

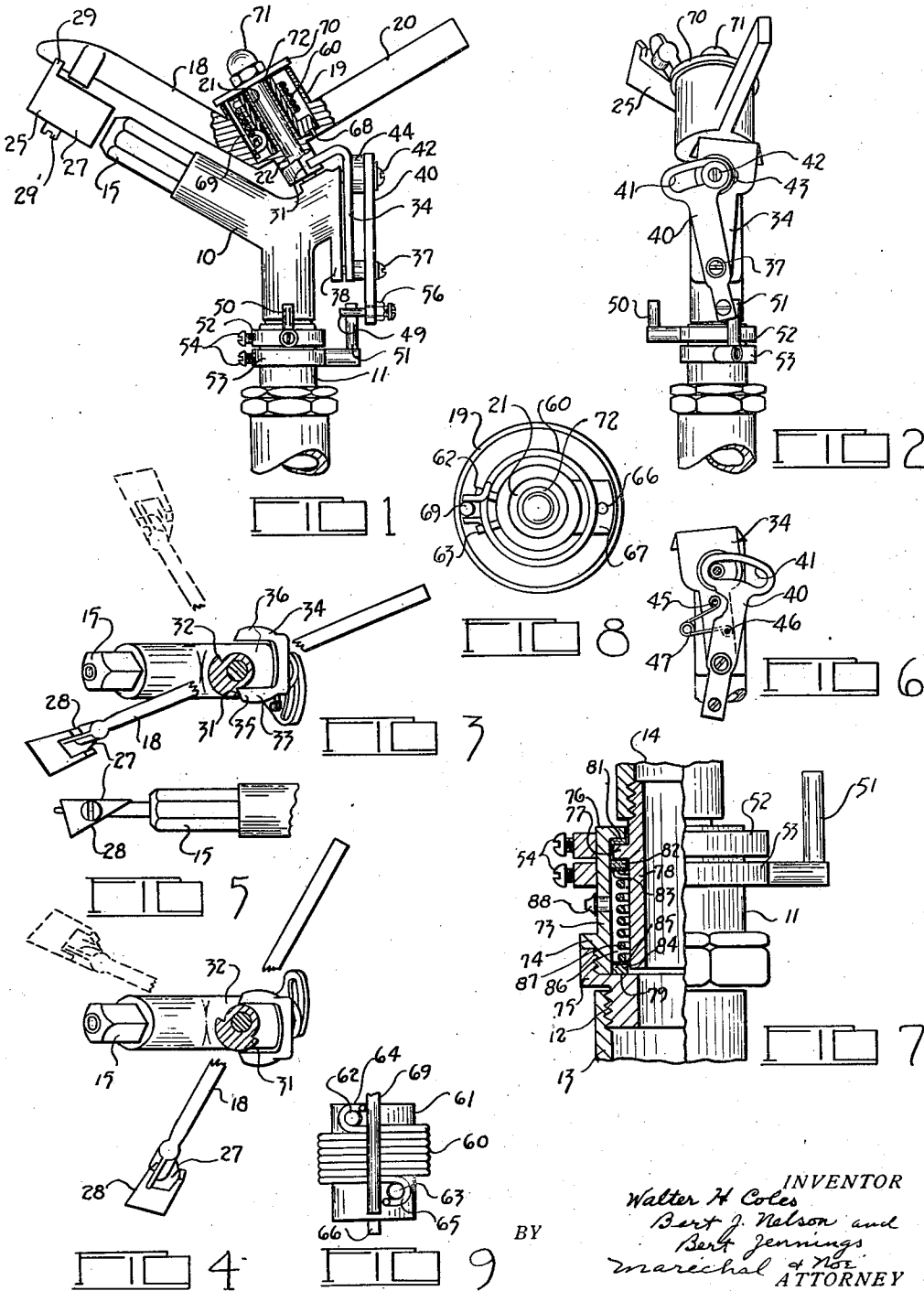
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SPRINKLING APPARATUS

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SPRINKLING APPARATUS

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This invention relates to water distributing or sprinkling devices and more particularly to sprinklers having controlled rotary movement.

