

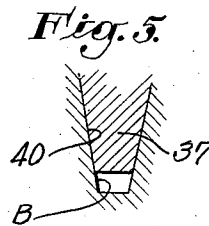
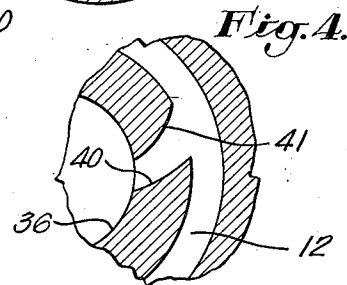
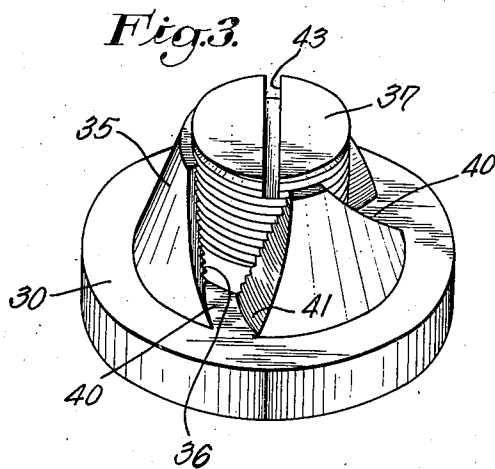
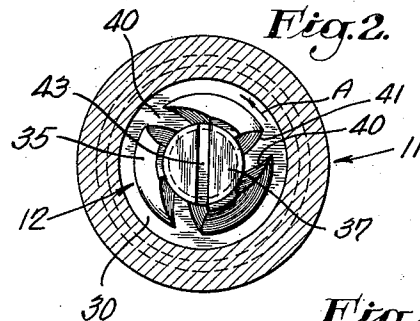
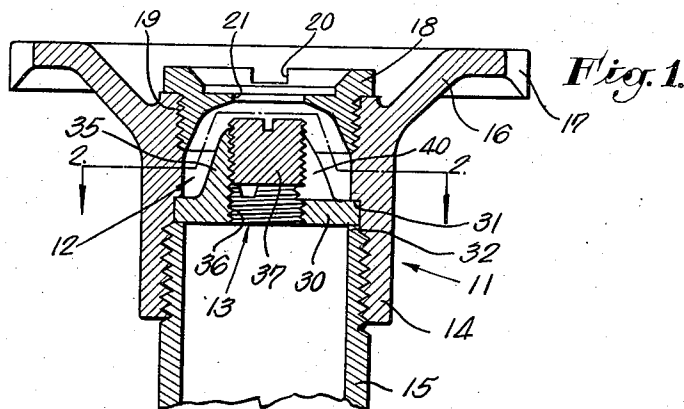
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SPRINKLER HAVING ADJUSTABLE PORT OPENINGS

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SPRINKLER HAVING ADJUSTABLE PORT
OPENINGS

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9 Claims. (Cl. 299—60)

My invention relates to spray devices such as lawn sprinklers, and is particularly adapted for use in automatic sprinkler systems.

A large variety of sprinkler heads have been devised which include spray adjustment means for varying the area covered by the spray emitted from the individual sprinkler heads of the system. It has been found desirable, from the standpoint of range and distribution, to effect a rotation or swirl of the water in the sprinkler head and as it is thrown from the outlet opening thereof. The accomplishment of these functions has led to the manufacture of some elaborate and expensive sprinkler heads including various types of spray adjustment or valve means and in addition thereto a water swirling or rotating means. This latter means ordinarily comprises variously shaped and sized ports formed in a dividing wall in the interior of the head so that the water flows from one chamber into another chamber through these ports, the ports being positioned to rotate the water as it enters the second chamber.

It is a primary object of my invention to provide a sprinkler head which is extremely simple and cheaply constructed, having a single chamber therein and including a single mechanism operable to control the volume, to rotate the water as it flows directly from a supply pipe into the delivery chamber from which it is sprayed through an outlet orifice, and to act as a strainer to prevent clogging particles, such as small snail shells, gravel, etc., from entering the chamber and clogging the outlet orifice.

It has been found that where permanent non-adjustable ports are provided for rotating the water in the chamber of a cylindrical head, these ports frequently become clogged by snail shells, gravel, or debris carried in the water, so that it is often difficult and sometimes impossible to clear these ports without completely dismantling the head and the parts thereof.

