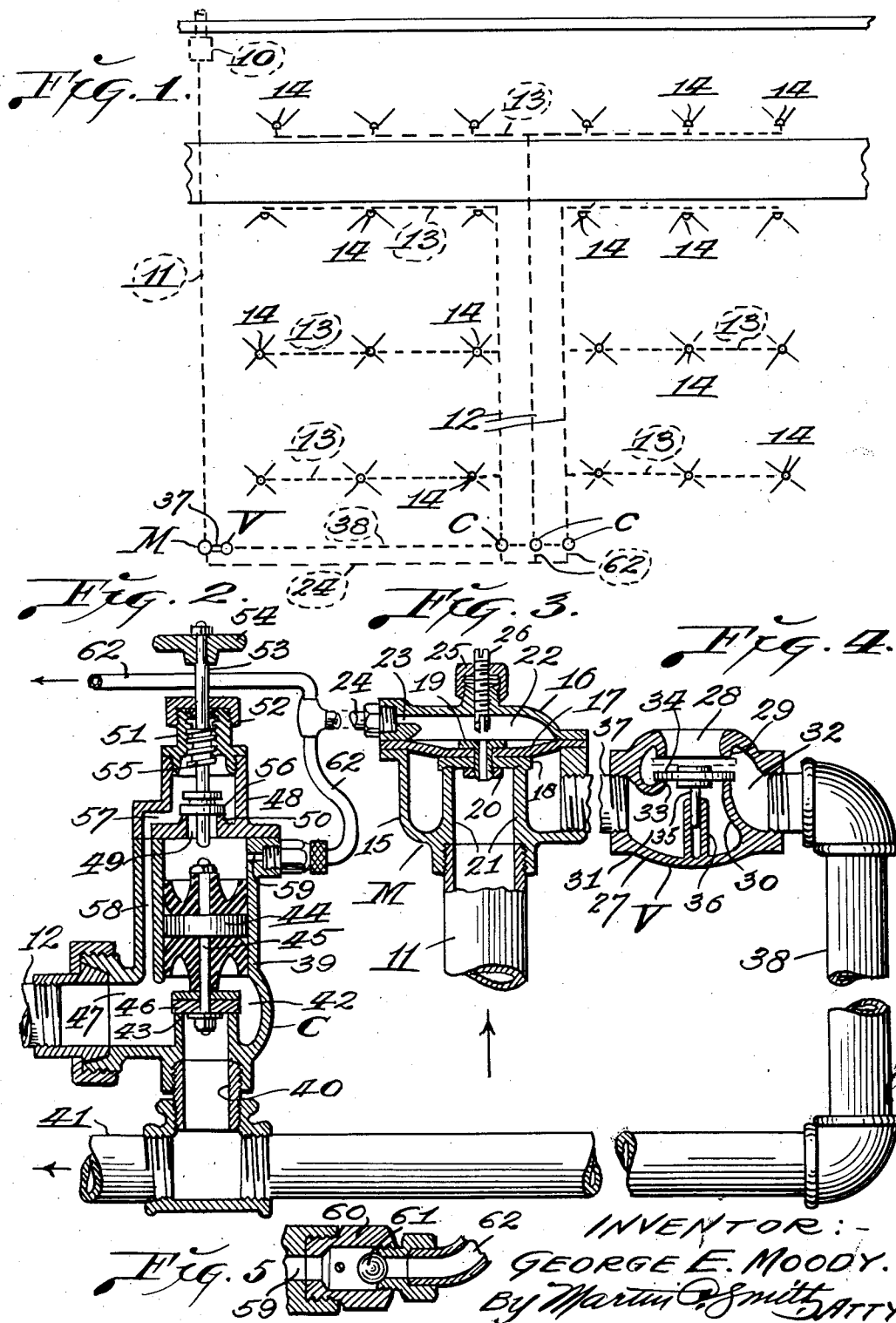
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SPRINKLER CONTROL SYSTEM

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SPRINKLER CONTROL SYSTEM

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My invention relates generally to control systems for liquid distributing means and more particularly to means for controlling the sprinkling systems used for the distribution of water on lawns, parkways, golf courses, and the like, or wherever a water distribution system involving underground pipes and sprinkler heads is used.