One object of the invention is the provision of a sprinkling device having means for rotating the sprinkling member step by step, the direction of rotation of the sprinkling member being automatically controlled and reversed at predetermined positions, step by step movements of the sprinkling member being produced by an oscillatable arm or the like which is oscillated to opposite sides of the stream of water issuing from the sprinkling member by the force of the stream.

Another object of the invention is the provision of a sprinkling device having a sprinkling member which is operated step by step by a stream actuated oscillatable member which is adapted to strike different stop portions of an adjustable stop member that is automatically shifted to control the limits of angular movement of the sprinkling member.

Another object of the invention is the provision of a sprinkling device including a sprinkling member having a distributing nozzle, the sprinkling member pivotally supporting an arm which carries a movable vane in front of the distributing nozzle, the construction being such that the arm is yieldingly held by one centering spring so that the vane is struck by the water issuing from the nozzle and the arm swings alternately to opposite sides of the stream and impacts against the sprinkling member at the end of its movement in one direction to impart step by step rotary movements to the sprinkling member.

Another object of the invention is the provision of a sprinkling device of the character mentioned in which the impact arm is normally maintained in a predetermined position by a simple removable spring assemblage that is concealed and protected in an enclosing housing.

Another object of the invention is the provision of a sprinkling member of the character mentioned having a bearing support provided with an effective water seal of such construction as to prevent any mud or other impurities that might be present in the water supply from entering the lubricated portion of the bearing that assumes the thrust load.

Other objects and advantages of the invention will be apparent from the following description, the appended claims, and the accompanying drawing, in which:

Fig. 1 is a side elevation of a sprinkling device embodying the present invention a part being shown in section;

Fig. 2 is a rear elevation of the sprinkling device;

Fig. 3 is a top view looking in the direction of the axis of rotation of the oscillatable arm, with the spring and its housing removed, and showing the parts adjusted for counterclockwise rotation of the sprinkling member;

Fig. 4 is a corresponding view with the parts adjusted for clockwise rotation of the sprinkling member;

Fig. 5 is a bottom plan view showing the relationship between the oscillatable vane and the nozzle;

Fig. 6 is a detail view showing part of the reversing mechanism;

Fig. 7 is an enlarged sectional view showing the bearing support of the sprinkler;

Fig. 8 is a top view of the spring and the body portion of its housing; and

Fig. 9 is a detail view of the spring and sleeve unit.

Referring more particularly to the drawing by reference numerals, 10 designates a sprinkling member, rotatably supported for movement about a vertical axis on a stationary member 11 which forms a bearing support for the lower end of the sprinkling member. The support 11, as shown, is provided with screw threads 12 adapted to be engaged in the threads on a water pipe 13 of any suitable character.

The body of the sprinkling member 10 has a central passage 14 in free communication with the end of the water supply pipe 13, and communicating with a water distributing nozzle 15 which is directed in a radial vertical plane at a suitable upward inclination so that the stream of water will be thrown a large distance over the ground.

The sprinkling member 10 is adapted to be moved step by step and at a comparatively slow rate of speed so that the stream of water issuing from the nozzle 15 will be moved slowly over different portions of the ground, and as herein shown the means by which the sprinkling member is moved is one operated by the water flowing through the sprinkling member and operated by the water after it issues from the nozzle 15. This means comprises a rigid arm 18 pivotally supported on the sprinkling member 10 for movement about an axis that is preferably inclined at a substantial angle to the horizontal and to the vertical. The arm 18 is integral with or rigidly connected to a shell or housing 19 and with an extension portion 20, and is provided with a bearing sleeve 21 rotatably supported on a fixed pivot

pin 22 which extends upwardly from the top of the body member. The shell 19 forms an enclosing housing for a spring 60 which acts to yieldingly hold the arm 18 in the position shown in Figs. 1 and 5.

