United States Patent

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[54] ROTARY WATER SPRINKLERS

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[52] **U.S. Cl.** **239/204,** 239/205, 239/DIG. 1

[51] **Int. Cl.**.....**B05b 15/10**

[58] **Field of Search**.....239/204, 205, 206, 251, 256, 239/257, 261, DIG. 1

[56] **References Cited**

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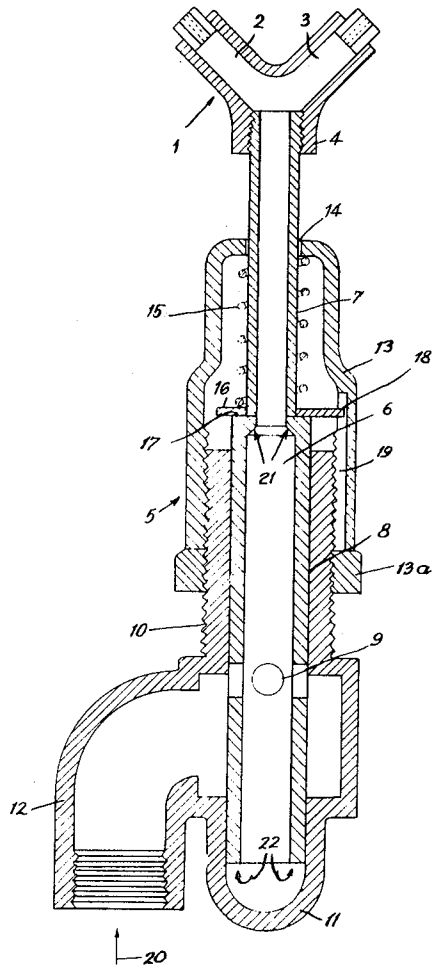
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[57] **ABSTRACT**

A rotary water sprinkler having a plurality of spray nozzles disposed at the ends of a plurality of conduit arms radiating from a common feed duct and being adapted to rotate about an axis passing through the feed duct under the influence of feed water flowing through the feed duct into the arms, the water sprinkler being provided with a pressure stabilizing device.

