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W. W. BALLARD

2,932,457

OSCILLATING TYPE SPRINKLER

Filed May 28, 1957

2 Sheets-Sheet 1

Fig. 1

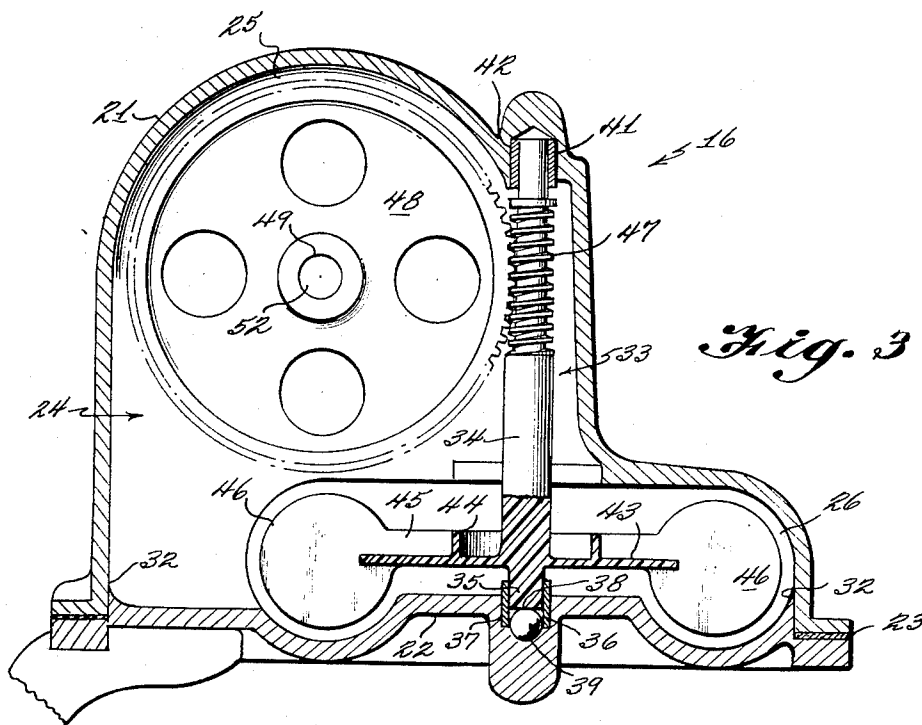
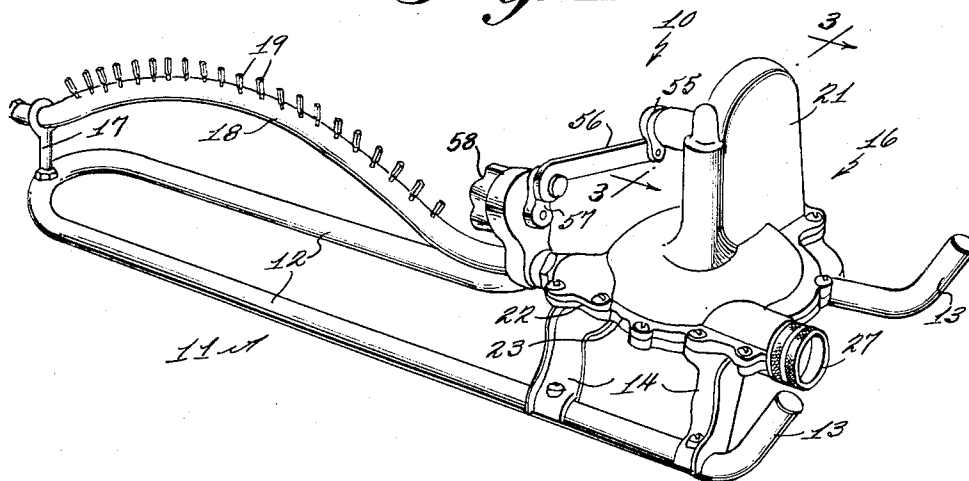


