June 7, 1955 S. IZCHAKI 2,710,226

SPRINKLERS

Filed Feb. 26, 1953

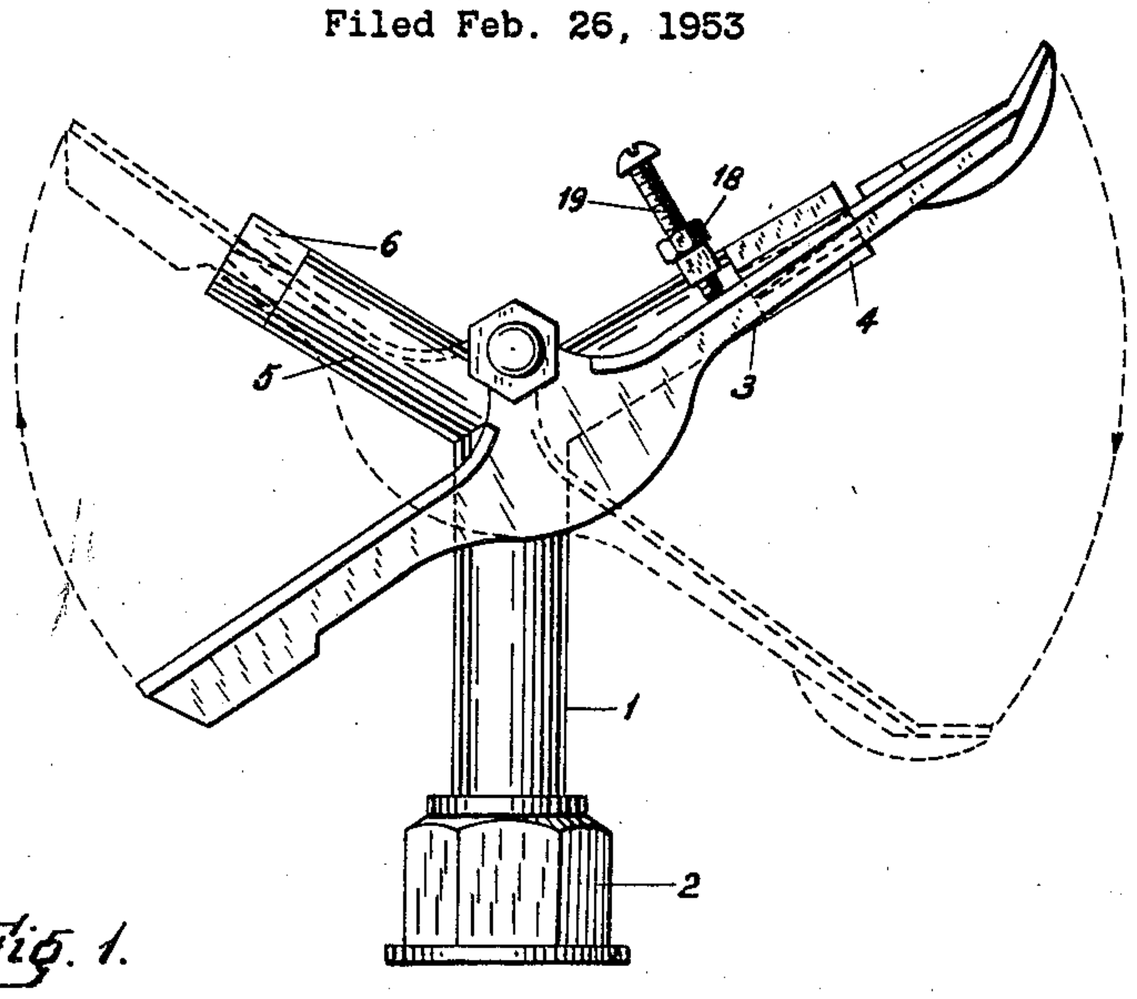

Fig. 1.