It is therefore an object of my invention to provide in a sprinkler head water-rotating ports which are adjustable in size so that these ports may be quickly and easily enlarged so that they may be flushed out without dismantling the sprinkler head.

It is an object of the invention to provide an adjustment means for the water-rotating ports mentioned in the above paragraph, which means is operable from the exterior of the cylindrical head without removing any of the parts thereof.

It is another object to provide water-rotating ports of such a cross-sectional shape as to be

non-clogging even when restricted in size to reduce the volume of water flowing therethrough to an operative minimum.

It is another object of the invention to provide water-rotating ports of the type referred to above having the walls thereof relieved so that the cross-sectional area of the port progressively increases from its entrance to the delivery end thereof.

It is another object to provide a sprinkler head in which water enters the head through a central passage and flows tangentially or spirally outward therefrom into a delivery chamber.

It is still another object of my invention to provide a sprinkler head having a single chamber into which water is delivered by a swirling or rotating means, the walls of the chamber being shaped for minimum interference with the rotation of the water therein.

It is a further object to provide water-rotating ports for delivering water into the chamber which are disposed so that the direction of flow of the water is not changed as it flows from the ports into the chamber.

It is a further object of the invention to provide a sprinkler having a single chamber into which water is delivered and caused to rotate by a water-rotating means, the walls of the chamber being shaped so that the water is guided thereby to a central outlet orifice with no abrupt change in the direction of flow.

It is likewise an object of my invention to provide as an article of manufacture a device for adjustably restricting a rotating fluid in a fluid-conducting passage.

It is a further object of my invention to provide a single chamber sprinkler having an outlet orifice in one end thereof and a means for controlling the flow of fluid into this chamber which includes a projection extending into the chamber toward the outlet orifice and which further includes a closure member connected to the projection so as to be longitudinally adjusted thereon, and which further includes ports through which the water flows into the chamber, the size of the ports being determined by the longitudinal position of the control member and the fluid introduced through the ports into the chamber flowing unobstructedly to and through the outlet orifice.

The above-stated objects will be enlarged upon and other objects will be made apparent in the following part of the specification which is to be read in connection with the accompanying illustrative drawing and the appended claims.

In the drawing,

Fig. 1 is a vertical section through a cylindrical head embodying the features of my invention.

Fig. 2 is a horizontal section taken as indicated by the line 2—2 of Fig. 1.

Fig. 3 is an enlarged perspective view of the volume control and water-rotating means of the invention.

Fig. 4 is a diagrammatic view illustrating the manner in which the walls of the water-rotating ports of the invention are relieved.

Fig. 5 is a schematic view illustrating the cross-sectional shape of the water-rotating ports of the invention.

Fig. 6 is a schematic view provided for the purpose of comparison in the description of Fig. 5 in the specification.

Referring to the drawing, my invention includes a shell 11 having walls forming a single chamber designated by the numeral 12 and a means generally designated by the numeral 13 for adjustably controlling the volume of flow of water directly from a supply pipe into the chamber 12, and for rotating the water therein.

Referring now to the details of construction, the shell 11 comprises a cylindrical body 14 adapted for threaded connection to a supply pipe 15, substantially in the manner shown. The shell 11 is preferably provided with a flange 16 having wrench-engaging notches 17 provided to facilitate the threading of the body 14 to the pipe 15. The upper end of the cylindrical body 14 is provided with a cap 18 which may be threaded therein as indicated at 19, there being wrench-engaging notches 20 provided thereon as shown for the purpose of threading the cap to the body. Provided in the cap 18 is a cylindrical opening 21 which communicates directly with the chamber 12 and which serves as an outlet orifice through which water is sprayed.

The control means 13 comprises a body, preferably in the form of a plate 30, adapted to be positioned in the shell 11 and cooperating with the walls thereof to form the single closed chamber 12.

For the purpose of securing the plate 30 in the shell, I prefer to provide a shoulder 31 therein against which the plate abuts, the end 32 of the pipe 15 serving to retain the plate against the shoulder 31 in the manner shown.

