Nov. 6, 1951 M. J. HOLMES 2,574,183

SPRINKLER

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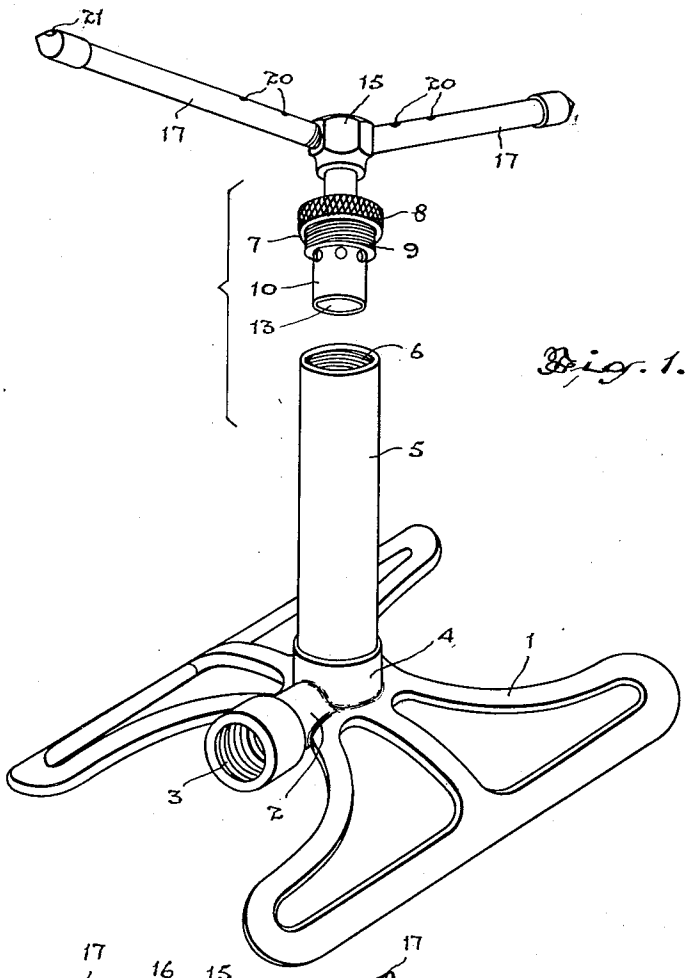


Fig. 1.

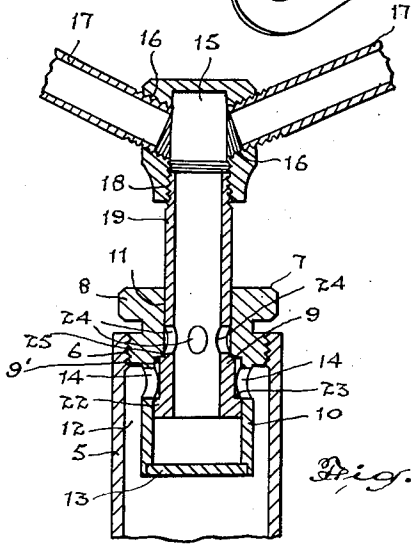


Fig. 2.

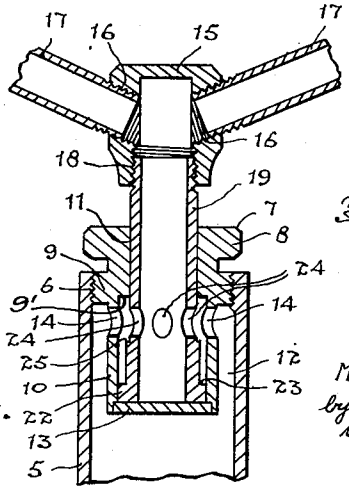


Fig. 3.

Inventor
Michael J. Holmes
by Douglas S. Johnson
Agent

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SPRINKLER

Michael Joseph Holmes, Windsor, Ontario, Canada

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2 Claims. (Cl. 299—69)

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This invention relates to self-rotating sprinklers of the type used in watering lawns and golf courses and the like, and the principal object of the invention is to provide an extremely simple and inexpensive form of self-rotating sprinkler in which the destructive wear between the moving parts will be completely eliminated and in which the sprinkler head will rotate at a self-regulated high rate of speed to deliver a large constant volumetric discharge of water in a fine and uniform spray over a wide area.