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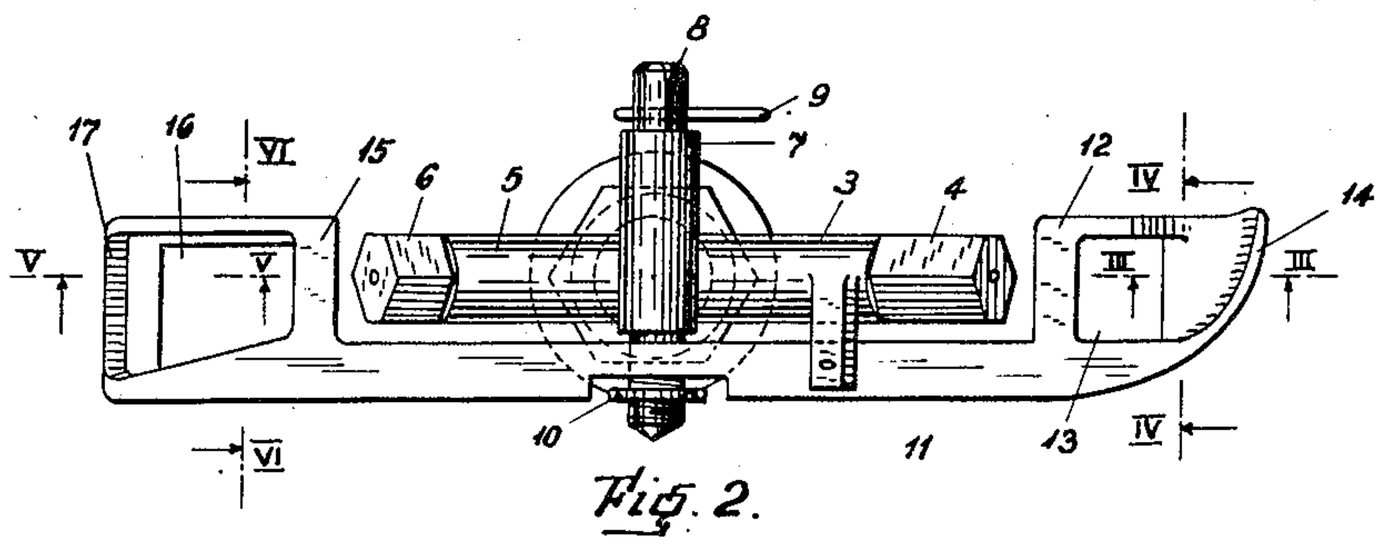

Fig. 2.

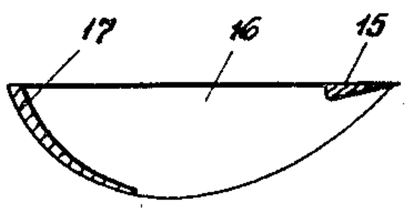

Fig. 5.

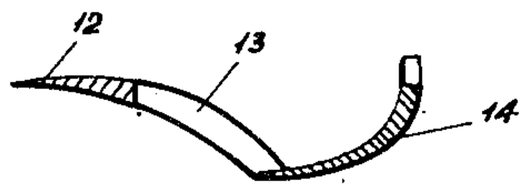

Fig. 3.

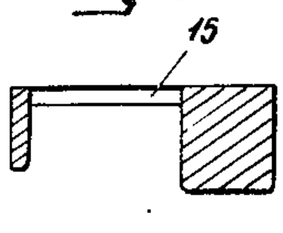

Fig. 6.

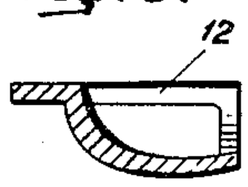

Fig. 4.

INVENTOR.

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United States Patent Office

2,710,226

Patented June 7, 1955

2,710,226

SPRINKLERS

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Application February 26, 1953, Serial No. 339,057

Claims priority, application Israel November 30, 1952

7 Claims. (Cl. 299—69)

This invention relates to sprinklers of the kind in which a pair of nozzles is stepwise shifted about a vertical axis owing to the action of a lever which includes a baffle on which the jet of one of the nozzles impinges in a certain angular position of the lever.

In hitherto usual sprinklers of this kind the lever swings about a vertical axis. The baffle at the head end of the lever is normally located in front of one of the nozzles, and as the jet impinges on the head the lever is pushed sidewards and tensions a spring which, with a sudden motion, urges the lever back into its starting position. In arriving there the lever strikes an abutment and thereby shifts the nozzle a step farther about a vertical axis. This arrangement has the drawback that it requires springs whose tension is apt to diminish in time so that the sprinkler ceases to function satisfactorily.