An integral projection 35 is formed on one side of the plate 30 so as to project into the chamber 12. The projection 35 is preferably tapered upwardly as shown and cooperates with the inner walls of the shell and cap 18 to cause the chamber 12 to assume the form of an annular channel which gradually diminishes in diameter from the bottom toward the top thereof, so that water is guided smoothly and gradually inward toward the outlet orifice 21 as it flows spirally upward in direction of flow. Extending longitudinally through the projection 35 and the plate 30 is an internally threaded bore 36, adapted to threadedly receive a plug 37, which, by reason of its threaded engagement with the bore is longitudinally movable therein.

Formed in the projection 35 is a plurality of elongated ports which extend longitudinally of the projection and which communicate between the bore 36 and the chamber 12, so that water enters the bore 36 and then flows outwardly into the chamber 12. One convenient manner of forming these ports comprises cutting slots 40, preferably three in number, as shown in the

drawing, which slots extend from the upper end of the projection to the upper surface of the plate 30. It will be seen that by a longitudinal movement of the plug 37 in the bore 36 the length of the slots 40 and thus the operative size of the ports formed thereby may be adjustably varied.

The ports formed by the slots 40 are disposed at such an angle relative to the bore 36 and to the walls of the chamber that the water delivered therethrough will be caused to rotate in the chamber, as indicated by the arrow A of Fig. 2. The axes of the slots 40 are thus disposed tangentially relative to a circle concentric to the longitudinal axis of the bore. I prefer to arcuate the slots 40, as shown best in Figs. 2 and 3, so that the curved axes of the slots are disposed tangentially to a circle as described above.

As shown best in Fig. 4, one side wall of each of the curved slots 40, such as the inner wall 41 thereof, is relieved so that the width of the slot progressively increases from the entrance thereof at the bore 36 to the outer or delivery end thereof, substantially as shown. This renders the ports 40 practically non-clogging, it being clear that any obstructive matter which is small enough to pass through the entrance of the port cannot become caught in any other portion of the slot.

As an additional non-clogging feature I also prefer to taper the side walls of the slots 40 upwardly from the plate 35, as shown in Figs. 2 and 3. This provides a more desirable cross-sectional shape for the ports, particularly when the plug 37 is adjusted downwardly to diminish the volume of flow to an operative minimum, as is clearly illustrated in Figs. 5 and 6. In Fig. 5 a port B is shown as being formed by the upwardly tapered slot 40 and the plug 37. In Fig. 6 a port C is shown as being formed by a straight-walled slot, the cross-sectional area of this slot C being substantially equal to the slot B shown in Fig. 5. It will at once be clear that with the two types of ports adjusted for the same volume of flow, the port B of my invention is of such a shape that only quite large particles could become lodged therein, while the port C presents such a restricted passage that relatively fine particles, moss, etc., would easily become clogged therein, thus clogging the port.

In the event that the ports 40 of the sprinkler do become clogged, the plug 37 may be threaded upwardly in the bore, greatly increasing the size of the ports so that matter lodged therein is readily flushed out.

The operation of threading the plug 37 upwardly or downwardly in the bore 36 is accomplished from the exterior of the cylindrical head by inserting a screw driver through the orifice 21 and engaging a screw driver slot 43 provided in the plug for this purpose. It will thus be seen that the volume of the water flowing through the ports 40 may be adjusted at will and that these ports may be adjusted for cleaning from the exterior of the cylindrical head without removing any part thereof.

My invention provides an extremely simple and cheaply constructed sprinkler head, the parts of which may be readily machined or may be die cast. The mechanism 13 for rotating the water is particularly adapted for use in connection with sprinkler heads, as described, but also finds utility apart from such use as a mechanism for adjustably restricting the flow of fluid through a fluid-conducting passage. It should be understood, however, that numerous other uses for my

device are contemplated and that the scope of my invention should not be limited to the disclosure, but should be given the full scope of the appended claims both in combination with sprinkler heads of the type above described and as an article of manufacture.

I claim as my invention:

1. In a sprinkler, the combination of: a shell adapted for connection with a supply pipe; a plate positioned in said shell and cooperating with the walls of said shell to form a closed chamber, said plate having a central projection extending into said chamber; walls forming an outlet orifice in said shell communicating directly with said chamber; walls forming a bore in said plate longitudinally through said projection; walls forming slots in said projection, said slots tapering outwardly from said plate to the end of said projection and disposed to deliver water tangentially from said bore into said chamber; and a plug longitudinally movable in said bore to adjustably shorten or lengthen said slots.