Fig. 3

INVENTOR

WALTER W. BALLARD

BY

Stone & Mack
ATTORNEYS

April 12, 1960

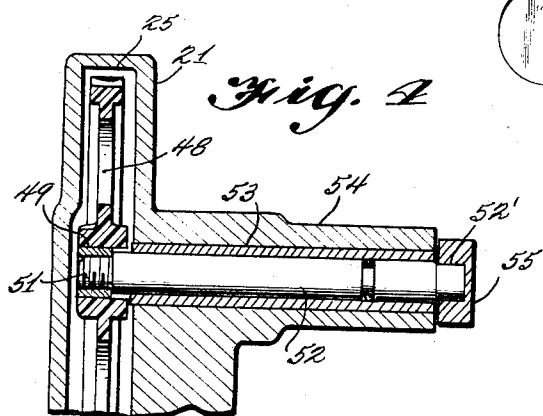
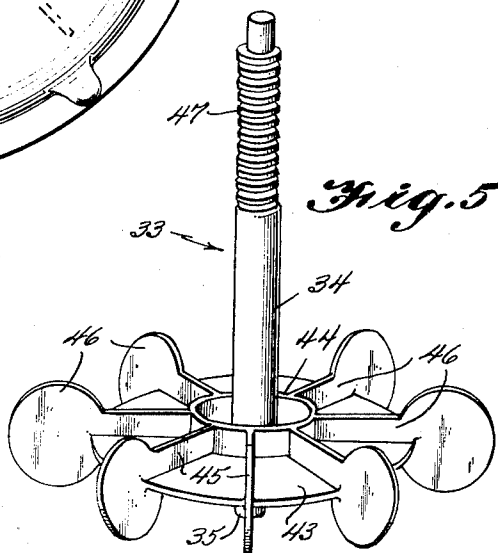
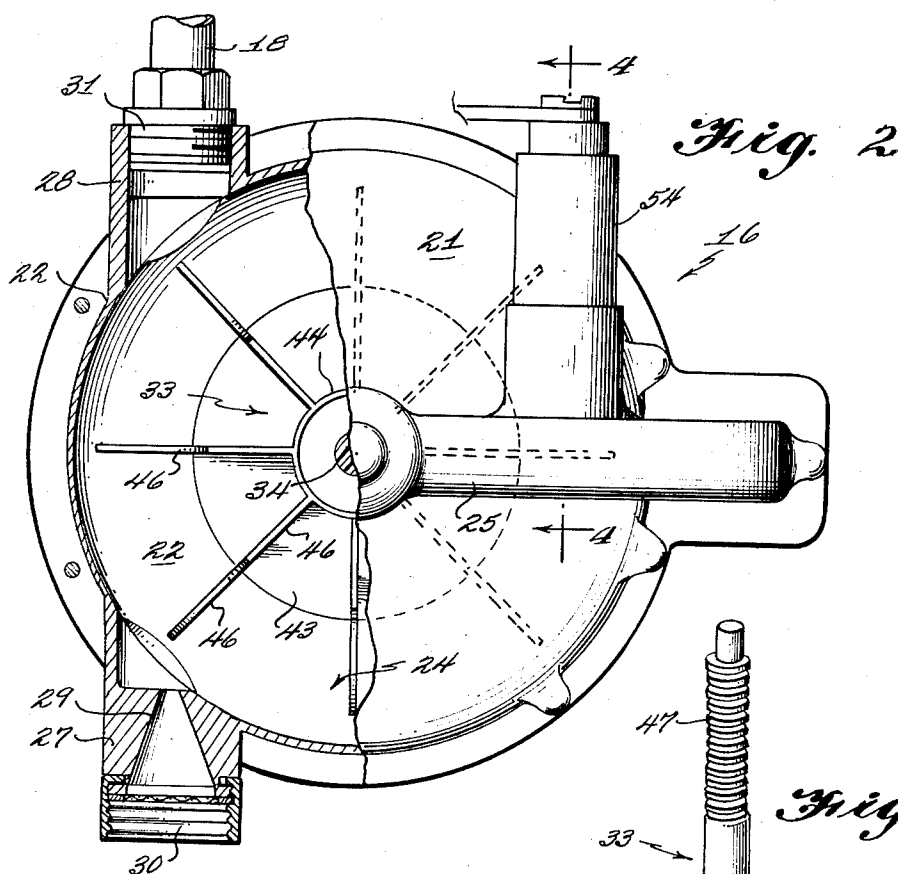
W. W. BALLARD

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INVENTOR
WALTER W. BALLARD

BY *Stone & Mack*
ATTORNEYS

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OSCILLATING TYPE SPRINKLER

Walter W. Ballard, Peoria, Ill.

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6 Claims. (Cl. 239—242)

This invention relates generally to oscillating type sprinklers and more particularly to the liquid motor used for the transmission of movement to the sprinkler head.

Efforts have been made in the past to provide sprinklers with a simple and durable fluid motor. However, such devices have proved unsatisfactory because the motor parts have been too complex and also subject to the corrosive action of the impelling fluid.