A further and important object is to provide a dynamically balanced self-rotating sprinkler which will be water lubricated and which will normally deliver the water to the rotating head at the full capacity of the connected supply but which will automatically effect a reduction of the quantity of water delivered to the head in the event of excessive water pressure or speeds of rotation.

The principal feature of the invention consists in providing a collar member adapted to be threaded on to the end of an upright supply pipe and formed with a reduced tubular extension extending into the pipe, the extension having a sealed lower end and a plurality of circumferentially spaced supply ports arranged in the wall thereof adjacent the upper end, and providing a rotary sprinkler head having a tubular extension journalled in said collar and extending into said collar extension, the tubular head extension being formed with an enlarged lower end defining an annular thrust bearing shoulder arranged below the ports of the collar extension and with circumferentially spaced supply ports arranged above the shoulder whereby water directed inwardly through the collar ports to be conveyed to the sprinkler head through the ports of the head extension forms an annular thrust absorbing cushion between the thrust shoulder and collar and forms a cushion between the lower end of the head extension and the sealed end of the collar extension to prevent deleterious wear between the collar and rotary head.

A further and important feature consists in arranging the ports in the tubular sprinkler head extension to normally communicate with the ports of the collar extension but upon excessive upward movement of the sprinkler head to enter the bore of the collar journal to effect a reduction of the volume of water supplied to the head to automatically regulate its speed of rotation.

A still further and important feature resides in the forming of the enlarged lower end of the head extension as a bearing hub journalled in the

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collar extension to increase the length of bearing between the collar and sprinkler head ensuring a dynamically balanced sprinkler.

Referring to the accompanying drawings

Fig. 1 is a perspective view of a self-rotating sprinkler embodying my invention showing the collar member and sprinkler head removed from the upright supply tube.

Fig. 2 is a vertical mid-sectional view of the sprinkler head showing the head drawn outwardly to a position cutting off all flow to the nozzles.

Fig. 3 is a view similar to Fig. 2 but showing the head in its normal position of rest in the bearing collar with the ports of the head extension communicating with the ports in the collar extension.

In the ordinary rotary sprinkler the rotary head is journalled in the sprinkler standard and due to the upward water pressure and the vertical component of the centrifugal force, moves upwardly to bring the upward thrust limiting surface of the rotary head into frictional contact with the underside of the journal member. This effect produces an aggravated condition of wear between the contacting metal surfaces particularly when sand or other abrasive material becomes lodged between the wearing surfaces thus greatly shortening the life of the sprinkler. Attempts to limit this cause of wear have resulted in very complicated and expensive sprinkler constructions.

The present invention has been devised to overcome the above difficulties by providing a very simple form of sprinkler in which the water flowing to the sprinkler head is utilized to provide a cushion on which the head floats or rides and which resists upward thrust of the head.

Referring to the accompanying drawings my sprinkler illustrated comprises a cast base frame 1 in which is secured an elbow 2 having a threaded end 3 for connection to a water supply conduit and a threaded end 4 to receive an upright tube 5 provided with an internally threaded upper end 6. The elbow 2 is preferably formed as an integral part of the base casting.

Secured in the upper end of the upright tube 5 is a collar generally designated at 7 having a knurled enlarged end 8 adapted to abut the end of the tube 5 and having a reduced threaded portion 9 to engage the threads of the tube end 6.

Extending downwardly from the threaded portion 9 of the collar is a tubular extension 10 which has an inner diameter larger than the diameter of the bore 11 through the collar end 8

and threaded portion 9 to define an internal shoulder 9' and an outer diameter smaller than the inner diameter of the tube 5 to provide an annular passage 12 therebetween.

The lower end of the collar extension 10 is sealed by a disc 13 and circumferentially spaced ports 14 are arranged in the wall of the extension adjacent the threaded portion 9 to provide communication between the interior of the collar extension and the supply tube 5.

