May 13, 1952 D. F. DUNHAM 2,596,383

SPRINKLER HEAD

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Fig. 1

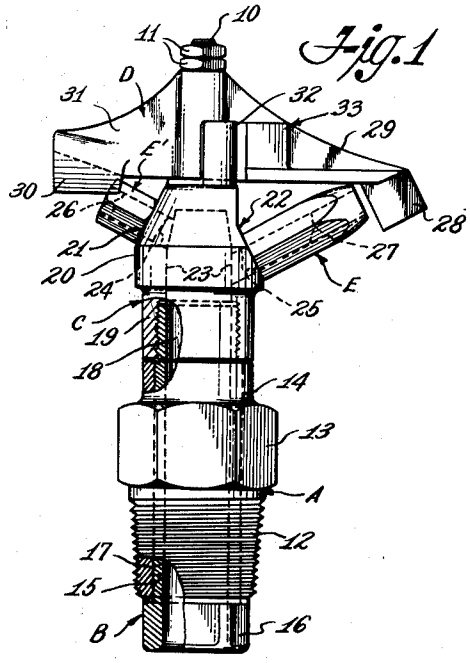


Fig. 2

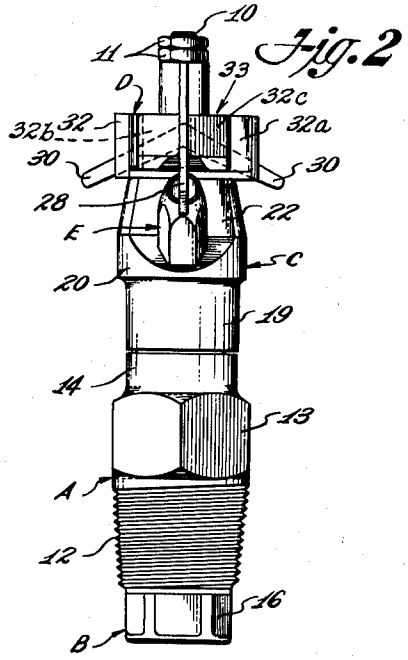


Fig. 4

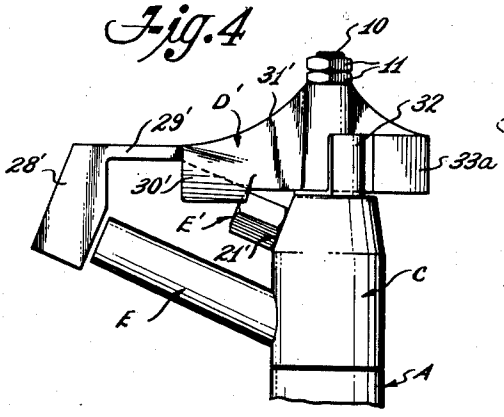
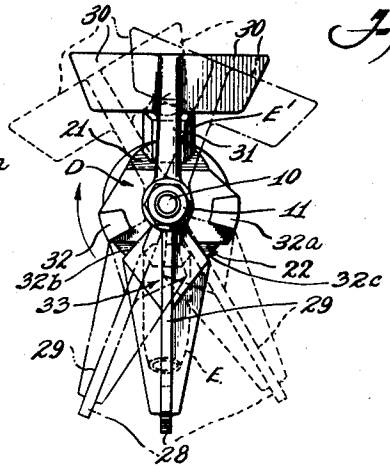


Fig. 3



INVENTOR.
DELBERT F. DUNHAM
BY Luther L. Spacy
Attorney

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SPRINKLER HEAD

Delbert F. Dunham, Long Beach, Calif.

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9 Claims. (Cl. 299—69)

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This invention relates to sprinkler heads adapted for connection to suitable water outlets such as are employed in lawn sprinkling systems or to special fixtures, and embodies certain improvements over a form of sprinkler head disclosed in U. S. Patent No. 2,421,551, granted to me on June 3, 1947.

It is an object of the present invention as also of the prior patented invention to provide a sprinkler head which is bodily rotatable, progressively in step-by-step manner on a stationary fixture to which water is supplied from a source, and includes an impulse member oscillatable on the head and adapted to be actuated by water jet means. However, the present invention contemplates the provision of a more economical and dependable device than those heretofore known and used.

It may be explained that sprinkler heads of the same broadly defined characteristics as those of my said former invention, my present invention includes the progressively rotatable head and one or another type of water jet oscillatable impulse member arranged to deflect and spread the water over as great an area as possible, the sweep of the water spray being occasioned and controlled by the forward and reverse swing of the impulse member over successive segments of a circular area of which the sprinkler head is the center.

