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K. V. SØRENSEN
SPRINKLING DEVICE FOR AGRICULTURAL
AND HORTICULTURAL PURPOSES

2,621,967

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2 SHEETS—SHEET 1

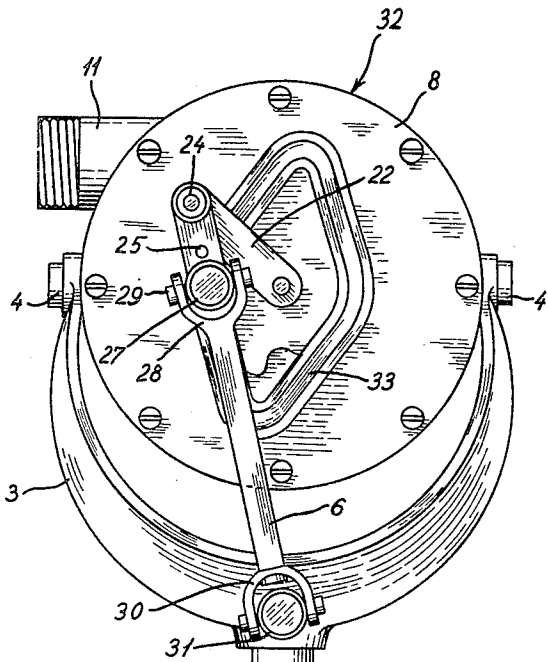


Fig. 1.

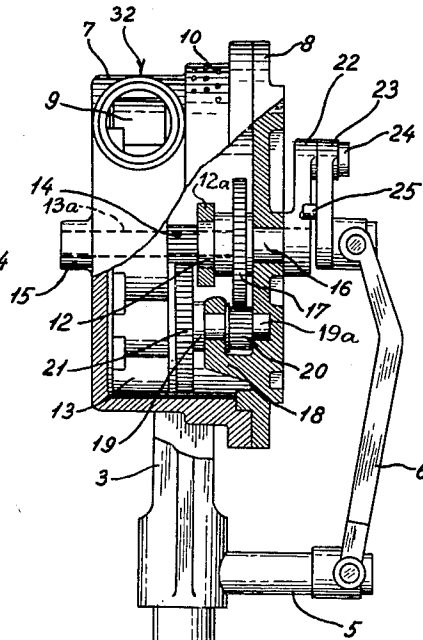


Fig. 2.

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2 SHEETS—SHEET 2

Fig. 2.

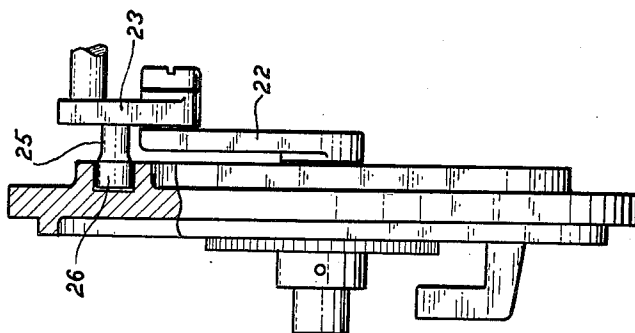
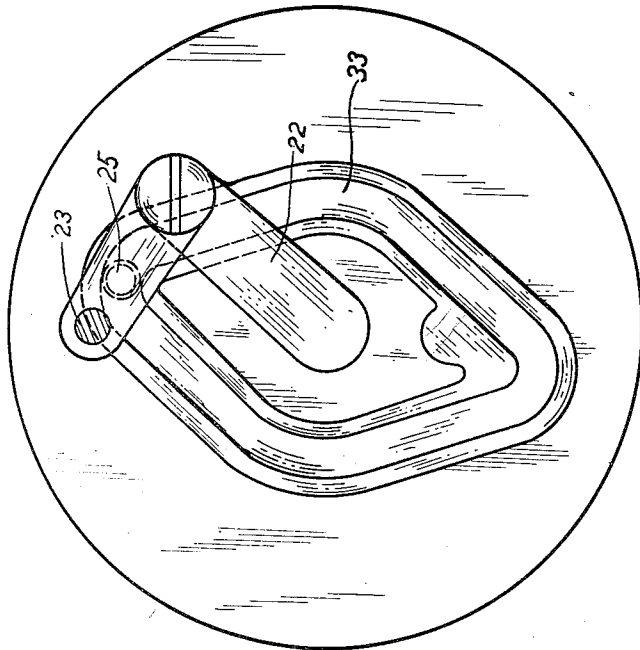


Fig. 3.