4 Claims, 4 Drawing Figures



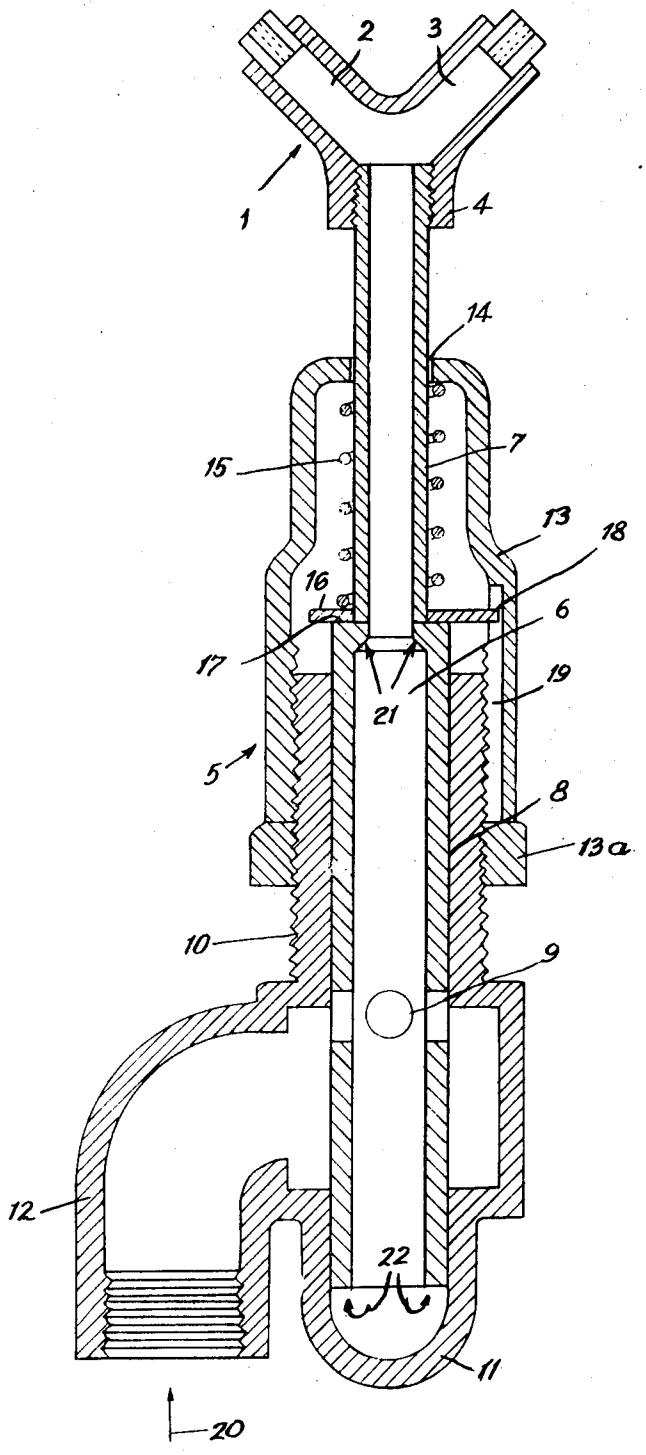


FIG. 1

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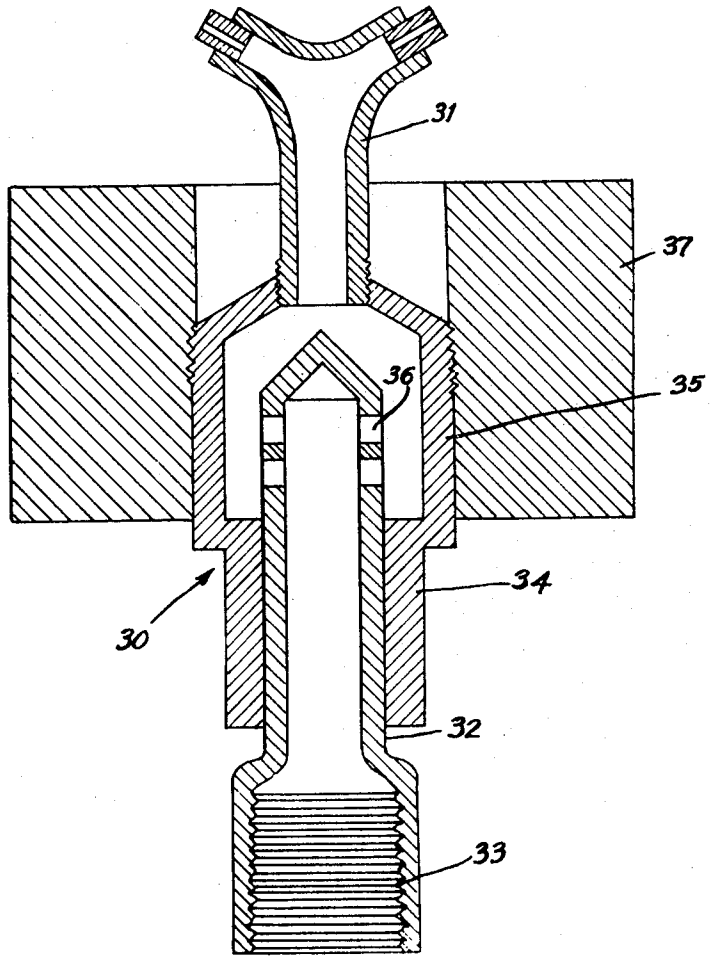