In another known arrangement the lever swings about a horizontal axis. It has at its head end a baffle designed laterally to deflect the jet impinging thereon whereby a reaction is generated which shifts the nozzle about a vertical axis while the head end of the lever swings downwards. The opposite or tail end of the lever is weighted so that the lever is made to return into its original position after each such stroke. This arrangement has the advantage that springs are not required. On the other hand, the weight exerts its momentum independently of the pressure of the water producing the jet that impinges on the lever head. When the pressure drops considerably, the jet is apt to become too weak to swing the lever head down at all, in which case the sprinkler ceases to operate. Moreover, the sprinkler has to be mounted strictly plumb in order to ensure proper functioning, and this condition is not always readily fulfilled.

The aforesaid drawbacks are overcome by the present invention which consists in a sprinkler of the kind referred to, comprising a nozzle unit with at least two nozzles; an oscillating lever; a baffle plate at the head end of the lever so designed that the jet emerging from one of the nozzles makes the head end of the lever swing away from that nozzle and is at the same time laterally deflected and exerts a reaction force on the head designed to shift the nozzle unit stepwise about a vertical axis; and a baffle at the tail end of the lever so designed that when the head end of the lever has swung away from the coordinated nozzle the tail baffle is located in front of the second nozzle and the jet emerging from the latter exerts on the tail baffle a momentum calculated to return the lever into its original position.

In a preferred embodiment of the invention the lever oscillates about a horizontal axis and the tail baffle of the lever is so designed that the jet impinging thereon makes the tail end of the lever swing downwards.

As contrasted to the aforesaid known sprinklers in which the baffle lever oscillates about a horizontal axis, the operation of the sprinklers according to the invention is virtually independent of variations of the water

pressure inasmuch as the oscillations of the lever are produced in both directions by impulses generated by water jets of substantially equal pressure. It has been found that the sprinkler can be designed to any given specification so as to be responsive to a water pressure not below a certain minimum, and to operate with optimal efficiency at a certain water pressure above the minimum.

The invention is illustrated, by way of example only, in the accompanying drawings in which:

Fig. 1 is a side elevation of a sprinkler according to the invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a longitudinal section of the head baffle of the lever on line III—III of Fig. 2;

Fig. 4 is a cross-section thereof on line IV—IV of Fig. 2;

Fig. 5 is a longitudinal section of the tail baffle of the lever on line V—V of Fig. 2;

Fig. 6 is a cross-section thereof on line VI—VI of Fig. 2.

On a vertical pipe connection **1** made integral with a cap nut **2** adapted to be screwed on the upper end of a rising water feed pipe (not shown), a nozzle unit is mounted so as to be rotatable about a vertical axis coinciding with the axis of the pipe connection **1**. The nozzle unit includes an arm **3** carrying at its end nozzle **4**, and diametrically opposite thereto an arm **5** with nozzle **6**. The axes of the arms and nozzles are directed upwards and include with that of the pipe connection **1** angles of substantially 120°. In the saddle between the arms a tubular bearing **7** is provided wherein an axle **8** is journalled, secured against longitudinal displacements relative to the bearing **7** at the rear end by a cotter pin **9**, and at the front end by a nut **10** which also fixes to the axle a lever **11**. The lever carries at either end a baffle. The head baffle is so designed that when the lever assumes a position in which the head baffle is located in front of the nozzle **4**, the jet projected by that nozzle passes beneath a bridge member **12** through a clearance **13** and impinges on an inclined baffle plate **14** so designed that the jet is deflected anticlockwise (as considered in the plan view of Fig. 2), and a reaction impulse is imparted on the lever in clockwise direction. At the same time the lever is given a downwards momentum by which it is swung into the position shown in dashed lines in Fig. 1. This brings the tail baffle in front of the nozzle **6**. The tail nozzle includes a bridge member **15** and a clearance **16** similarly as the head nozzle, and a baffle plate **17** which is so devised that the jet emerging from nozzle **6** imparts to the tail end of the lever a downward momentum without lateral component. An abutment including a tapped ear **18** secured to the arm **3** and a screw **19** screwed into the ear, limits the upward movement of the head part of the lever. The operation of the sprinkler is as follows:

At the start, one of the two arms of the lever is shifted in front of the corresponding nozzle. If the lever is fully balanced it may happen that at the start, neither baffle is in front of the corresponding nozzle. The concussions caused by starting the flow of the water will, however, set the lever oscillating, and soon one of the baffles will be struck by one of the jets, when normal operation of the sprinkler begins. However, one of the arms, say the tail arm, may be slightly weighted so that in the position of rest the lever assumes automatically the position shown in full lines in Fig. 1. Such overweight or bias weight would be so small as not substantially to prejudice the independence of the lever from the water pressure. Assuming the starting position to be that shown in full lines in Fig. 1, the jet emerging from the nozzle **4** now strikes the baffle plate **14** and swings

the head end of the lever down. At the same time the jet is deflected anti-clockwise and thereby exerts a reaction on the lever so that the nozzle unit is shifted clockwise about its vertical axis over a short angular distance. When the lever has reached the position shown in dashed lines the tail baffle has assumed its operative position in front of the nozzle **6**. The jet emerging from the latter then strikes the baffle plate **17** and swings the tail end of the lever down, thereby bringing the head baffle in front of the nozzle **4**. As no lateral momentum is exerted on the tail baffle, the nozzle unit is not shifted angularly during this movement. However, the tail baffle may be devised similarly as the head baffle so that the tail end of the lever is given a downward and lateral momentum, and a further angular step is carried out by the nozzle unit when the tail end of the lever swings down.

The adjustable abutment **18, 19** admits variations of the amplitude of the lever movement within certain relatively narrow limits.

The biassing of the lever may be effected by a weak spring instead of by weight.

The invention is not confined to the case in which the lever oscillates about a horizontal axis, for the same principle of throwing the lever back into operative position by the impact of a second jet on a tail baffle may be carried into effect with an inclined or even a vertical oscillating axis.

In addition to the advantages stated above the sprinkler according to the invention has the further advantage that the second nozzle, which cooperates with the tail baffle, may be an ordinary nozzle of the same simple design as the first nozzle which cooperates with the head baffle, as the baffle acts in both cases as a means for disintegrating the jet into a spray. In hitherto known sprinklers of the kind referred to, the second nozzle, which does not cooperate with a baffle, has to be of a special design calculated to disintegrate the jet, and this not only makes the manufacture more costly but causes frequent interruptions of the irrigation owing to clogging.

I claim:

1. In a sprinkler in combination: a nozzle unit including at least two jet-producing nozzles and being rotatable about a substantially vertical axis; a lever oscillatable about a fulcrum located in a zone intermediate its ends, and having a baffle at either end, means limiting the amplitude of oscillation of the lever so that at one limit of its oscillation one of the baffles is located within the jet range of one of the nozzles, and at the other limit of its oscillation the other baffle is located within the jet range of the other of said nozzles; each of said baffles being arranged to impart a swinging movement to the lever upon impingement on that baffle of the jet of the corresponding nozzle, and at least one of the baffles being shaped laterally to deflect the jet for producing by reaction a shifting of the nozzle unit about its axis.

2. A sprinkler as claim as claimed in claim 1, wherein the nozzle unit consists of two nozzles disposed in diagrammatically opposite directions.

3. A sprinkler as claimed in claim 1, wherein the nozzles are upwardly inclined.

4. A sprinkler as claimed in claim 1, wherein the axis of oscillation of the lever is horizontal.

5. In a sprinkler in combination: a nozzle unit including two upwardly inclined nozzles disposed in diametrically opposite directions and rotatable about a substantially vertical axis; a lever oscillatable about a substantially horizontal axis located intermediate its ends, and having a baffle at either end, means limiting the amplitude of oscillation of the lever so that at one limit of its oscillation one of the baffles is located within the jet range of one of the nozzles, and at the other limit of its oscillation the other baffle is located within the jet range of the other of said nozzles; each of said baffles being arranged to impart a swinging movement to the lever upon impingement on that baffle of the jet of the corresponding nozzle, and one of the baffles being shaped laterally to deflect the jet for producing by reaction a shifting of the nozzle unit about its axis.

6. A sprinkler as claimed in claim 1, including means for biassing the lever for normally keeping one of the baffles within jet range of the corresponding nozzle.

7. A sprinkler as claimed in claim 5, wherein one side of the lever is slightly overweighted.

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