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UNITED STATES PATENT OFFICE

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SPRINKLING DEVICE FOR AGRICULTURAL AND HORTICULTURAL PURPOSES

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8 Claims. (Cl. 299—67)

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The invention relates to a sprinkling device for agricultural and horticultural purposes.

It is one object of the invention to provide a sprinkling device having a rocking sprinkling member or sprinkler head adapted to distribute sprinkler fluid uniformly over a definite area and which is especially adapted for use in gardens, orchards or the like.

In designing such apparatus it must be kept in mind that they are normally to be handled by technically unskilled men. Therefore the construction must be robust and rigid, and as few sensitive parts as possible should be accessible. Accordingly it is a further object of the invention to provide a construction which comprises a rocking sprinkler head enclosing the essential part of the mechanism so as to prevent it from being mechanically damaged. A further problem in sprinkling devices is to effect the rocking movement thereof by means of the kinetic energy available from the sprinkler fluid passing through the sprinkler head.

In order to utilize to the largest possible extent the kinetic energy of the fluid, care must be taken not to lose too much pressure of said fluid. There are different sources for loss of pressure and among these also the resistance against the passage of the fluid through the sprinkler head plays a considerable role. Therefore also seen from this point of view a considerable part of the mechanism should be housed within the sprinkler head so as not to be subjected to soiling, because soiling increases the friction in gears or the like used in the mechanism.

A further problem in sprinkling devices is to obtain a uniform distribution of the sprinkling fluid over the area. In order to obtain this it will be necessary that the rocking sprinkler head is moving with varying angle velocity. In accordance herewith it is a further object of the invention to provide a sprinkling device in which the movement of a small turbine wheel driven by the fluid passing through the sprinkler head is translated to a rocking movement of the sprinkler head which will vary so as to secure the most uniform distribution of the fluid. It will be appreciated that in general the velocity of such a small turbine will be constant, except for small variations in the load, and in order to be able to vary the angular velocity of the rocking sprinkler head I provide means to be more fully described in the following.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

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Figure 1 is a side view of a sprinkling device embodying the invention.

Figure 2 is a side view partly in section perpendicular to Figure 1,

Figure 3 is a front elevational view, partly in section, of the housing of the sprinkling device, and

Figure 4 is a view partly in section perpendicular to Figure 3 showing the moving elements of the housing.

Detachably secured to the upper end of a post 1 with a base 2 is a forked support 3 provided at its two upper free ends with holes forming bearings for two pivot pins 4 of a housing 32. Perpendicular to and integral with the central portion of said forked support is a short arm 5 to the outer free end of which a connecting rod 6 is pivotally mounted.

The housing 32 comprises two detachable parts, of which one part 7 forms a cylindrical bowl having a flat bottom and a flange provided with screwthreaded holes by means of which a circular cover 8 forming the other part of the housing may be screwed on the bowl-formed part.

An inlet opening 9 is formed substantially tangentially on the bowl-shaped part 7, and a number of smaller outlet openings 10 are provided in the cylindrical walls of said bowl-formed part and substantially radially thereon, said inlet opening communicating with an inlet passage formed in a short screwthreaded tube 11 on which may be screwed one end of a flexible hose, and said outlet openings being distributed in a number of parallel lines covering a narrow, substantially rectangular area of the cylindrical walls of said housing.