The principal objects of my invention are, to provide a sprinkling system that includes a master control valve and a plurality of manually operable sprinkler head control valves, each of the latter controlling the operation of a plurality of sprinkler heads and, to provide in such system a single vacuum breaker of simple structure and which will act automatically to break any vacuum or suction that may be developed in the street main or the conduit that supplies the sprinkling system with water as a result of a break in the street main or supply pipe, or the rapid pumping of a large amount of water from the street main or supply pipe by a fire engine, or the like.

In certain municipalities, ordinances have been passed and are in force that require a vacuum breaker to be located in sprinkling systems so as to prevent water contaminated with dirt and fertilizer from being drawn from the surface of the ground that is being sprinkled, backwardly through the sprinkling system to the street main or source of supply to contaminate the water flowing therethrough and, it is one of the objects of my invention to provide a sprinkling system having means in the form of a vacuum breaker that will act automatically under abnormal conditions to prevent contaminated water being drawn from the surface that is being sprinkled back to the water main or other source of supply.

A further object of my invention is, to provide a sprinkling system wherein but one vacuum breaker is required regardless of the number of sprinkler heads used in the system and, to provide for the location of said vacuum breaker with respect to the master valve and the sprinkler head control valves so as to bring about the highest possible degree of efficiency of operation and at the same time complying with the ordinances that require the installation of a vacuum breaker with the sprinkling systems of lawns, parkways, golf courses, and the like.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing, in which:

Fig. 1 is a diagrammatic view of a lawn sprinkling system equipped with my improved control means.

Fig. 2 is a vertical section taken through the center of the valve that controls the operation of a group of sprinkler heads.

Fig. 3 is a vertical section taken through the center of the master control valve.

Fig. 4 is a vertical section taken through the center of the vacuum breaker that is utilized in connection with the sprinkler system.

Fig. 5 is a detail section of a check valve that is utilized on the sprinkler head control valve.

Referring by numerals to the accompanying drawing and particularly to Fig. 1 which shows a diagrammatic view of a system particularly adapted for sprinkling a lawn and the parkway in front of the lawn, 10 designates the conventional meter that is located in the supply line from the street main and, leading from said meter to a point near one corner of the lawn or area to be sprinkled is a conduit 11. This conduit is connected to a master control valve indicated generally by the letter M and, located at a suitable point preferably adjacent the master control valve is a vacuum breaker designated generally by the letter V. Located at a convenient and readily accessible point on the lawn or area that is to be sprinkled is a plurality of sprinkler head control valves designated generally by the letter C.

Leading from each control valve is a conduit 12 to which are connected branch conduits 13 generally known as laterals and, connected to said laterals are conventional sprinkler heads 14 that are arranged to discharge water over the surface of the lawn or area that is serviced by the system.

The master valve shown in vertical section in Fig. 3 comprises a lower body member 15 and an upper body member 16, the latter being detachably positioned on the lower member 15 in any suitable manner.

Interposed between the marginal portions of the upper and lower members 15 and 16 is the edge of a diaphragm 17 of flexible material and, arranged on the under side of the central portion of said diaphragm is a disc valve 18. This valve is secured to the central portion of the diaphragm by means of a tubular member 19 provided on its upper end with a flange that rests on top of the diaphragm 17 and, the lower portion of said tubular member is threaded for the reception of a nut 20 that bears against the under side of valve 18.

Under normal conditions or while the sprinkling system is not in service, the disc valve 18

rests upon the open upper end of a tubular member 21, which latter projects upwardly from the bottom of the lower body member 15 and, connected to the lower portion of the lower body member 15 and communicating with the opening through tubular member 21 is the conduit 11.

