

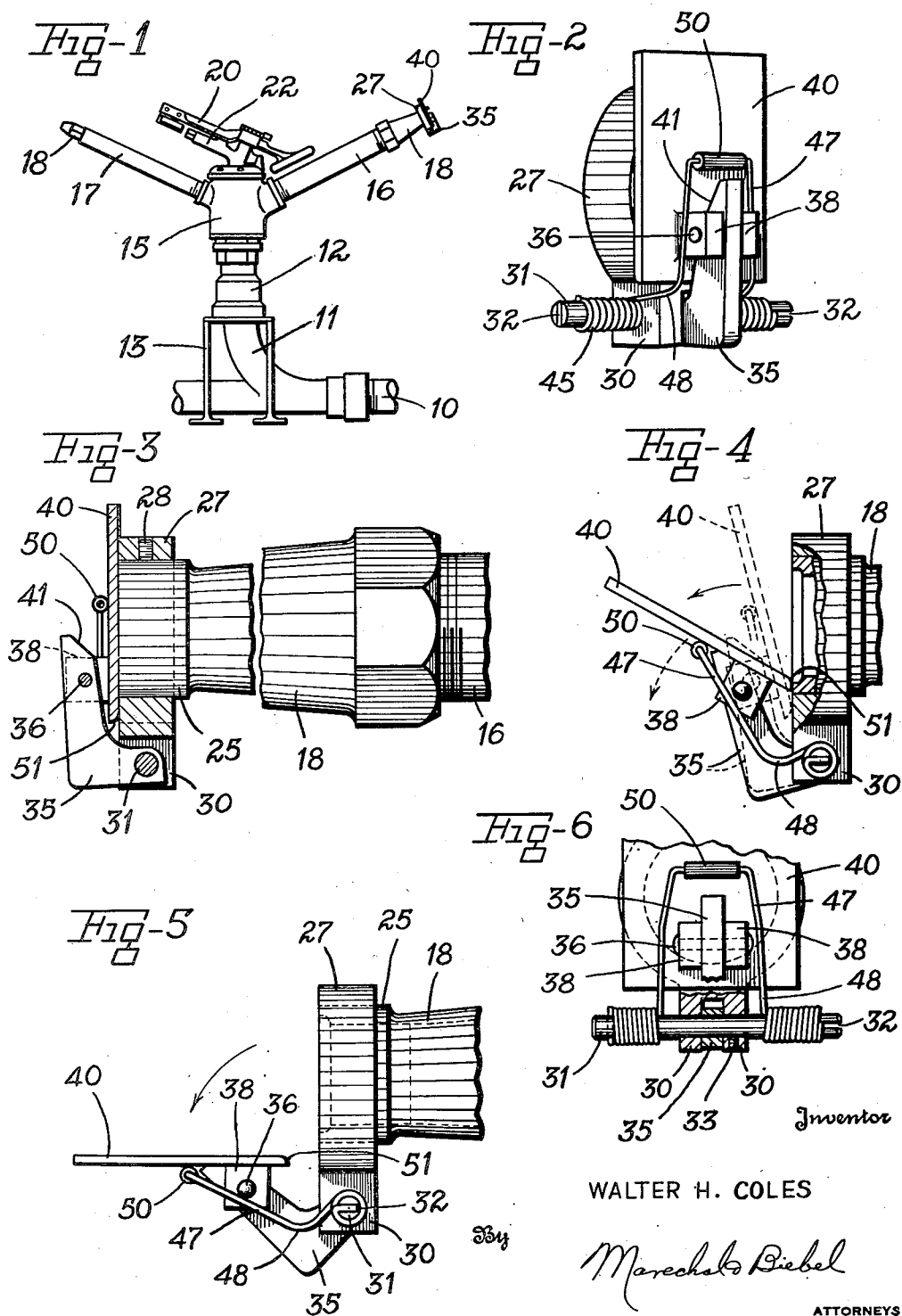
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SPRAY DEFLECTOR

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SPRAY DEFLECTOR

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This invention relates to spray irrigation equipment and more particularly to a spray deflector which intercepts the stream in response to low pressure supply of water.