The rotary sprinkler head comprises a hollow head member 15 of hexagonal form provided with threaded ports 16 in which radially and upwardly extending hollow sprinkler arms 17 are secured, and arranged in the base of the head is a threaded orifice 18 in which a tubular extension 19 is secured.

The sprinkler arms 17 are preferably formed with a plurality of small discharge ports 20 adjacent the hollow head 15 and with large ports 21 at the ends thereof, the arms being set so that the ports 21 discharge the water in opposing directions to provide the propelling force to rotate the head.

The tubular extension 19 of the sprinkler head is journalled in the collar 7 extending through the collar bore 11 to provide a close water tight sliding fit therebetween, and projects downwardly within the collar extension 10.

The lower end of the head extension 19 is enlarged at 22 to form a close sliding fit with the interior of the collar extension 10 and to define an annular thrust shoulder 23 arranged below the collar extension ports 14. Arranged above the annular shoulder 23 are a plurality of circumferentially spaced ports 24 extending through the wall of the head extension and providing communication between the interior thereof and the interior of the ported collar extension.

Preferably the sprinkler head extension 19 is provided with a second smaller annular shoulder 25 spaced above the thrust shoulder 23 to provide an effective stop to limit the upward movement of the sprinkler head to prevent the shoulder 23 from moving above the collar extension ports 14 and rendering the sprinkler inoperative.

In assembling the sprinkler it is merely necessary to slip the head extension 19 through the collar from the lower end, place and secure the sealing disc 13 in position to seal the collar extension, thread the head 15 on to the extension 19 and thread the collar with the head in position on to the end of the upright tube 5.

In operation, water from the supply source enters the tubular collar extension through the ports 14 and passes through the ports 24 in the head extension to be delivered to the head discharge ports 20 and 21 to effect rotation of the sprinkler through the action of the oppositely directed water jets.

As the water pressure and speed of the sprinkler head increases the head will tend to move upwardly towards the position illustrated in Fig. 2. This action is counterbalanced by the water entering the ports 14 and filling the annular chamber formed between the annular thrust shoulder 23 of the head extension and the annular shoulder 25 defined on the underside of the threaded collar portion 9 by the collar bore 11. Thus the upward thrust of the rotary head is cushioned and resisted by a solid annulus of moving lubricating water between the shoulders 23 and 9' and under pressure of the source to maintain the head extension shoulder out of engagement with the underside of the collar to completely eliminate

destructive wear between the moving parts. This will be more clearly understood when it is appreciated that the chamber defined between shoulders 23 and 9' is always in communication with the pressure source through the constant area inlet openings 14, but as the head moves upwardly the outlet openings 24 are decreasing in area. Pressure under any stable condition in the chamber defined between these shoulders 23 and 9' may be somewhat less than the source pressure due to the velocity through openings 14 and 24 but upon sudden upward movement of the head the pressure will tend to increase as the outlet openings 24 are restricted and the water cannot readily escape therethrough.

In addition to the water cushion forming between the collar shoulder 25 and the thrust shoulder 23, it will be understood that water under pressure of the source will flow downwardly through the open end of the head extension and form a wide annular lubricating cushion while under pressure of the source between the underside of the enlarged head extension end 22 and the disc 13 sealing the lower end of the collar extension. Thus it will be understood that due to variations in pressure of the water supply the head extension will ride up and down on a double water cushion.

In the event that the water pressure increases and the sprinkler head reaches an excessive angular velocity and the downward force of the water against the thrust shoulder 23 is overcome, the head extension will begin to move upwardly towards the position of Figure 2 so that the ports 24 therein partly enter the collar bore 11 reducing the effective area of communication between the collar extension and the head thereby creating an increased downward water pressure on the thrust shoulder to equalize the upward force on the head and provide a dynamic balance. It will be noted that during upward movement of the head the external thrust shoulder 23 presents a constant area in unrestricted communication with the chamber which in conjunction with the internal shoulder 9' it defines, and the pressure of the water annulus between the shoulders acts with a uniform pressure thrust throughout this constant area surface.