The upper body member 16 of the master control valve is provided above the diaphragm 17 with a chamber 22 having an outlet 23 on one side and, connected to said outlet is a small tube 24 preferably of metal having a considerable degree of flexibility, for instance, copper. Passing through a gland 25 in the top of the upper body member 16 is a screw 26 that provides an adjustable stop for limiting the upward movement of the diaphragm 17 and the tubular member 19.

This master control valve may be located at any convenient point on or adjacent the lawn or area that is to be sprinkled and, where the system is installed on the lawn of a residence the master control valve may be located in an out-of-the-way position, for instance, adjacent a wall of the building, a fence, or the like, and to hide or partially hide said valve from sight it may be located under or behind shrubbery.

Located adjacent the master control valve is a vacuum breaker that is adapted to act automatically to break any vacuum that may be developed in the street main or some other source of water supply for the system and which vacuum if not broken, would act to draw water contaminated with dirt, fertilizer, and the like, back through the sprinkler heads 14, the ducts 12, laterals 13, and through the sprinkler head control valves C to the pure or uncontaminated water that is flowing from the street main through branch main 11 to the system.

In order to function properly, the vacuum breaker must be located on the outlet side of the master control valve and in order to comply with the ordinances relating to the locating of vacuum breakers in sprinkling systems, the vacuum breaker should occupy a position at least six inches above the lowermost one of the sprinkler heads in the system.

The vacuum breaker used in my improved system comprises a substantially spherical hollow body 27 provided in its upper portion with an air inlet opening 28 and, formed within the hollow body around said opening 28 is a lip or flange 29 that provides a valve seat. A partition 30 divides the space within the housing 27 into chambers 31 and 32 and the upper portion of said partition is formed so as to provide an annular valve seat 33 that is located a short distance below the valve seat 29.

Arranged between the valve seats 29 and 33 is a disc valve 34 that is adapted to rest on either one of said seats and, depending from the center of said disc valve is a stem 35 that is arranged for sliding movement in a tubular guide 36, which latter projects upwardly from the lower portion of the body 27.

A tube 37 connects the chamber in the lower body member 15 of the master control valve M with chamber 31 in the housing 27 and, connected to said housing and leading from chamber 32 to one of the sprinkler head control valves C is a pipe or conduit 38.

When the sprinkling system is in service and water under pressure is flowing from the master control valve through pipe 37 into chamber 31 within the vacuum breaker, valve 34 will be elevated by the pressure of the water so as to engage valve seat 29, thereby preventing the

escape of water through opening 28 and likewise preventing the inlet of air through said opening.

If for any reason vacuum should develop in the street main or the conduits leading therefrom, valve 34 will be drawn away from valve seat 29 by the suction produced by said vacuum, thereby permitting air to enter opening 28 to break the existing vacuum and preventing back flow of contaminated water through the system.

As illustrated in Fig. 2 each sprinkler head control valve C comprises a vertically disposed hollow body 39, the lower end of which is connected by a tube or nipple 40 to conduit 38 and the other sprinkler head control valves in the system are connected to conduit 33 by branch conduits such as 41.

I prefer to locate the sprinkler head control valves immediately adjacent one another and at a point where they are readily accessible, for instance, immediately adjacent the porch on the front of a dwelling house or adjacent the walk leading from the dwelling to the sidewalk.

Formed in the lower portion of the control valve 39 is a chamber 42 and formed therein around an opening that communicates with the tube or nipple 40 is an annular valve seat 43. A substantially tubular portion of the housing 39 immediately above the chamber 42 functions as a cylinder within which is arranged for sliding movement a piston 44. Passing axially through this piston is a rod 45 on the lower end of which is mounted a disc valve 46 that is adapted to rest on valve seat 43.

Chamber C is provided with a laterally disposed outlet opening 47 and connected thereto is one of the distributing pipes 12 to which the laterals 13 are connected.

Suitably secured on top of the cylindrical upper portion of valve housing 39 is a vertically disposed housing 48 and formed through the lower end thereof is an axial opening 49 that communicates with the upper end of the chamber in which piston 44 operates and, formed around the upper portion of opening 49 is an annular valve seat 50.