In the use of spray irrigating equipment a nozzle is utilized which under normal conditions delivers a stream of water at such velocity that it will effectively break up and atomize before it strikes the ground, and in this way provides the desired uniform water distribution on the area being irrigated. However in the event of a reduction in the supply pressure, such as may occur during the beginning or ending of an operation or which may continue for some time because of failure of the supply pressure for one reason or another, the stream may not contain enough energy to cause the desired atomization after it is discharged from the nozzle. If this occurs it is possible for an essentially solid stream, or one having a solid core, to be discharged, and to carry in such solid form throughout its travel and until it strikes the ground. If this occurs with a stream of substantial size, an objectionable washing out of the ground may occur, which is particularly serious if allowed to continue for any period of time.

In accordance with the present invention a construction is provided which prevents such occurrence, whatever the reduction in supply pressure, and regardless of how long it may persist. The device is simple and further is adapted for direct application to existing nozzle equipment so that it does not require rebuilding or replacement of equipment already in operation. It effectively accomplishes atomization under low pressure supply conditions, and when the full supply pressure is available, it presents no obstruction or interference, allowing the nozzle to function entirely in a normal manner.

It is accordingly the principal object of the invention to provide a deflector for use with a spray irrigating nozzle which in response to low pressure supply of water automatically intercepts and deflects the stream with resultant breaking up and atomization thereof and the motion of which is so controlled as to effect a bodily withdrawal of the deflector to the side of the stream where it will not intercept the flow under the normal pressure supply conditions.

It is also an object to provide such deflector mounted upon double pivots and yieldably urged toward deflecting position about both pivots to provide the desired motion and the withdrawal thereof from intercepting position when the nozzle is operating under full pressure.

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It is also an object to provide such a deflector in which the yieldable force may be varied to adjust the plate for different supply pressures.

The objects and advantages will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a view in side elevation of an impact type sprinkler showing the application of the present device to one of the nozzles thereof;

Fig. 2 is a view in perspective of the device separated from the nozzle;

Fig. 3 is a side view partially in section and partially in elevation showing the deflector in closed position across the discharge end of the nozzle;

Figs. 4 and 5 are progressive side elevational views showing different steps in the travel of the deflector plate as the supply pressure changes; and

Fig. 6 is an end view partially in elevation and partially in section showing the details of construction of the device.

Referring to the drawings which disclose a preferred embodiment of the invention, a typical application is illustrated in Fig. 1 in which there is shown a supply line 10 receiving water under pressure having a curved branch 11 supplying the water to an upright portion 12 mounted in fixed position by means of bracket 13. A rotating head 15 is provided with upwardly extending arms or pipes 16, 17, each of which carries a nozzle 18 at the outer end thereof. As shown, this device embodies an impact arm 20 which operates in a jet from a third nozzle 22, providing for advancing the entire nozzle assembly with a circumferential step-by-step movement. Preferably the nozzles are of different size as indicated in order to provide proper balance and distribution, a suitable construction in this respect being that described in applicant's copending application Serial No. 24,980, filed May 4, 1948, now Patent No. 2,586,517, issued February 19, 1952.

While the deflector of the present invention may be applied to any or all of the nozzles, it is shown in Fig. 1 as fitting over the discharge end of the nozzle 18 on arm 16. The nozzle itself is formed with a cylindrical outer surface 25 and the device of the present invention incorporates a ring 27 which is of the proper size to fit over the end of the nozzle, and to be detachably secured in place thereon by a set screw 28.