FIG. 2

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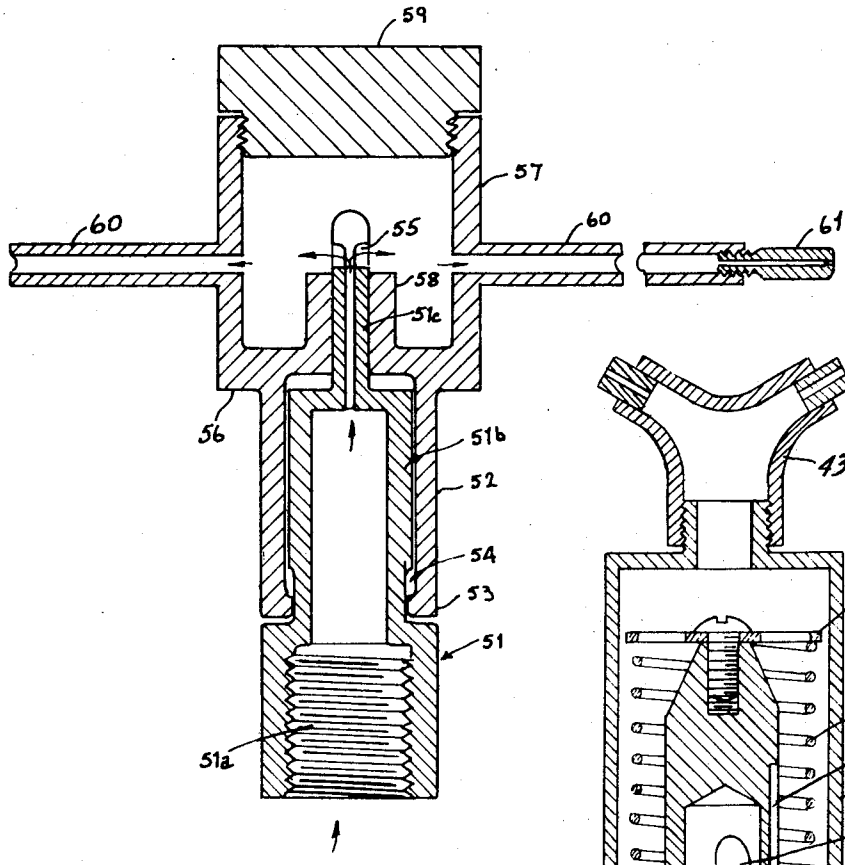


FIG. 4

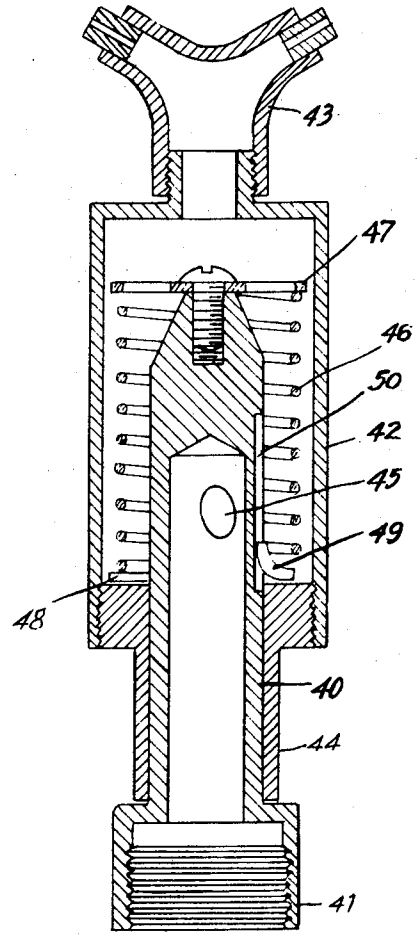


FIG. 3

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ROTARY WATER SPRINKLERS

This invention relates to rotary water sprinklers of a kind wherein a plurality of spray nozzles are respectively disposed at the ends of a plurality of conduit arms which radiate from a common feed duct, said arms being adapted to rotate about an axis passing through said feed duct under the influence of feed water flowing through the feed duct into the arms.