Also, it is desirable to provide vertically disposed vanes together with or apart from angularly or otherwise disposed surfaces within the influence of one or two water jets for effecting oscillation of the impulse member as the head is bodily rotated. The arrangement and disposition of the surfaces of the impulse member on which water from the jet or jets impinges are such that forces are applied thereto primarily to swing the impulse member to the right or left from a central or neutral position relative to a jet and, secondly, to effect a return swing of the impulse member not merely to but beyond neutral position to a predetermined extent. Hence, it is important to so dispose the water impinged surfaces of the impulse member that no conflicting or offsetting forces are applied thereto which would tend to neutralize or actually stop the swing of the impulse member and thereby at least intermittently defeat the purpose of the invention.

Resort has been had to various expedients to overcome known difficulties and promote efficiency and dependability with more or less success, but the requisite characteristics have provoked the production of expensive and complicated devices beyond the ability of acquisition by the large majority of potential users.

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Therefore, it is an object of the instant invention to provide a sprinkler head free from the aforesaid objections, capable of being produced at a minimum cost to the user, requiring a minimum of service and repairs, and of assured dependability. Other and more detailed objects of the invention will appear in the following description.

A preferred type of sprinkler head of two slightly different forms is shown in the annexed drawings in which:

Fig. 1 is an elevational view, partly in section, embodying one form of head and impulse member;

Fig. 2 is an elevational view of the same with the head and impulse member viewed at a right angle from the plane of Fig. 1;

Fig. 3 is a top plan view; and

Fig. 4 is an elevational view showing a slightly different form of impulse member than that of Fig. 1.

Briefly described, the sprinkling unit in one form as shown in Figs. 1, 2 and 3, includes a body fixture A, a head attaching member B, a head C attached to member B and rotatable therewith on fixture A, an impulse member D oscillatable on head C on a stud 10 and held by one or more nuts 11, and two water nozzles E and E' diametrically located on opposite sides of head C.

Fixture A has a nipple 12 adapted for connection with a water service tap, a wrench receiving portion 13, a boss 14 and a longitudinal bore 15. Member B has a wrench receiving head 16 abutting the end of nipple 12 and an elongated tubular stem 17 extending entirely through fixture A and thereabove for attachment to head C, a water passage 18 being provided for conducting water from a source to head C. Said head has a depending skirt 19 internally threaded to receive stem 17 and an enlarged upper body portion 20 formed with two diametrically opposite inclined flats 21 and 22 as in Fig. 1. Water nozzles E and E' are attached to body 20 of head C and are inclined upwardly at right angles from flats 21 and 22, respectively. Head C has a water chamber 23 in communication with passage 18 of stem 17 and to which outlets 24 and 25 in the head lead to passages 26 and 27, respectively, of nozzles E and E'.

The primary movement of member D being a swing to one or the other side of the axis of a jet the impulse member is formed as in Fig. 1 with a vertically disposed vane 28 as in Fig. 1, on a leading arm 29 and a pair of inclined wings 30, 30 on a tail arm 31 as in Fig. 1. In either case the

vane 28 is at a sufficient distance from the common axis of head C and member D to afford a maximum swing of the impulse member with a minimum effort and to such end also the longer nozzle E is extended upwardly and outwardly to a point close to the arc described by the vane in its swinging movement. Such vane being disposed edgewise of the jet issuing from nozzle E cannot remain in neutral position in the path of the jet because of the unequal forces applied thereto by the water while in a stream or spray and, therefore, will always swing to the right or left, depending upon the distribution of the applied forces. The member D is limited in its swing in opposite directions by upstanding lugs 32 and 32*a* attached to or integral with head C and adapted to be engaged by facets 32*b* and 32*c* of a driver 33 on member D. Thus, on an impulse stroke facet 32*a* will forcibly strike lug 32 shown in Fig. 3 and the impact will cause member 33 to rebound to an extent limited by the engagement of facet 32 with lug 32*a* on the right hand side of head C as shown in Fig. 3.

The provision of wings 30, 30 under the influence of a separate jet issuing from nozzle E' effects a secondary movement to the impulse member by means of which said member is returned to neutral position after each swing occasioned by the jet from nozzle E.