The ring 27 is provided with a pair of spaced downwardly extending projections 30 which are drilled to receive a pin 31. The pin has a slot

32 at each end to receive a screw driver by means of which it can be turned, and it is removably and adjustably held by set screw 33. As shown, the axis of the pin is approximately at the end of but below the discharge nozzle. Between the arms 30 a lever arm 35 is received, being mounted on pin 31, and being essentially L-shaped as shown in Fig. 3 with its upper part being drilled to receive a mounting pin 36 the axis of which is approximately opposite the discharge end of the nozzle and downstream thereof. This pin 36 passes through projections 38 which carry the deflector plate 40, such plate having a deflecting surface of sufficient size to overlie and substantially close the entire end of the nozzle. The plate is thus pivotally mounted upon the lever arm 35, and is allowed to swing or pivot thereon to a position where its rear face will engage the abutment 41 on the lever, thereby limiting the plate against further movement in this direction.

The plate 40 is yieldably urged toward intercepting position across the end of the discharge nozzle by means of a spring which tends to both swing the plate about its pivot 36, as well as to swing lever arm 35 about its pivot on pin 31. This is accomplished by means of the coil spring 45, the opposite ends of which are received in open slots 32 in the ends of pin 31, the spring being coiled around the overhanging portion of pin 31 and having a loop 47 which extends upwardly toward the rear face of the deflector plate. The side portions of the loop have a substantially right angular bend or knee 48 which extends around the lower edge of the plate. At its upper end the loop of the spring carries a roller 50 which has variable engagement with the rear face of the deflector plate being allowed to roll on such face while continuously urging the plate toward its closed position. It will be evident from the description and drawings that this single spring thus acts to urge the deflector in a clockwise direction as shown in Fig. 2 about both its pivot axes toward closed position, and further that it will allow the plate to rock backward against the spring about both axes in response to the application of a force on the face of the plate.

In operation, with no supply pressure, the plate is closed across the outlet of the nozzle in the manner shown in Fig. 2, thereby avoiding the collection of dirt or the like in the event that the nozzle should be left upon the ground or in any place in which such dirt could collect. As the pressure is supplied, the plate assumes the position shown in dotted lines in Fig. 4 in which the lower edge 51 thereof rides against the surface of the ring, causing a composite swinging motion of the plate about both axes, thereby maintaining the lower edge in close relation with the surface of the ring. When the plate is deflected to the full line position of Fig. 4 it strikes the abutment surface 41, and thereafter is prevented from further rocking about its pivot axis 36. The final travel thereof to the position shown in Fig. 5 is accomplished by the swinging of the entire assembly of deflector and lever arm about the pivot pin 31. This provides for effective withdrawal of the plate gradually to the side of the stream where it is essentially clear of interference or interception and substantially tangent to the flow, the composite action provided by such double pivot arrangement therefore keeping the plate adjacent the discharge end of the nozzle for proper interception under low pressure conditions and providing for its effective with-

drawal to a non-interfering position in response to full supply pressure conditions. In this way the plate may assume a position where it is substantially parallel to the discharge stream so that substantially its entire area is in contact with the side thereof, thereby reducing stream disturbance to a minimum, which would not be possible if the plate could only pivot about a single axis. There is further an increase in the force required to deflect the flow, the initial force being relatively low because deflection occurs largely about pivot axis 36 the lever arm of the spring with respect to this axis being relatively short. When however the plate engages abutment 41 the swinging occurs wholly about the lower pivot 31 and this requires a greater force because of the greater tension in the spring as well as the longer effective lever arm thereof.

The plate may be readily adjusted to deflect under different supply line pressures by twisting pin 31 to increase or decrease the spring tension, resetting and locking the pin by means of set screw 33. In this way the correct amount of deflection can be secured for different size nozzles and different flow pressures to assure the proper distribution of the water on the ground.

As a specific example, a nozzle having an outlet diameter of an inch and an eighth is normally intended to operate at a supply pressure in the range of about 30 to 40 lbs. per square inch. During the starting up of the operation the pressure of course must build up from zero to the proper operating level, and it is found that during the interval the objectionable discharge of a solid stream would occur unless properly protected. With the present device the deflector plate will move to a position such as that shown in full lines in Fig. 4 when the supply pressure is at an intermediate value below that which will assure the proper atomization, and in this position the outflowing stream will strike the plate at such an angle as to be deflected therefrom and largely broken up or atomized before it reaches the ground. The plate moves downward progressively toward the position shown in Fig. 5 as the line pressure rises until at a pressure of about 30 to 40 pounds per square inch it is maintained in the non-interfering position of Fig. 5 at which time the stream has sufficiently high velocity to be self-atomizing. The reverse situation occurs as the pressure is cut off, the plate moving back toward intercepting position and thus at all times avoiding the delivery of a solid stream upon the ground.