The present invention is directed to a liquid driven motor rotated by the passing of water through the motor, this movement serving to provide the oscillation of the sprinkler head with a minimum of parts being necessary. A further object is to provide a mechanism which is positive in operation but is durable in construction.

Another feature of this invention relates to a liquid motor with moving parts formed of a plastic material, and which motor is lubricated by its own propelling means and is of a material that will insure realignment of its parts, after being deformed by foreign matter passing through the motor or by a shock, such as when dropped or striking an object.

Another feature of this invention is a liquid motor, the parts in contact with water being formed of a plastic material which presents a surface of high lubricity when in contact with the impelling liquid passing around and through its moving parts.

Another feature of this invention is a liquid motor for sprinklers with parts formed of a plastic material having a very low co-efficient of expansion and contraction due to temperature changes of the impelling liquid, thereby assuring a quiet, and yet positive movement of the sprinkler.

Other objects and advantages of this invention will become apparent during the course of the following description when considered in connection with accompanying drawings in which there is shown one embodiment of this invention.

Fig. 1 is a perspective view of a motor and sprinkler constructed in accordance with a preferred embodiment of this invention.

Fig. 2 is a fragmentary plan view of the fluid motor with parts in section.

Fig. 3 is a vertical sectional view through the fluid motor taken on line 3—3 of Fig. 1.

Fig. 4 is a detailed sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a perspective view of the impeller of the fluid motor.

Referring now to the drawings in detail:

A sprinkler is designated generally at 10, as having a substantially U-shaped frame 11 comprising horizontally disposed ground engaging runners 12 with upwardly sloping ends 13 for sled-type movement over the ground. Rigidly mounted at one end of the frame 11 upon legs 14 is a fluid motor shown generally at 16 which serves also as a water supply chamber. Positioned horizontally between the motor 16 and an upright bearing 17 secured

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at the closed end of frame 11 is a sprinkler head 18 having a plurality of radially extending jet nozzles 19 positioned horizontally along its periphery for the discharge of liquid. The fluid motor housing 16 is formed of an upper and lower casing 21 and 22, respectively, which are adapted to be joined together, as at 23, forming a water-tight chamber 24. The upper vertical portion 25 of chamber 24 is substantially circular in cross section and is formed contiguous with and at right angles to a horizontally disposed annular recess 26 formed in the lower portion of chamber 24. As is best shown in Figs. 2 and 3, the chamber 24 is provided with aligned inlet and outlet ports 27 and 28, respectively, and which are directed tangentially through the lower portion 26 of chamber 24. A cone-shaped aperture 29 is provided within the inlet port 27 to direct a liquid jet stream, the purpose of which will be hereinafter described, and the outer end of inlet port 27 is provided with the conventional type coupling 30 for connection with a garden-type hose. The outlet port 28 has a suitable water-tight bearing 31 to receive the forward end of a conduit of the sprinkler head 18. The lower casing 22, as will be seen in Fig. 3, is provided with a substantially horizontal bottom wall whose periphery terminates in an upstanding knife edge 32 that merges into the upper casing, forming a smooth annular surface within the chamber 24, thereby tending to reduce any turbulence at the junction 23 of the two casings 21 and 22.

Vertically mounted within the chamber 24 is an impeller 33 formed of plastic and having a shaft 34 whose lower end 35 is of reduced diameter and is secured against horizontal movement by a bushing 36 pressed into a recess 37 located in the lower casing. The lower end 38 of the shaft 34 rests upon the upper periphery of a ball bearing 39 deposited within the recess 37, thereby reducing the contact surface of impeller 33 with casing 22, thus minimizing the friction thereof. The uppermost end of shaft 34 is likewise secured against horizontal movement by a bushing 41 pressed into a recess 42 located in the top of upper casing 21. As will best be seen in Fig. 5, the impeller 33 has formed integrally with and at right angles to its shaft 34 near its lower end a horizontally disposed skirt 43 with an upstanding collar 44 molded upon its upper surface. Extending radially from collar 44 are a plurality of stiffening members 45 whose ends terminate in circular paddles 46 against which a stream of water is directed from the conical-shaped aperture 29 within the inlet port 27.

As will be apparent from Figs. 3 and 5, the plastic members including the skirt 43, collar 44, stiffening members 45 and paddles 46 are of relatively thin plastic sheet material and by the specific disposition of such members an impeller of relatively light weight, while being of sufficient strength for its purpose, is provided.