12 designates a bearing bushing arranged inside the housing 32 on a bracket or the like 12a that is fixed to the housing (not shown in detail). Mounted in this bearing bushing and a centrally formed bearing in the bottom of the bowl formed part is a shaft 13a provided with a toothed part 14 and having fixedly secured to it a turbine wheel 13. Loosely mounted on the one end of said shaft and a centrally formed bearing in the bottom of the bowl-formed part is a secondary shaft 16 having fixedly secured to it a gear wheel 17, the outer end of said shaft 16 passing through the cover 8 to protrude from the outer face thereof.

Secured to the inner face of the cover 8 is a bracket 18 carrying a bushing 19 forming bearing for an intermediate shaft 19a provided with a toothed part 20 adapted to engage with the gear wheel 17 and having fixedly secured to its

other end a gear wheel 21 engaging the toothed part 14 of the turbine wheel shaft 13a.

Secured to the protruding end of the secondary shaft 16 is a crank arm 22 to the outer end of which another arm 23 is pivotally mounted.

Fixed to the outer end of the arm 23 is a bolt 24 forming trunnion for a bearing shell 27 pivotally mounted by means of pivot pins 29 between the two prongs of a forked portion 28 formed at and integral with the upper end of the connecting rod 6 the whole thus forming an universal joint.

Secured to the inner face of the arm 23 at an intermediate point thereof is a pin 25 carrying a roll 26 adapted to move in a guide 33 formed in outer face of the cover 8, said guide forming a substantially rhomboid closed groove between upstanding edges about the axis of said secondary shaft.

Rotatably mounted on the lower end of the connecting rod 6, by means of a pivot pin, is a fork portion 30 between the prongs of which a bearing bushing 31 is pivotally mounted, said bearing bushing forming bearing for a pivot pin fixed to the outer end of the short arm perpendicular to the central portion of the support 3, the whole thus forming a universal joint.

The operation of the device is as follows:

The fluid flowing in through the substantially tangential inlet opening 9 rotates the turbine wheel 13 and thereby the shaft 13a of said turbine wheel.

Through the toothed part 14 of said shaft the gear wheel 21 on the intermediate shaft 19a, the toothed part 20 of said intermediate shaft and the gear wheel 17 this rotation is transferred into a much slower rotation of the secondary shaft 16.

The rotation of said secondary shaft causes the rotation of the crank arm 22 and thereby the arm 23. The roll 26 moving in the guide 33 forces the outer end of the arm 23 to describe a predetermined curve.

Through the universal joints 27, 28, 29 and 30, 31 and the connecting rod 6, the rotation is transferred into a rocking movement of the housing 32, said rocking movement being substantially uniform without any stops in the dead points of the crank movement.

During the rocking movement of the housing the fluid is ejected through the outlet openings 10, and due to the arrangement of these openings the fluid forms a fan, which sweeps a substantially rectangular area of land, the fluid being uniformly distributed over the whole area on account of the rocking movement of the housing.

It is to be understood that the form of the invention herewith shown and described, is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of the parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. An oscillating mechanism for use in connection with a sprinkling device having a support, a closed housing pivotally mounted on said support and having a fluid inlet and a fluid outlet, said mechanism comprising a turbine wheel rotatably mounted within said housing in a position to be rotated by fluid passing from said inlet to said outlet, a secondary shaft rotatably mounted in said housing and extending substantially at right angles to the pivoting axis of said

housing, a step-down drive connection from said turbine wheel to said secondary shaft, cam means on said housing, and cam-follower means driven by said secondary shaft and being operatively connected to said support and operable to rock said housing about the pivoting axis thereof in response to rotary movement of said secondary shaft.

2. A sprinkling device comprising a support, a closed housing pivotally mounted on said support and having a fluid inlet and a number of fluid outlets in positions to sweep a strip of land substantially parallel to the pivoting axis of said housing, a turbine wheel rotatably mounted within said housing in a position to be rotated by fluid passing from said inlet to said outlet, a secondary shaft rotatably mounted in said housing a step-down drive connection from said turbine wheel to said secondary shaft, and guiding means including a cam path on said housing and a movable cam path engaging element on said secondary shaft operatively connected to said support, said guiding means being operable to rock said housing about the pivoting axis thereof in response to rotary movement of said secondary shaft thereby to direct fluid discharged through said fluid outlets towards succeeding areas.