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 low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises a deflector plate adapted to extend across the discharge end of said nozzle, a mounting for said plate at one side of said nozzle for securing said plate in operative position adjacent said discharge end, a double pivot means for adjustably supporting said plate on said mounting, one pivot having its axis located substantially to one side of and beyond the opening in said nozzle, and the other having its axis located substantially closer to but on the same side of the axis of said

nozzle as said one pivot, and a single yieldable means for urging said plate toward spray intercepting position about both said pivot axes.

2. A nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises a deflector plate adapted to extend across the discharge end of said nozzle, means for mounting said plate in intercepting position adjacent said discharge end at one side thereof, a double pivot means for adjustably supporting said plate on said mounting, one pivot having its axis located substantially to one side of and beyond the opening in said nozzle, and the other having its axis located substantially closer to but on the same side of the axis of said nozzle as said one pivot, and spring means for urging said deflector plate into intercepting position with an initial relatively weak force and with a substantially greater force as said plate moves toward open position beyond a predetermined intermediate position.

3. A low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises an arm pivoted for swinging about an axis at one side of the outlet end of said nozzle, a deflector plate pivotally mounted on said arm for swinging movement about an axis located approximately opposite the end of said discharge outlet, and spring means for urging said plate into spray intercepting position about both said axes and allowing outward swinging thereof about both said axes into a position substantially parallel to the discharge stream in response to the impact pressure of the discharge stream thereon.

4. A low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises an arm pivoted for swinging about an axis at one side of the outlet end of said nozzle, a deflector plate pivotally mounted on said arm for swinging movement about an axis located approximately opposite the end of said discharge outlet and spaced downstream from said arm axis, and spring means for urging said plate into spray intercepting position about both said axes and allowing outward swinging thereof about both said axes to a position in which said plate is substantially parallel with the discharge stream and at one side thereof in response to the impact pressure of the discharge stream thereon.

5. A low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises a deflector plate adapted to extend across the discharge end of said nozzle, an arm pivoted for swinging about an axis at one side of the outlet end of said nozzle, means on said arm for pivotally mounting said deflector plate for swing-

ing movement about an axis located approximately opposite the end of said discharge outlet, means for limiting the pivotal movement of said plate on said arm to assure the pivoting of said arm about its said axis in response to continued deflection of said plate to allow said plate to move to a position substantially parallel to and at one side of the discharge stream, and spring means for urging said plate into spray intercepting position about both said axes and allowing outward swinging thereof about both said axes in response to the impact pressure of the discharge thereon.

6. A low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises an arm pivoted for swinging about an axis at one side of the outlet end of said nozzle, a deflector plate pivotally mounted on said arm for swinging movement about an axis located approximately opposite the end of said discharge outlet, and spring means having a variable connection with said plate for urging said plate with a low initial force and with a greater force as the deflection increases into spray intercepting position about said axes and allowing outward swinging thereof about said axes in response to the impact pressure of the discharge thereon.

7. A low pressure nozzle deflector for attachment to a spray irrigation nozzle adapted to be supplied with water under pressure which comprises an arm pivoted for swinging about an axis at one side of the outlet end of said nozzle, a deflector plate pivotally mounted on said arm for swinging movement about an axis located approximately opposite the end of said discharge outlet, and spring means centered on the pivot axis of said arm and having variable engagement with said deflector plate above the pivot axis of said plate on said arm for urging said plate into spray intercepting position about both said axes and allowing outward swinging thereof about both said axes in response to the impact pressure of the discharge thereon.

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