Pivotally supported on the outer end of the arm 18 is a vane 25, which, in the normal position of the arm 18 assumed when the device is not in use, is positioned in front of the nozzle 15. It is thus in the path of the stream of water issuing from that nozzle. The vane is of triangular formation having diverging faces 27 and 28. A pin 29 extends through a hole in the vane and is removably screwed in the arm 18, thus providing a pivot support for the vane, which is arranged so that either one or the other of the diverging surfaces 27, 28 may be struck by the stream issuing from the nozzle. Ears 29 project toward the end of the arm 18 and form limiting stops determining the angular movement of the vane on the arm.

With the vane 25 arranged as shown in Fig. 5, the stream issuing from the nozzle 15 acts against the surface 28 and the force of the stream rapidly swings the arm 18 clockwise as shown in that view against the action of the spring 60; and just before the vane is moved entirely out of the water stream the outer end of the surface 28 is pushed by the water so as to turn the vane clockwise on the arm 18 so that when the vane is returned again into the stream by the action of the spring, the force of the stream on the vane will swing the arm counterclockwise and also turn the vane on the pin 29. Thus each time the vane passes the nozzle it is struck by the stream and propelled along in the same direction it moves as it enters the stream, and the vane is automatically tilted on the arm by the stream itself. Since the arrangement is symmetrical, the force of the stream on the arm is the same regardless of the direction of rotation of the arm.

As the arm moves in one direction its inertia is gradually overcome by the spring 60 and there is not any substantial reaction effect on the sprinkling member such as would move it on the support 11. However when the arm moves in the opposite direction it impacts against a stop, provided on the sprinkling member, before the vane 25 moves very far from its normal position and before the spring 60 is effective in stopping the arm. A series of impacts is thus produced on the sprinkling member and the latter is thus rotated step by step each of comparatively small angular travel. The stop means is then automatically operated, so that the sprinkler will be moved in the opposite direction before a complete 360° turn of the sprinkling member so that only a part of the circle is watered.

The mechanism for accomplishing the change of direction of rotation of the sprinkling member as herein shown comprises a plurality of stop projections 31 and 32 preferably provided integrally on the spring housing shell 19 not far from the axis of rotation of the sprinkling member on the support 11 and symmetrically at opposite sides. Cooperating with one or the other of the stop projections 31 and 32 is a stop member 33 preferably in the form of a plate member 34 bent over at its upper end and bifurcated so as to provide the two stop portions 35 and 36 cooperating respectively with the stop projections 31 and 32 of the oscillated arm. The plate 34 is pivotally supported by means of a screw or bolt 37 which is threaded into projection 38 integrally provided on the sprinkling member 10. The bifurcated portion

of the stop member 33 preferably straddles the lower end of the arm which limits its swinging movement, and when positioned as shown in Fig. 3 it will be noted that the stop portion 35 is in the path of travel of the projection 31 and will be impacted by that projection and thus limit the travel of the arm in a counterclockwise direction after the arm has moved some little distance away from the stream issuing from nozzle 15. This impact produced by the stop 31 on the stop portion 35 serves to jolt the sprinkling member and move it through a small angle in a counterclockwise direction as viewed in Fig. 3. The spring 60 then returns the arm 18 which is carried along in a clockwise direction into the position shown in dotted lines in Fig. 3 and in this position the stop portion 36 is arranged outwardly beyond the path of travel of the stop 32 on the arm so that the spring acts to gradually stop the arm without producing an impact or blow on the sprinkling member.

The stop member 33 may be moved into the position shown in Fig. 4 by adjustment of the plate 34 on the pivot stud 37, and in this position the stop portion 36 is in the path of travel of the projection 32, limiting the movements of the arm in a clockwise direction and producing a clockwise rotation of the sprinkling member. The arm under these conditions may swing in a counterclockwise direction as far as may be required until the spring 60 brings the arm to rest in the position shown in full lines in Fig. 4.