Thus it will be seen that the sprinkler will automatically regulate its speed and the volume of water it discharges to maintain a dynamic balance and the water will be provided with a direct path from the supply to the sprinkler arms of the rotary head where, by the arrangement of discharge orifices and rotational movement of the head, the water will be discharged as an even highly atomized stream or fine spray over a wide area.

It will be readily understood that my construction is very simple enabling the sprinkler to be produced at a very low cost, and it will be further understood that in addition to the elimination of the destructive upward thrust by the provision of the water cushions, the arrangement whereby the head extension forms a close sliding fit with the collar bore and the enlarged lower end 22 of the head extension forms a close sliding fit with the interior of the collar extension greatly increases the effective bearing length between the head and collar further reducing wear to extend the life of the sprinkler indefinitely.

What I claim as my invention is:

1. A water sprinkler comprising a base, an upright outer tube supported by said base and having an inlet for connection to a pressure

supply and an outlet, a collar arranged for closing said outlet and formed with a central bore and a tubular extension extending into said supply tube and aligned with said bore but of a larger internal diameter to define an internal shoulder at the upper end of said extension, said extension being sealed at the lower end and formed with peripherally aligned ports in the wall thereof adjacent said collar, and a sprinkler head having a tubular extension open at the lower end journalled and vertically slidable in said collar bore and extending into said collar extension and formed with an enlarged lower end defining an external shoulder in sliding water seal with the inner wall of said collar extension below said ports, said sprinkler head extension having a series of peripherally aligned ports in the wall thereof above said external shoulder, said internal and external shoulders forming an annular chamber between said collar and sprinkler head extensions and water sealed at the top and bottom and in lateral communication through said ports with the interiors of said upright outer tube and sprinkler head, the disposition of said sprinkler head extension ports and external shoulder in relation to said collar extension ports being such that on upward movement of said sprinkler head extension the ports therein enter said collar to progressively close off communication between said chamber and sprinkler head while leaving said chamber in non-restricted communication with said upright outer tube through said collar extension ports to present by virtue of said external shoulder a constant area thrust surface within said chamber against which water under pressure of the source entering unrestricted through said collar extension ports exerts its pressure to displace said sprinkler head downwardly.

2. A water sprinkler comprising a base supporting an upright tubular standard having a threaded upper end and adapted to be connected at its lower end to a pressure water source, a threaded collar closing said upper end and formed with a central bore and a tubular extension aligned axially with said bore and of a larger internal diameter than said bore to define an internal annular shoulder at the upper end of said extension, said extension projecting into said tubular standard and spaced from the inner wall thereof and being sealed at the lower end and

formed with peripherally aligned ports in the wall thereof adjacent the upper end, and a sprinkler head having a tubular extension open at the lower end journalled and vertically slidable in said collar and extending into said collar extension and formed with an enlarged lower end defining an external shoulder in close sliding contact with said collar extension below said ports, said sprinkler head extension having a series of peripherally aligned ports in the wall thereof above said external shoulder, said internal and external shoulders forming an annular chamber of variable depth between said collar and sprinkler head extensions and water sealed at the top and bottom to provide an upper annulus of moving water forming a lubricating cushion between said shoulders resisting upward movement of the sprinkler head under pressure of a source connected to said standard, and a lower annulus of water forming a lubricating cushion between said enlarged lower sprinkler head extension end and said sealed collar extension end resisting under water pressure in said sprinkler extension downward movement of the sprinkler head, the disposition of said sprinkler head extension ports and external shoulder in relation to said collar extension ports being such that on upward movement of said sprinkler head extension the ports therein enter said collar to progressively close off communication between said chamber and sprinkler head reducing pressure within said sprinkler head to decrease the pressure of said lower lubricating cushion while the area of said external shoulder in unrestricted communication with said source through said collar extension ports and against which said upper lubricating water annulus exerts its pressure remains constant to provide an increase in the effective downward thrust on said external shoulder.

MICHAEL JOSEPH HOLMES.

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