When such a water sprinkler is in use, water emerging therefrom is sprayed over a substantially circular area of land whose radius is determined primarily by the pressure of water fed to the sprinkler. Thus variations in this water pressure lead to variations in the area to be sprayed by the particular sprinkler. Such variations can be particularly disturbing when a network of sprinklers is employed, each constituent sprinkler of which is arranged to spray a specific area. If owing to any of a diversity of reasons such as variations in ground level, etc., the pressure of water fed to the sprinklers varies from sprinkler to sprinkler then some sprinklers will spray a greater area than others, and in consequence some portions of the land to be sprayed will either be over or undersprayed.

It is an object of the present invention to provide a pressure stabilizing device for use with a water sprinkler of the kind specified so as to ensure that the sprinkler is fed with water at a substantially constant pressure.

According to the present invention there is provided a pressure stabilizing device for a water sprinkler of the kind wherein a plurality of spray nozzles are respectively disposed at the ends of a plurality of conduit arms which radiate from a common feed duct, said arms being adapted to rotate about an axis passing through said feed duct under the influence of feed water flowing through the feed duct into the arms, comprising a conduit member which is axially slidable in a sleeve member, one of said members being adapted for connection to the sprinkler and to be rotatable therewith and with respect to the other member, an inlet duct of the device being adapted to communicate with the interior of the one member via one or more inlet channels, the direction of flow pressure of the water into the one member being such as to bias the one member into closing of the channels and biassing means acting on the other member in a direction opposite to the bias exerted by the water flow pressure so as to open the channels.

Thus, with such a pressure stabilizing device the pressure of water flow and the biassing pressure act against each other and as a result an equilibrium is achieved which is expressed in the degree of opening of the inlet channels. Should the feed water pressure rise above a certain level the effect of the water flow will be to tend to close further the channels, thereby reducing the pressure of water flowing out of the device to the sprinklers to the desired levels. Should, however, the feed water pressure fall below the desired level, then the effect of the biassing means will be to open the channels completely. Furthermore, by virtue of the relative rotation of the two members, jamming of the members due to accumulated dirt, etc., is substantially avoided.

Various embodiments in accordance with the invention will now be described by way of example and with reference to the accompanying drawings in which:

FIGS. 1 to 3 are respectively longitudinal sectional views of three differing pressure stabilizing devices; and

FIG. 4 is a longitudinal sectional view of a combined pressure stabilizing device and water sprinkler in accordance with the invention.

As seen in FIG. 1 of the drawings a water sprinkler 1 which is only schematically shown, includes a pair of arms 2 and 3 which extend radially from a central duct 4, the arms being rotatable by means not shown about the longitudinal axis of the duct 4 under the influence of the water flowing therethrough.

Coupled to the water sprinkler 1 is a pressure stabilizing device 5 which comprises a central conduit 6, the upper portion 7 of which is of reduced diameter as compared to the lower portion 8. A plurality of apertures 9 are formed in an intermediate position in the lower portion 8. This lower portion

8 is surrounded by and is slidable in an externally threaded sleeve 10, the lower end 11 of which is sealed. An inlet duct 12 is formed in the sleeve 10 and is arranged to communicate with the interior of the conduct 6 via the apertures 9. An internally threaded cap 13 is screwed on to the sleeve 10 and surrounds the conduit 6, the upper portion 7 of this conduit extending through an aperture 14 formed in the upper surface of the cap 13. The end of the upper portion 7 of the conduit 6 is externally screw threaded and is screwed into the mouth of the duct 4 of the water sprinkler 1.

A compression spring 15 surrounds the upper portion 7 of the conduit 6 and bears at its upper end against the cap 13 and at its lower end against a disc 16 which rests on a shoulder 17 formed on the conduit 6. The disc 16 is provided with an externally directed key 18 which is adapted to ride axially in a key way 19 formed in the inside wall of the cap 13. The compression of the spring 15 is varied by screwing up or down of the cap 13 which can be locked in the required position by a lock nut 13*a*.