An internally threaded plug 51 is removably seated in the upper end of the housing 48 and a cap 52 is screw seated on the upper end of said plug. Passing through cap 52 and plug 51 is a valve stem 53 on the upper end of which is mounted a disc handle 54 and, the lower portion of said stem 53 is provided with a thread 55 that engages the internal thread of plug 51. Carried by the lower portion of stem 53 is a valve 56 that is adapted to rest on valve seat 50 and thereby close opening 49. Stem 53 extends downwardly a short distance through opening 49, thus providing a stop to limit the upward movement of the rod or stem 45 and the piston 44 carried thereby.

Formed through the lower portion of housing 48 is a port 57 that communicates with the upper end of a vertically disposed duct 58, which latter extends downward through the wall of the cylindrical upper portion of housing 39 and, the lower end of this duct communicates with the chamber that is formed in the lower portion of said housing 39 and which has the outlet opening 47.

Formed through the upper portion of the wall of housing 39 and communicating with the upper portion of the piston chamber therein is an inlet port 59 and, connected thereto is the housing 60 of an inwardly opening check valve 61. Connected to the inlet end of the valve housing 60

is one end of a small tube 62 preferably of metal, having a considerable degree of flexibility, for instance, copper, and this tube and branches thereof extend to the inlet check valves of the other sprinkler head control valves of the system.

The tube 24 that is connected to the outlet 23 from chamber 22 in the master control valve is connected to tube 62 so as to supply water under pressure from the chamber 22 in the upper portion of the master control valve to the upper portions of the chambers in the sprinkler head control valve housings above the pistons 44.

The operation of my improved control system is as follows:

Under normal conditions or while the system is not in service, valve 18 is maintained in closed position upon the valve seat formed on the upper end of tubular member 21, by the pressure of the water that passes from branch main 11 upwardly through tubular member 19 into the chamber 22 and the pressure of this water is exerted on the top of diaphragm 17, thereby cutting off flow of water through conduit 37 to the vacuum breaker V.

Water from chamber 22 passes through pipe 24 to pipe 62 and from the latter the water passes the various check valves 61 to fill the upper portions of the piston chambers in valve housings 39 and, the pressure of the water in said chambers maintains the pistons 44 at their lower limits of movement, thereby maintaining the valves 46 on the valve seats 43 and consequently preventing flow of water into the lower portions of the sprinkler head control valves and from the latter through the conduits 12 and the laterals 13 to the sprinkler heads 14.

When the system is not in service, the manually operated valves 56 are positioned in the valve seats 50, thus cutting off the passage of water through the openings 49 from the piston chambers in the housings 39 to the chambers within the housings 48. Inasmuch as there is no water pressure in the vacuum breaker, valve 34 will by gravity rest on the valve seat 33, thus permitting air to enter opening 28.

To place the sprinkling system in service, the sprinkler head control valves C are opened by manual operation of the valve stems 53 so as to lift valves 56 off their seats and thereby permit water under pressure to flow from the upper portions of the piston chambers in the valve housings 39 upwardly through the openings 49 into the chambers within the housings 48 and, from thence the water flows through ports 57 and ducts 58 into the chambers 42 in the lower portions of the valve housings and, from thence the water passes through the branch conduits 12 and thence through the laterals 13 to the sprinkler heads, which latter distribute the water over the ground area covered by the system.

Obviously, any one of the sprinkler head control valves may be opened as just described in order to place in service the corresponding set of sprinkler heads.

As the manually operated valve 56 is opened as just described, water under pressure will flow from chamber 22 above the diaphragm 17 through outlet port 23, pipe 24, thence past check valve 61 that is associated with the sprinkler head control valve that has been opened and, this water will pass from the chamber above the piston 44 out through opening 49 and thence through port 57 and duct 58 to conduit 12.