As shown best in Fig. 2, wherein the member D is in neutral position with its impulse receiving vane 28 and the apex of the wings 30 axially alined with nozzle E, the tendency of the member to swing to the right or left in accordance with the particular direction in which the member is urged by the greatest force of the jet from nozzle E is opposed to a minimum extent by the impingement of water from jet E' on the inclined lower surface of the trailing wing 30 as the leading wing is moved out of the influence of the jet from nozzle E'. But as the trailing wing moves forwardly the forces applied thereto are gradually increased until member 33 closely nears its stop lug 32 and at such time the forces applied to the trailing wing have attained a maximum and are sufficient to institute a return swing of impulse receiving element 30 with the former trailing wing now becoming the leading wing, and vice versa. Thus, member D is quickly actuated on a reverse stroke through the jet of nozzle E, the forces applied by the jet from nozzle E being additional to those applied to the leading wing 30 from nozzle E' and together sufficient to overcome the retarding forces applied to the trailing wing 30.

Operation of member D is very rapid and the surfaces of vane 28 and wings 30 which are impinged by water from jets E and E' are so disposed and their interrelationship such that all possible benefit of momentum is taken and inertia is quickly overcome at the extremes of each swing of member D, thereby preventing any possibility of a more or less static condition, actual stoppage or quivering condition of member D.

It is apparent that as the member D rapidly oscillates while under the influence of its water jets, at the end of each forward stroke the impact of member D with the lug 32 on head C will be of sufficient force to slightly rotate head C on fixture A. As shown in Fig. 3, the rotation of head C is clockwise on fixture A and the swing of member D in one direction beyond neutral position is greater than in an opposite direction, the direction of greatest swing being opposite to the rotative direction of the head. Thus, the force of member D applied to and for progressively rotating the head is greater than the forces applied to and for retracting member 30 on the head to a position for a subsequent movement of the head.

Obviously the rotative swing of member D under influence of jet E is quick and the impact of member 33 on lug 32 is of sufficient force as to effect a slight rotation of head C at each stroke, thereby rotating the jets in gradual stages for directing the water to successive segments of a lawn or sward while at the same time spreading the stream backwardly and forwardly over successive areas around the unit.

The design of member D is such that it will be counterbalanced on its axis and thereby minimize the forces required to overcome inertia and at the same time afford all possible benefit of momentum. To such end the tail arm 31' of the member D of Fig. 4 is formed with a driver 33*a*.

When the sprinkler head is attached to a suitable water outlet and mounted in erect position as shown, regardless of the position of the member D at the time the water is turned on the fixture A the member D will swing either to one extreme or the other of its range and under the influence of water pressure applied alternately and successively by the jets from nozzles E and E' will begin and continue to rapidly oscillate. The jet from primary nozzle E except for momentary interruptions as vane 28 moves backwardly and forwardly through the stream from nozzle E will have a long range of from 30 to 100 feet radius in its progressively rotative sweep to the extent of a complete circular area around the head C as its center.

The secondary jet or stream will be more or less of a spray of much shorter radius than that of the primary jet as it is broken up, deflected, and spread by reason of the impingement of the water on wings 30. The spray of the secondary jet, however, is also progressively rotative over a small circular area concentric with the larger outer area.

The modified form of device shown in Fig. 4 operates in a manner similar to the form previously described but the structure is different as follows: the jets E and E' are arranged one above the other on the same side of the head C and the impulse member D' is formed with the wings 30' and vane 28' on the same radial plane under the influence of jets E' and E respectively, and a weight 33*a* on the trailing side of member D' and between the lugs 32 and 32*a*. A rib 31' connects and strengthens wings 30' and vane 28. In this form of structure the operation and effect is the same as in the previously described form.

In its broadest concept this invention comprehends the provision of a progressively rotatable sprinkler head which is actuated by an oscillatable impulse member mounted on the head and arranged with at least one vane disposed edgewise relative to a primary water jet, and one or more wings, ribs, or vanes under the influence of a secondary water jet. Said vane or vanes, wings, or ribs are arranged on the same or different sides of the impulse member and so arranged as to effect alternate forward and reverse swings of the impulse member and to impart rotative movement to the head at corresponding alternate swings.

In the description of this invention the terms "forward swing" or "forward stroke" are intended to mean the effective stroke of the impulse member for rotating the head, while the "reverse" or "backward swing" or "stroke" refers to the re-

turn movement of the impulse member into position for a succeeding effective stroke.