The plate 34 is automatically controlled at predetermined positions of the sprinkling member on the support. As will be seen from Figs. 1, 2, and 6, the stud 37 pivotally carries a lever 40 having a slot 41. Extending through the slot is a bolt 42 which is threaded into the upper portion of the sprinkling member, the bolt also extending through a slot 43 provided in the plate 34. A spacer disk 44 is provided on the screw 42 with suitable clearance between the opposite sides of the disk and plate 34 and lever 40, so that those parts can move freely on the stud 37. Projecting from plate 34 and lever 40 are pins 45 and 46 connected to a spring 47, the location of the pins 45 being such that when the lever 40 is moved to one position or the other as limited by the slot 41, the spring 47 acts to rapidly snap the plate 34 in the opposite direction.

The lower end of the lever 40 is provided with an inwardly extending finger 49 adapted to be brought into contact with a plurality of pins 50 and 51 which project up from adjustable collars 52 and 53 that may be adjustably secured to the upper cylindrical surface of the support 11. Set screws 54 hold the collars in any desired position on the support so that the distance between the pins 50 and 51 can be changed in order to vary the angular travel through which the sprinkling member moves before its direction of rotation is reversed.

When the sprinkling member is arranged for counter-clockwise rotation as viewed in Figs. 1, 2, and 3, the nozzle will be turned slowly step by step until the finger 49 is brought up against the pin 51, corresponding to the position shown in Fig. 2. Further impacts of the arm on the stop portion 35 will then swing the lower end of the lever 40 over to the right, see Fig. 2, and this will snap the upper end of the plate 34 over so as to move the stop portions 35 and 36 into the position shown in Fig. 4. This will reverse the direction of rotation, and the sprinkling member will then move clockwise until the finger

49 is brought up against the pin 50, which will then return the parts to their positions as shown in Figs. 2 and 3. As herein shown the stop pins 50 and 51 are positioned to permit about one quarter of a turn of the sprinkling member before its direction of rotation is reversed but any desired angular travel of the sprinkling member is permitted by changing the relative settings of the collars 52 or 53. Continued operation of the sprinkling member in one direction can be effected by removing the finger 49 or moving it out far enough so that it will not engage the pins 50 and 51. As shown the pin 49 is a screw-threaded into the lower end of the lever 40 and held in position by lock nut 56.

The spring, which is concealed and protected within the shell 19, is preferably a spiral spring wire wound on a sleeve 61 which has projecting therefrom two small pins 62 and 63 around which the ends 64 and 65 of the spring are turned, with the spring wound under tension. In the normal position of the spring on the sleeve, as shown in Fig. 9, the ends of the spring press firmly against these pins. The sleeve 61 is provided with a downwardly projecting pin 66, fixed to a lug 67 which is integral with the sleeve 61, the pin 66 projecting into a hole 68 provided at the bottom of the shell 19 as shown in Fig. 1, thus definitely positioning the sleeve against relative turning but permitting the spring and sleeve unit to be readily withdrawn from the housing 19. The two ends 64 and 65 of the spring project outwardly and are relatively displaced in a relative direction so as to afford space between these ends for a rod 69 which is fixed to the cap or cover 70 of the shell 19. The cap 70 is held by a nut 71 against the flanged portion 72 of the fixed pivot pin 22, thus holding the cap 70 and the rod 69 fixed with respect to the sprinkling member 10. In the normal position of the arm 18 no spring pressure is exerted against the rod 69 by either end of the spring, this relationship of the parts being shown in Fig. 8, but as soon as the arm turns in one direction or the other from its normal position it pushes either the upper or the lower end of the spring, depending on the direction of movement of the arm, so as to increase the spring tension and apply the spring pressure directly to the rod 69 and thus yieldingly urge the arm 18 back to its normal position. The spring has a number of turns so that the arm can be swung through a wide angle in either direction without subjecting it to positive or sudden restraining forces, and thus permitting the gradual absorption of the inertia of the moving arm without imparting rotational movements to the sprinkler.

As will now be apparent, since the vane 25 is symmetrical so as to produce equal turning forces in either direction of movement of the arm, and since the stop portions and the stop projections provided respectively on the sprinkling member and on the arm are symmetrically arranged, the speed of rotation of the sprinkling member will be the same regardless of which way it is turning.

