

Mechanical Description: Oscillating Sprinklers

Introduction: General Descriptions

Oscillating sprinklers are devices that spray water intermittently over a wide area by attaching to a hose. Usually made of plastic and metal, the sprinkler is powered by the force of the hose water. It can cover an area up to 43' x 66' for a total of 2,750 square feet depending on the force of the water and the positioning of the metal arm.

Sprinklers became popular with the development of cultured yards. Originally fountains were used to irrigate lawns, and the first patent for a sprinkler was given in 1871. The oscillating sprinkler is popular in several forms. The stationary sprinkler that creates a wave of rain has been preferred for many years because it is inexpensive and dependable. NELSON produced its Turbo-Heart® model in 1984.

This document will describe how an oscillating sprinkler works, showing the mechanisms within.

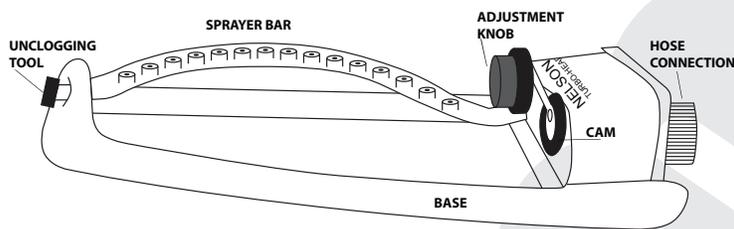


Figure 1: Overall view of oscillating sprinkler

The NELSON Turbo-Heart® model 1310 sprinkler has an outer casing of bright yellow molded plastic with black knobs and a curved metal sprayer bar. The casing creates two footings that sit directly on the ground and keep it steady. The arched sprayer bar is situated between two arms, one of which houses the driving mechanism and all the controls. Fixed to the larger side of the base is the heart-shaped cam that adjusts the position of the spray and moves the sprayer bar. A garden hose, connected to the same side, provides the power to spin the gears inside the base housing. The gears, or turbine, slow down the speed of the water, causing a slow arc of the sprayer arm. This particular model also comes with a tool which can be used to unclog the nozzles. The tool can be found screwed into the end of the sprayer bar and is also used as the end cap.

The major parts in the oscillating sprinkler are: the base, sprayer bar, adjustment knob, cam, turbine and hose attachment.

BASE: The base is made from yellow, molded plastic. It stabilizes the unit on the ground and houses the gears.

SPRAYER BAR: The bar is a curved metal pipe, with small holes drilled through. Model 1310 has gray plastic ferules (rings) affixed to each hole to prevent rusting and to direct the spray. The water is directed down the pipe from the housing.

ADJUSTMENT KNOB: The black adjustment knob (shown on the right of the sprayer bar in Figure 1) is secured to the sprayer bar and allows the consumer to change the spray pattern to cover fully, centered, left, or right. Model 1310 allows for 59 positions.

CAM: The heart-shaped cam is fastened to the adjustment knob by a small arm and screws. The black plastic cam is heart-shaped to create uniform coverage and prevent a slow down at the ends of the sprayer coverage (the far left or right of the cycle).

TURBINE: Inside the housing are several stacked gears, or a turbine, which are used to slow down the speed of the water.

HOSE ATTACHMENT: The hose attachment swivels independently from the housing for easy securing.

Description and Function of Parts

The consumer screws a hose onto the black plastic hose attachment on one side of the sprinkler unit. There is a rubber O-ring inside to prevent leakage. The water is then turned on. Water flows in two directions: into the narrow plastic tube to the spray arm, and to the left of entry towards the turbine (Figure 2).

The water diverted to the left runs over a small water wheel made from white plastic. However, this water moves too fast to effectively water the lawn. To reduce the speed, NELSON utilizes a gear train (see Figure 3). This slows down the force of the water and turns the heart-shaped cam at a rate of one revolution per minute.

The water wheel is connected to a set of three stacked gears, or a planetary gear system, which is housed inside a water-proof yellow gear tube.

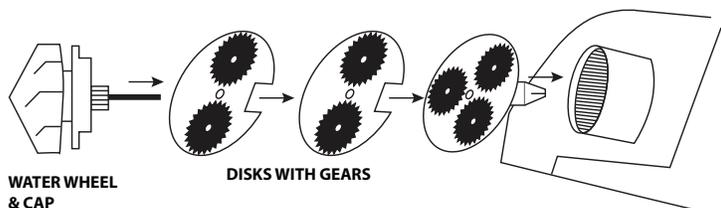


Figure 3: Turbine exploded view

The gear system, also called a turbine, begins with the water wheel (Figure 3). The wheel is fastened to a thin white plastic cover with a thin metal rod through a small gear in the center. This cover creates a water-proof seal over the turbine tube. The rod passes through the center of another thin white plastic disk. This disk has two small black plastic gears attached to each half on one side. The rod then passes through a second disk with two black gears attached. The rod passes through a third disk, but this one has three black gears attached evenly on the top. Each disk has a small white gear attached around the hole for the metal rod. This small gear fits into the center of the disk below it,

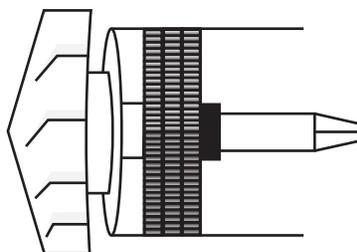


Figure 4: Turbine side view

turning the gears on the next level. The third disk is connected to a white plastic spool that ends in ribbed arms. The ribbed arms slip through a hole in the yellow base in the housing for the turbine, where they form a tight core to hold a small screw tight.

As the water wheel spins, it turns the gears. Each gear level rotates slower until the third disk has slowed the force of the spin enough to move the arm in a leisurely manner.

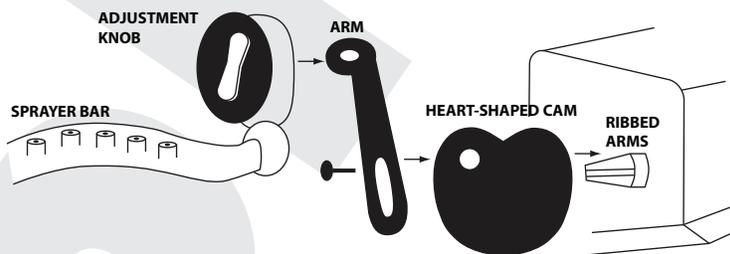


Figure 5: Cam attachment to sprayer bar

The heart-shaped cam is screwed to the ribbed arms. The cam turns, pushing and pulling, the affixed arm, which moves the adjustment knob back and forth. The adjustment knob is attached to the sprayer bar, moving the bar as the knob moves. As the water flows out of the sprayer bar, coverage is kept smooth by the heart-shape, evenly watering the lawn.

Operating Description

The oscillating sprinkler is extremely easy to use. Once the hose is screwed into the attachment, the base is placed onto the ground. The watering area can be adjusted with the knob. The area can be watered all on the left side of the unit, the right side of the unit, or any configuration in between. The height of the spray is adjusted by the force of the hose water. As water flows out of the sprayer bar, the bar is pushed and pulled by the rotating cam. The bar waves to the right and left smoothly, providing an even coating of water.