2. In a sprinkler, the combination of: a shell adapted for connection with a supply pipe; a plate positioned in said shell and cooperating with the walls of said shell to form a closed chamber, said plate having a central projection extending into said chamber; walls forming an outlet orifice in said shell communicating directly with said chamber; walls forming a bore in said plate longitudinally through said projection; walls forming slots in said projection extending from the end thereof to said plate and disposed to deliver water tangentially from said bore into said chamber to rotate said water in said chamber the width of said slots progressively increasing from said bore to the outer ends thereof; and a plug longitudinally movable in said bore to adjustably shorten or lengthen said slots.

3. In a sprinkler, the combination of: a shell adapted for connection with a supply pipe; a plate positioned in said shell and cooperating with the walls of said shell to form a closed chamber, said plate having a central projection extending into said chamber; walls forming an outlet orifice in said shell communicating directly with said chamber; walls forming a bore in said plate longitudinally through said projection; walls forming tapered slots in said projection extending from the end thereof to said plate and communicating between said bore and said chamber for the passage of water into said chamber, the width of said slots progressively increasing from said bore to the outer ends thereof; and a plug longitudinally movable in said bore to adjustably shorten or lengthen said slots.

4. In a sprinkler, the combination of: a shell adapted for connection with a supply pipe; a plate positioned in said shell and cooperating with the walls of said shell to form a closed chamber, said plate having a central projection extending into said chamber; walls forming an outlet orifice in said shell communicating directly with said chamber; walls forming a bore in said plate longitudinally through said projection; walls forming longitudinal slots in said projection extending the entire length thereof and communicating between said bore and said chamber for the passage of water into said chamber; and a plug longitudinally movable in said bore to adjustably shorten or lengthen said slots.

5. In a sprinkler, the combination of: a shell having walls forming a single closed chamber; a projection formed to extend into said chamber; walls forming a bore in said shell extending longitudinally through said projection; a plug longitudinally movable in said bore; walls forming an outlet orifice in said shell communicating directly with said chamber; and walls forming ports in said projection disposed to deliver water tangentially from said bore into said chamber said ports being adjustably restricted by said movable plug in said bore.

6. In a sprinkler, the combination of: a shell having walls forming a closed chamber having an outlet orifice; a projection formed to extend into said chamber, said projection having a bore extending through said shell and said projection, and having ports disposed to deliver water tangentially from said bore into said chamber; and a closure member adjustably supported by said projection, said closure member controlling the size of said ports depending on its position, to control the volume of fluid flowing through said sprinkler.

7. In a sprinkler, the combination of: a shell having side and end walls forming a single chamber, there being an outlet orifice in one of said end walls; a projection extending into said chamber from the other of said end walls, in a position in alignment with said outlet orifice, said projection having an inlet orifice and port means formed in the side thereof in communication with said inlet orifice and said chamber for directing fluid tangentially into said chamber; and a closure member adjustably supported by said projection for restricting said port means.

8. In a sprinkler, the combination of: a shell having side and end walls defining a single unobstructed chamber, there being an outlet orifice in one of said end walls; and flow control means for controlling the flow of fluid through said sprinkler comprising a projection extending into said chamber from the end wall opposite said outlet orifice in alignment with said outlet orifice, said projection having an inlet orifice formed therein, and a closure member threadedly secured to said projection so as to be longitudinally adjustable thereon, and walls forming ports in said flow control means for directing fluid from said inlet orifice to said chamber, the effective size of said ports being determined by the longitudinal position of said closure member, the fluid introduced into said chamber flowing unobstructedly into said outlet orifice.

9. In a sprinkler, the combination of: a shell having side and end walls defining a chamber, there being an outlet orifice in one of said end walls; and flow control means for controlling the flow of fluid through said sprinkler comprising a projection extending into said chamber from the side wall opposite said outlet orifice, said projection having an inlet orifice formed therein, and a closure member threadedly secured to said projection so as to be longitudinally adjustable thereon, and walls forming tangentially disposed slots in said flow control means for directing fluid from said inlet orifice to said chamber, the effective length of said tangentially disposed slots being determined by the longitudinal position of said closure member.

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