It will also be apparent that the means by which the successive impacts are produced on the sprinkling member is of such construction as to be fully effective without any injurious results regardless of how muddy the water may be that is supplied to the sprinkler. To permit the operation of the sprinkler with a muddy water supply, the support in which the sprinkler member is rotatably mounted is so arranged as to prevent

the entrance of the water in the bearing portions. As shown in Fig. 7, the support 11 comprises a shell portion 73 formed of upper and lower sections 74 and 75 which are secured together by screw threads. At the upper end of the shell 73 is an inwardly extending flange 76 which overlies an outwardly extending flange 77 provided on a tube 78 the upper end of which is secured by threads to the sprinkling member 10. The lower end of the tube 78 projects down to a point closely adjacent an inwardly extending flange 79 provided near the bottom of the shell 73. Between the upper side of the flange 77 and the lower side of flange 76 is a packing disk 81 preferably of leather. Below the flange 77 is a packing ring 82, preferably of felt. Below the ring 82 is a metal washer 83. Above flange 79 is a second felt ring 84 and a second metal washer 85. The tube 78 and the casing 73 thus form a lubricant compartment 86 containing a spring 87 which holds the felt washers 82 and 84 against the flanges 77 and 79 respectively, the spring also acting to hold the flange 77 up against the leather disk 81, the construction thus providing an effective water seal which prevents the leakage of water through the bearing, the lower felt washer preventing the entrance of any impurities into the lubricated bearing portions, which are preferably supplied with grease by means of grease nipple 88.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A sprinkling device comprising a support, a sprinkling member rotatably mounted on said support and having a sprinkling nozzle, an arm pivoted on said sprinkling member, said arm having means operated by the water which flows through said sprinkling member for maintaining an oscillating movement of said arm back and forth on its pivot, stop means on said sprinkling member adapted to be struck by said arm when rotating in one direction to rotate said sprinkling member step by step, and means for automatically operating said stop means at a predetermined position of said sprinkling member on said support to shift said stop means into such position that it will be struck by said arm when the arm rotates in the opposite direction.

2. A sprinkling device comprising a support, a sprinkling member rotatably mounted on said support and having a sprinkling nozzle, an oscillatable member mounted on said sprinkling member and having means operated by the water which flows through said sprinkling member for moving said oscillatable member alternatively towards opposite sides of a normal position, stop means adjustably mounted on said sprinkling member for movement to different positions in one of which it is struck by said oscillatable member when moving in one direction and in the other of which it is struck by said member when moving in the other direction, and means for automatically adjusting said stop means at predetermined positions of said sprinkling member to control the limits of angular movement of the sprinkling member.

3. A sprinkling device comprising a support, a sprinkling member rotatably mounted on said support and having a sprinkling nozzle, an arm

pivoted on said sprinkling member, a vane pivoted on said arm in front of said nozzle and adapted to be operated by the water flowing from said nozzle to move through the stream and swing said arm to opposite sides of said stream, means for returning said arm to position said vane in front of said nozzle, stop means on said sprinkling member adapted to be struck by said arm to rotate said sprinkling member step by step, and means for shifting said stop means so it will be struck by said arm to reverse the direction of rotation of said sprinkling member.

4. A sprinkling device comprising a support, a sprinkling member rotatably mounted on said support and having a sprinkling nozzle, an arm pivoted on said sprinkling member and having means operated by the water which flows through said sprinkling member for oscillating said arm in both directions from a normal position, a stop member having a plurality of stop portions, means for adjustably supporting said stop member on said sprinkling member to selectively position either one of said stop portions in the path of movement of said arm when said arm moves away from a normal position, and means for automatically operating said stop member at predetermined positions of said sprinkling member on said support.