In use water is fed from a main supply into the inlet 12 in the direction of the arrows 20. This water flows into the interior of the conduit 6 via the aperture 9. During its flow the water acts on the conduit 6 in the direction of the arrows 21 and 22 thereby tending to bias the conduit 6 upwards and to displace the apertured portion of the conduit 6 away from the inlet duct 12 and thereby partially close the apertures 9. At the same time, however, the effect of the compression spring 15 is to bias the conduit downwards to tend to open further the apertures 9.

Thus, in use, any rise in the pressure of the feed water above a desired level tends to close further the apertures 9 thereby tending to maintain the pressure of water flowing through the device substantially constant. However, a lowering of the pressure of the feed water below the desired level results in the full opening of the apertures 9 under the influence of the spring 15.

In FIG. 2 there is shown a further form of pressure stabilizing device 30 coupled to a rotatable water sprinkler 31. The device comprises a conduit 32 having a tapped mouth 33 constituting a device inlet. The conduit 32 is surrounded by a sleeve 34 which is axially rotatable with respect to the conduit 32, the upper portion 35 of the sleeve 34 being spaced from the conduit ; the interior of the upper portion 35 communicating with the conduit via apertures 36 formed in the walls of the conduit 32. The sleeve is screwed to an annular weight 37 while the outlet of the sleeve is coupled to the rotatable spinkler 30.

In use water flows into the conduit 32 and through the apertures 36 into the sleeve 34 and thence to the sprinkler 31. The pressure of water flowing through the sleeve 34 tends to move the sleeve 34 upwards with the result that the walls of the sleeve tend to close the apertures 36. This tendency is resisted by the downwardly acting weight 37. As in the embodiment described above an equilibrium is achieved and as long as the supply pressure of the water exceeds a predetermined minimum, the outflow of water will always be at the predetermined pressure. The relative rotation of the sleeve and conduit ensures that those parts do not become jammed due to accumulated dirt.

When devices such as have been described above are associated with a network of water sprinklers it can be ensured that each water sprinkler is operated under substantially constant conditions of water pressure and that in consequence the area of land surrounding these water sprinklers and sprayed thereby remains substantially constant. There is thus substantially avoided the disadvantageous over or under spraying associated with standard water sprinklers not provided with such pressure stabilizers.

FIG. 3 shows a modification of the embodiment shown in FIG. 2. In this modification a conduit 40 has a tapped mouth 41 constituting a device inlet. The conduit 40 is surrounded by a sleeve 42 which is axially rotatable with respect to the conduit 40 and which is spaced from the conduit 40. The upper

end of the sleeve is secured by screwing to a water sprinkler **43** whilst the lower end of the sleeve is screwed to an externally threaded flanged collar **44** which surrounds the lower part of the conduit **40**. Communication between the interior of the conduit **40** and the sleeve **42** is effected via apertures **45** formed in the conduit walls. A compression spring **46** surrounds the conduit **40** and bears at its upper end on a ring **47** bolted to the upper end of the conduit **40** and at its lower end on a ring **48** which is slidable with respect to the conduit **40** but cannot rotate with respect thereto by virtue of the projection of a lug **49** formed integrally with the ring **48** in a key way **50** formed longitudinally in the conduit walls.

The device shown in FIG. **3** is designed in a similar fashion to that described with reference to FIG. **2**, the spring **46** replacing the weight shown in FIG. **2** as the biassing means.

FIG. **4** shows a further modification of the embodiment shown in FIG. **2** wherein the pressure stabilizing device is formed integrally with a rotatable water sprinkler. The device comprises a conduit **51** having a tapped mouth portion **51***a* constituting a device inlet. An intermediate portion **51***b* of the conduit **51** is surrounded by a sleeve **52** which is axially rotatable with respect thereto. The lower edge **53** of the sleeve **52** is inwardly flanged and projects into a peripheral recess **54** formed in the wall of conduit portion **51***b* so as to limit relative axial movement of the conduit **51** and sleeve **52**. The upper end of the conduit portion **51***b* merges with a narrow tubular end portion **51***c* provided at its upper end with outlet apertures **55**.