As the water pressure is thus relieved in chamber 22, the greater pressure of the water in

branch main 11 will unseat valve 18 by moving diaphragm 17 upwardly and, the water discharging into the chamber within the lower portion of the master control valve housing 15 will flow through pipe 37 into chamber 31 and, the pressure of this water against the under side of valve 34 will elevate the latter to close air inlet opening 28 and, the water after passing through the vacuum breaker will flow through pipe 38, thence through nipple 40, and the pressure of this water against the under side of valve 46 will elevate the same and the piston 44, thus permitting the water entering the sprinkler head control valve to pass into and through the branch pipe 12 to be discharged from the sprinkler heads that are connected to the laterals 13 that lead from said pipe 12.

If while the sprinkling system is in service, the pressure of the water in the street main drops to such a degree as to produce a certain degree of vacuum and consequent suction through the system such suction might, in the absence of a vacuum breaker, draw contaminated water from the surface of the lawn through the sprinkler heads, the laterals, the branch pipes and the branch main, back to the street main, thereby contaminating the water therein and, this abnormal condition might result in water distribution systems other than lawn sprinkling systems.

The drop in pressure in the street main might arise from different causes, for instance, a section of the street main beyond the sprinkling or water distribution system might be drained and then closed or, a break might occur in the street main and which would bring about a marked reduction in pressure and consequent vacuum.

If while the system is in service, a vacuum or partial vacuum develops in branch main 11 or the street main to which said branch main is connected, flow of water from the main control valve to and through the vacuum breaker V and from thence through duct 38 to the sprinkler head control valves will cease and in the absence of pressure below valve 34, the latter will by gravity move downward onto seat 33, thereby admitting air through opening 28 to duct 38, and this air passes through the lower portions of the control valve C, the branch pipes 12 connected thereto and the laterals 13 to which the sprinkler heads are connected, thus breaking any vacuum that might prevail in the system and effectually preventing contaminated water from being drawn backwardly through the system to the water main.

While I have illustrated and described my invention as being particularly applicable for use as a lawn sprinkling system, it will be understood that the arrangement and construction may with minor changes be advantageously employed in all liquid distribution systems wherein there is a possibility of vacuum and consequent suction in the supply line, drawing liquid backwardly through the pipes, ducts, and other parts of the distributing system.

Thus it will be seen that I have provided a liquid distributing control system that is relatively simple in construction, inexpensive of manufacture, capable of being readily assembled and installed, and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved sprinkler control system, may be made and substituted for those herein

shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a liquid control system, the combination 5
of a supply main for water under pressure, a plurality of distributing pipes, each distributing pipe being provided with a plurality of outlets and a control valve for controlling the flow of water therethrough, a master control valve in the supply main and a duct connecting the outlet of the master control valve to the inlet of each distributing pipe control valve, the master control valve and each distributing pipe control valve being arranged to be held closed by liquid 10
under pressure and to open on relief of said pressure, a manually operable valve associated with each distributing pipe control valve, means arranged to relieve the pressure holding the master control valve closed and that holding any 15
distributing pipe control valve closed on the opening of the manual valve associated therewith. 20

2. A liquid control system as set forth in claim 1 wherein a vacuum breaker is located in said duct. 25

3. A liquid control system as set forth in claim 1 wherein the pressure liquid for holding the master control valve and distributing pipe control valves closed is supplied by ducts extending between the master control valve and the distributing control valves.

4. A liquid control system as set forth in claim 1 wherein the distributing pipe control valve includes a valve housing provided with a valve chamber, a piston valve arranged for operation within said valve chamber dividing the space therein into an upper chamber portion and a lower chamber portion, the piston valve controlling the flow of liquid into said lower chamber portion, there being a second valve chamber in the upper end of said housing with a port leading from the chamber above said piston valve to the second mentioned valve chamber, said port being controlled by said manually operable valve, there being a by-pass leading from the second mentioned chamber to the lower chamber portion and means for conducting liquid under pressure from the master control valve to the upper chamber portion.

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