I claim:

1. A sprinkler head comprising: a fixture attachable to a water outlet, a head rotatable thereon, primary and secondary nozzles radially and inclinably fixed to said head for jetting separate streams of water, an impulse member oscillatably supported on said head and having a vane disposed edgewise relative to said primary nozzle and a pair of wings reversely inclined downwardly from a central radial plane disposed adjacent the secondary nozzle, a pair of abutments on said head at opposite limits of movement of the impulse member, said impulse member having a driver movable between said abutments formed with opposite surfaces alternately engageable with said abutments, for imparting rotative motion to the head through impact with one of the abutments at the end of each forward stroke and limiting movement of the impulse member on each reverse stroke of the impulse member.

2. A sprinkler head as characterized in claim 1 in which the vane on said impulse member is at a greater radial distance from said head than said wings.

3. A sprinkler head as characterized in claim 1 in which said vane is borne by a leading portion and said wings are borne by a trailing portion of the impulse member.

4. A sprinkler head as characterized in claim 1 in which the vane and the wings of the impulse member are radially disposed on the head and said vane at a greater distance from the axis of the head than said wings as to receive greater power impulses from an associated jet on each forward stroke of the impulse member than is applied to said wings from the other jet on each reverse stroke of the impulse member.

5. A sprinkler head comprising: a fixture attachable to a water outlet, a head rotatably mounted thereon, a primary nozzle and a secondary nozzle spaced apart on the periphery of the head and inclined upwardly for directing separate streams of water over nearby and distant areas surrounding the sprinkler, said head being freely rotatable intermittently and progressively in opposite directions, an impulse member coaxial with and oscillatably mounted on said head, primary and secondary impulse receiving elements radially disposed in the paths of the jets from said nozzles respectively, said primary impulse receiving element having a vane disposed edgewise and said secondary impulse receiving element having wings disposed flatwise and oppositely inclined, said impulse member having a driver arcuately movable in a given path when the impulse member is oscillated, and a pair of abutments stationary on said head in the path of said driver and adapted to be engaged by a suface of said driver at one extreme of movement of the driver for imparting rotative motion to the impulse member at the end of each forward stroke and for limiting a reverse stroke of the impulse member when the other abutment is engaged by an opposite surface of the driver.

6. A sprinkler head as characterized in claim 5 in which the vane of said primary impulse receiving element is at a greater distance from the

axis of the sprinkler than the wings of the secondary impulse receiving member whereby a maximum impact of the driver on the abutments of said head is afforded for imparting fractional rotation to the head at each forward stroke of the head while less effort is applied to the wings of the secondary impulse receiving element for effecting a reverse stroke of the impulse member.

7. A sprinkler head as characterized in claim 5 in which the vane of said primary impulse receiving element is at a greater distance from the axis of the sprinkler than the wings of the secondary impulse receiving member whereby a maximum impact of the driver on the abutments of said head is afforded for imparting fractional rotation to the head at each forward stroke of the head while less effort is applied to the wings of the secondary impulse receiving element for effecting a reverse stroke of the impulse member, said nozzles and said impulse receiving elements being correspondingly arranged in diametrically opposite positions on said head and said impulse member respectively.

8. A sprinkler head as characterized in claim 5 in which the vane of said primary impulse receiving element is at a greater distance from the axis of the sprinkler than the wings of the secondary impulse receiving member whereby a maximum impact of the driver on the abutments of said head is afforded for imparting fractional rotation to the head at each forward stroke of the head while less effort is applied to the wings of the secondary impulse receiving element for effecting a reverse stroke of the impulse member, said nozzles being arranged on the same side of said head and said impulse receiving elements being co-radially extended from the impulse member with the impulse receiving elements thereof in the paths of the jets issuable from said nozzles, respectively.

9. A sprinkler head as characterized in claim 5 in which the vane of said primary impulse receiving element is at a greater distance from the axis of the sprinkler than the wings of the secondary impulse receiving member whereby a maximum impact of the driver on the abutments of said head is afforded for imparting fractional rotation to the head at each forward stroke of the head while less effort is applied to the wings of the secondary impulse receiving element for effecting a reverse stroke of the impulse member, said nozzles being arranged on the same side of said head and said impulse receiving elements being co-radially extended from the impulse member with the impulse receiving elements thereof in the paths of the jets issuable from said nozzles, respectively, said driver being diametrically opposite said impulse receiving element.

DELBERT F. DUNHAM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,309,782	Orr	Feb. 2, 1943
2,421,551	Dunham	June 3, 1947