3. A rocking mechanism for use in connection with a sprinkling device having a support, a substantially cylindrical housing including an end wall and being pivotally mounted on said support for rocking movement about a pivoting center substantially perpendicular to the center of said cylindrical housing, said cylindrical housing having a substantially tangential fluid inlet and a number of fluid outlets distributed over a circumferentially extended area of the cylindrical surface of said housing at the top thereof, said mechanism comprising a turbine wheel mounted within said housing for rotation in a position to be rotated by fluid entering through said substantially tangential fluid inlet, a secondary shaft mounted in said housing for rotation and extending through said end wall thereof, a step-down drive connection from said turbine wheel to said secondary shaft, a guide provided on the outer face of said end wall, said guide forming a substantially rhomboid closed path about the axis of said secondary shaft, a first arm carried on said secondary shaft outside said housing, a second arm pivotally connected with said first arm and disposed opposite said guide, means extending on said second arm for engaging said guide, and a link having its ends connected to said second arm and to said support respectively by universal joints, whereby rotary movement of said secondary shaft will be translated in a rocking movement of said housing about the said pivoting center thereof.

4. In a sprinkling device, in combination, a support, a closed housing pivotally movable on said support and having a fluid inlet and at least one fluid outlet, rotatable means within said housing in a position to be rotated by fluid passing from said inlet to said outlet, a secondary shaft rotatably mounted in said housing, gear means between said rotatable means and said secondary shaft mounted in said housing, a guide forming a non-circular closed path about the axis of said secondary shaft and means operable by said guide to perform a predetermined motion and being operable to rock said housing about the pivoting axis thereof in response to the rotary movement of said secondary shaft.

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5. In a sprinkling device in combination, a base, a sprinkler head mounted on said base for oscillatory movement, said sprinkler head having a fluid inlet and at least one fluid outlet, a revoluble turbine wheel in said housing, a rotatable secondary shaft journaled in said housing and spaced from said turbine wheel, a step down gear between said turbine wheel and said secondary shaft disposed within said sprinkler head, a guide forming a non-circular closed path, means being engaged to said guide to move therein along said closed path and means associated with said base for kinematically translating said movement to an oscillatory movement of said sprinkler head in response to the rotary movement of said secondary shaft.

6. In a sprinkling device in combination, a supporting structure, a sprinkler head pivotally mounted in said supporting structure and having a fluid inlet and at least one fluid outlet, a rotatably arranged shaft, means for driving said shaft in response to the passage of fluid through said sprinkler head from said inlet to said outlet, a guide forming a non-circular closed path, means in engagement with said guide to move relative thereto along said path, means responsive to the rotation of said shaft to relatively move said guide and said guide engaging means and means connected with relation to said supporting member for rocking said sprinkler head responsive to said relative movement between said guide and said guide engaging means.

7. In a sprinkling device, a supporting structure, a sprinkler head pivotally mounted in said supporting structure, and having a fluid inlet and at least one fluid outlet, a rotatably arranged shaft, means for driving said shaft in response to the passage of fluid through said sprinkler head from said inlet to said outlet, a non-circular cam member, a cam follower engaging said cam

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member to move therealong, means responsive to the rotation of said shaft to relatively move said cam follower and said cam member, and means interposed between said supporting member and cam follower for rocking said sprinkler head responsive to said relative movement between said cam follower and said cam member.

8. In a sprinkling device in combination, a supporting structure, a sprinkler head pivotally mounted in said supporting structure, said sprinkler head having a fluid inlet and at least one fluid outlet and forming on the interior between said inlet and outlet a passage for sprinkling fluid, a connecting member extending from said supporting structure, a cam follower associated with the extending end of said connecting member, a non-circular closed cam member engaged by said cam follower, and means operative in response to passage of fluid through said sprinkler head for imparting to said cam member and said cam follower a relative movement to rock said sprinkler head.

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