5. A sprinkling device comprising a support, a sprinkling member rotatably mounted on said support and having a sprinkling nozzle, an arm pivoted on said sprinkling member, a vane pivoted on said arm in front of said nozzle and adapted to be operated by the water flowing from said nozzle to swing said arm to opposite sides of said stream, means for returning said arm to position said vane in front of said nozzle, a pair of projections symmetrically provided on said arm closely adjacent the axis of rotation of said sprinkling member, a stop member having a pair of stop portions engaged by the projections on said arm and determining the direction of rotation of said sprinkling member under the impact of said arm, and means for automatically shifting said stop member to move one of said stop portions into the path of movement of one of the stop projections of the arm and to move the other stop portion out of the path of movement of the other stop projection of the arm.

6. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, an arm having a projection rigid therewith, means on said member pivotally mounting said arm for oscillatory movement, a vane pivoted on said arm actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream, a coil spring, a casing on said arm enclosing said spring and having a portion engaging opposite ends of said spring and normally urging said arm to position said vane in front of said nozzle, and means on said member engaged by said arm projection at a predetermined position of said arm at one side of said stream for imparting step by step movement to said member on said support.

7. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, an arm pivotally mounted on said sprinkling member for oscillatory movement, means on said arm actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream, means on said sprinkling member impacted by said arm and

limiting the swinging of said arm at one side of said stream, a spring housing on said sprinkling device and a tensioned spring and sleeve assembly in said housing and removable as a tensioned spring unit from said housing, said spring and sleeve having portions respectively engageable with said sprinkling member and with said housing and yieldingly holding said arm to position said stream actuated means in said stream.

8. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, an arm pivotally mounted on said sprinkling member for oscillatory movement, means on said arm actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream, means on said sprinkling member impacted by said arm and limiting the swinging of said arm at one side of said stream, a spring housing carried by said arm, a spring support removably held in said housing, a spring on said spring support and means fixed to said sprinkling member projecting in said housing and engageable with opposite ends of said spring for yieldingly holding said arm to position said stream actuated means in said stream.

9. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, a rigid arm pivotally mounted on said member for oscillatory movement thereon, a vane supported on said arm and actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream, spring means normally urging said arm into a normal position in which the vane is in front of the nozzle, said spring means being operably connected to the arm and the sprinkling member to provide equal restoring moments on the arm for any particular degree of displacement from the normal position of the arm regardless of the direction of displacement, said sprinkling member having a portion engaged by said arm at a predetermined position of said arm when said vane is removed from the stream at one side thereof for imparting step-by-step movement to said member on said support, and means operable to reverse the direction of rotation of the sprinkling member when said sprinkling member reaches a predetermined position on said support.

10. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, a rigid arm pivotally mounted on said member for oscillatory movement thereon, a vane supported on said arm and actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream so that the vane moves through and past the stream from each side to the other, a coil spring normally urging said arm to yieldingly position said vane in front of said nozzle, said spring having operable connections at its ends to both the arm and the sprinkling member and held thereby under substantial normal tension when the arm is in its normal position and providing equal restoring forces on the arm for any particular degree of displacement from the normal position of the arm regardless of the direction of displacement, said sprinkling member having a portion engaged by said arm at a predetermined position of said arm when said vane is removed from the stream at one side thereof for imparting

step-by-step movement to said member on said support.

11. A sprinkling device comprising a support, a sprinkling member mounted for rotational movement on said support and having a distributing nozzle, a rigid arm pivotally mounted on said member for oscillatory movement thereon, a vane supported on said arm and actuated by the stream of water issuing from said nozzle for swinging said arm alternately towards opposite sides of said stream so that the vane moves through and past the stream from each side to the other, spring means normally urging said arm to yieldingly position said vane in front of said nozzle, said spring means having an operable engagement at one end thereof to both the arm and the sprinkling mem-

ber and having an operable engagement at the other end thereof to both the arm and the sprinkling member and under substantial normal tension when the arm is in its normal position and providing equal restoring forces on the arm for any particular degree of displacement from the normal position of the arm regardless of the direction of displacement, said sprinkling member having a portion engaged by said arm at a predetermined position of said arm when said vane is removed from the stream at one side thereof for imparting step-by-step movement to said member on said support.

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