The sleeve **52** depends downwardly from and is formed integrally with the base **56** of a cup shaped member **57** which is formed with an axially apertured boss **58** which projects upwardly from the base **56** and through which passes the tubular end portion **51***c*. The cup member **57** is closed by means of a screw or cap **59** while formed integrally with and extruding radially from the cup member **57** are a pair of sprinkler arms **60**, one of which is shown fitted with a sprinkler nozzle **61**.

The operation of the device is essentially similar to that of the device shown in FIG. **2**. Thus the weight of the cup member **57**, cap **59**, arms **60** and sleeve **52** tend to ensure that the outlets **55** are kept open whilst the upwardly directed water pressure acts in the opposite direction and tends to lead to the closing of the outlets **55**. In the present instance, however, in view of the fact that the water emerges from a very narrow tubular portion **51***c* the head of water is relatively small and the corresponding weight of the cup member **57**, etc., is correspondingly reduced.

I claim:

1. A pressure stabilizing device for a water sprinkler of the kind wherein a spray nozzle is disposed at the end of a conduit arm which radiates from a common feed duct, said arm being adapted to rotate about an axis passing through said feed duct under the influence of feed water flowing through the feed duct into the arm, comprising a conduit member, a sleeve member axially slidable on said conduit member, said sleeve member being adapted for connection to the sprinkler and to be rotatable therewith and with respect to said conduit member, an inlet duct adapted to communicate with the interior of the sleeve member via at least one inlet channel, the direction of flow pressure of the water into the sleeve member being such as to bias the sleeve member into closing of the channels and a spring acting on the sleeve in a direction opposite to the bias exerted by the water flow pressure so as to open the channel.

2. A pressure stabilizing device for a water sprinkler of the kind wherein a spray nozzle is disposed at the end of a conduit arm which radiates from a common feed duct, said arm being adapted to rotate about an axis passing through said feed duct under the influence of feed water flowing through the feed duct into the arm, comprising a conduit member, a sleeve member in which said conduit member is axially slidable, said conduit member being adapted for connection to the sprinkler and to be rotatable therewith and with respect to said sleeve member, an inlet duct adapted to communicate with the interior of said conduit member via at least one inlet channel, the direction of flow pressure of the water into the conduit member being such as to bias the conduit member into closing of the channel, said conduit member having an abutment portion, a ring slidably mounted on said conduit member and keyed from rotation with respect thereto, a spring acting against said ring to urge the later against said abutment portion to urge said conduit member in a direction opposite to the bias exerted by the water flow pressure so as to open the channel.

3. A pressure stabilizing device for a water sprinkler of the kind wherein a spray nozzle is disposed at the end of a conduit arm which radiates from a common feed duct, said arm being adapted to rotate about an axis passing through said feed duct under the influence of feed water flowing through the feed duct into the arm, comprising a conduit member, a sleeve member axially slidable on said conduit member, said sleeve member being adapted for connection to the sprinkler and to be rotatable therewith and with respect to said conduit member, an inlet duct adapted to communicate with the interior of the sleeve member via at least one inlet channel, the direction of flow pressure of the water into the sleeve member being such as to bias the sleeve member into closing of channels, and a weight associated with the sleeve member acting to move the latter in a direction opposite to the bias exerted by the water flow pressure so as to open the channel.

4. A combined water sprinkler and pressure stabilizing device therefor comprising an inlet conduit, a tubular end piece thereof in which are formed a plurality of outlets, a cup shaped distributing member, at least one sprinkler arm radiating from said distributing member, a first sleeve portion integral with said distributing member and slidable on said conduit, a second sleeve portion integral with said distributing member and slidable on said end piece, the direction of flow of water into said distributing member being such as to bias said second sleeve portion into closing the outlets whilst the weight of said distributing member and elements integral therewith being so directed as to displace the second sleeve portion into opening the outlets.

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