

Design of Rotating Sprinkler with Variable Discharge

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Abstract: Sprinkler rotors operate by rotating a stream of water over the landscape instead of the mist produced by spray head sprinklers. This allows rotors to be placed farther apart than spray head sprinklers, saving you installation time and money. Rotors are generally designed to rotate in full or partial circles and do not perform with a throw radius of less than 15 feet. The main objective is to vary the discharge and to cover more sprinkling area.

I. Objective

The objective of this model is to provide sprinkler which provides the variable discharge for every four rotation of the nozzle. For every cycle of four nozzle rotation, stream distance is varied. As for each four rotation radial distance of watering is varied it increases the efficiency of sprinkler to water the lawn area properly.

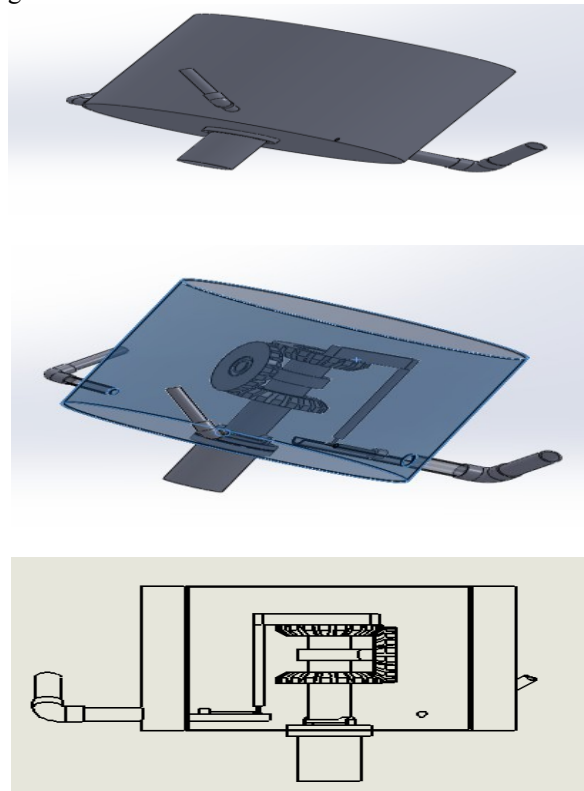
II. Methodology

The model has three nozzles with one of the nozzle can be closed or opened for each four cycle which in turn varies the velocity, when third nozzle is open area for flow is more and hence velocity is low than when it is for nozzle is closed and hence stream will reach less distance than when it is closed.

To vary the number of rotation between the nozzle and arm used for closing the nozzle a gear system with 8:1 rotation of nozzle to arm is used. The rotational motion of gear is transferred to translational motion by the arm. This arm motion will close or open the nozzle.

III. Design Of Sprinkler

Sprinkler is designed by using solid works



IV. Drawing Details And Working

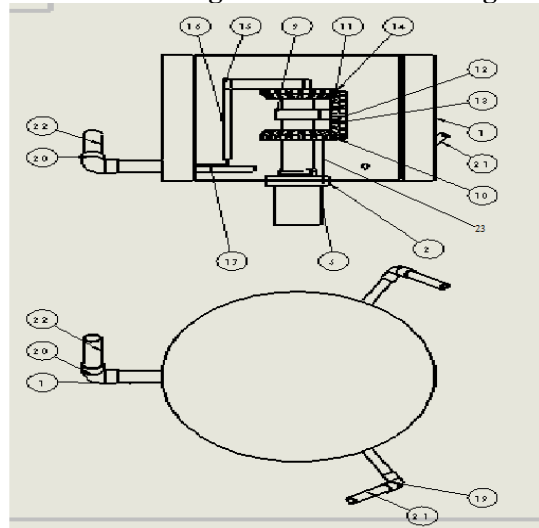


Fig shows the details of base of the sprinkler no. n1 and n2 are nozzle with small diameter than n3. 5 is pipe which is used for inlet of flow. 2 are bearing used for free rotation. 2 is attachment with pipe which is used for supporting gear system. 17 is piston used for translational motion of the arm. 11 is pivot used for mounting the gear system. 10, 12 and 14 are the gears, 10 with rotation of nozzle and 14 with 1:8 of 9. Arm 23 is attached with the gear (10) and bearing (2) which makes gear (10) rotation equal to nozzle rotation. And gear (14) is attaches with translational motion arm which consists of arm (15) freely attached to lever arm (16) which is attached with spring and circular block for blocking the nozzle. As 15 rotate with gear 14 it makes the translational motion of arm 16 in the piston system. Suppose 15 is towards the nozzle (n3) then nozzle is closed by the block when gear (14) takes 1:4th rotation arm is moved away from the nozzle (n3) and loosening the spring and still nozzle (n3) is closed when gear 14 takes rotation beyond 1:4th to 1:2 of gear 13 lever arm (16) with spring is moved away nozzle (n3). And from 1:2 to 3:4th it moves towards nozzle but still opened but as soon as it is at 3:4th motion it is just closed and as it moves further for rotation after rotation beyond 3:4th arm 16 pushes the spring and it closes the nozzle (n3) till next 1:4th of rotation and keeping the cycle repeating. As gear 14 rotation is 1:8th of nozzle rotation above cycle is repeated for every 8 rotation of nozzle cycle and hence nozzle is closed for 4 rotation of nozzle and opened for 4 rotation of nozzle and hence vary the stream radial distance for every 4 rotation of nozzle. So watering the area efficiently than the conventional sprinklers.

References

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