Adjacent the upper end of shaft 34 a helical thread 47 is formed and so positioned as to engage and rotate a spur gear 48 rotatably mounted within the upper portion 25 of the chamber 24. The impeller 33, having the configuration as shown and described and being molded of a suitable plastic material with a low specific gravity, materially reduces the friction of shaft 34 within the bearings 36 and 41, as the worm rotates to drive spur gear 48. The impeller 33 and the spur gear 48 both being formed of a stiff, yet resilient type plastic, have the advantage of allowing any foreign matter that might enter into the chamber 24 with the liquid to pass between the moving parts, forcing them apart, and with the result that those parts could and do spring back into true alignment without the usual jamming or breaking.

A satisfactory example of a suitable material from which the impeller and geared wheel may be produced

is nylon. More particularly the most suitable form of nylon is known as Nylon Zytel 31, which is the trade name of the nylon product made by E. I. du Pont de Nemours & Company. This specific product has demonstrated the necessary strength and also resistance to the absorption of water and swelling of bearings which may result from absorption of water.

As shown in Fig. 4, the spur gear 48 has at its center an aperture 49 into which is secured against rotational movement an internally threaded bushing 51 that is threaded onto the end of a horizontally disposed shaft 52, the shaft 52 being journaled for rotational movement within a bushing 53 pressed into a boss 54 formed integrally with the upper casing 21. Near its outer end the shaft 52 is turned down, forming a groove into which an O-ring has been inserted, thus forming a water-tight seal around the shaft 52. At its outer end the shaft 52 is of reduced diameter, as at 52', to receive a stub link 55 rigidly secured for rotational movement. The link 55, as shown in Fig. 1, is pivotally secured to a pitman link 56 which in turn is connected to a second stub link 57 secured to a control dial 58 rigidly clamped against rotation upon the conduit of the sprinkler head, this dial being a means for selectively changing the linkage length, thereby controlling the oscillation of the sprinkler.

In operation, the inlet port coupling 27 is connected to an ordinary garden hose or other suitable source of liquid under pressure. The linkage 55, 56, 57 is adjusted to its proper length by rotation of the control dial. Liquid from the supply flows through the inlet port 27, and is directed against the paddles 46, thereby causing the impeller shaft 34 to rotate. The liquid then passes through outlet port 28 into the conduit of the sprinkler head 18 and is discharged into the atmosphere through the liquid jets 19. The rotation of impeller shaft 34 and spiral thread 47 causes the spur gear 48 to be rotated through engagement therewith, and the drive shaft 52 is likewise rotated, thereby determining the degree of oscillation of the sprinkler head 18 through the linkage 55, 56, 57 and the control dial.

I claim:

1. In an oscillating sprinkler type device including a frame supporting an oscillatable sprinkler head, a liquid motor comprising a stationary casing, a vertical shaft positioned within said casing having a horizontal liquid impeller mounted adjacent the lower end thereof and unitary therewith, said casing being provided with inlet and outlet ports for directing liquid under pressure against said liquid impeller and discharge it to the sprinkler head thereafter, spiral threads on the upper end of said shaft, a second shaft having a spur gear fixed thereto and meshing with said spiral threads mounted in said casing, and linkage means connecting said second shaft with the sprinkler head for oscillating the same upon flow of liquid through said ports to rotate said impeller, said liquid impeller, said first shaft and said spur gear being of plastic material and characterized by being repellant to liquids, thereby effecting a substantially frictionless movement of said plastic parts by said liquid.

2. A device as recited in claim 1 wherein said casing conforms in shape to said liquid impeller and said spur gear to form an integral housing having generally circular portions contiguous with and at right angles to one another with the medial plane of one portion including the axis of the other portion.

3. A device according to claim 1, wherein said liquid

impeller includes a skirt disposed adjacent said one end of said first shaft and at right angles thereto, and a plurality of paddles projecting radially outwardly of said first shaft and being disposed in planes parallel with the axis of said first shaft, and said first shaft, said skirt and said paddles being a unitary molded nylon structure.

4. A device according to claim 1, wherein said spur gear includes a toothed peripheral rim, a hub centrally of said rim for receiving at least a portion of said second shaft and a disk body intermediate said rim and said hub, said rim, hub, and disk body being a unitary molded nylon structure.

5. In an oscillating type sprinkler, an elongated U-shaped frame having an upright bearing at the right end thereof and the legs of said frame terminating in upwardly inclined portions, a fluid motor supported on said frame adjacent said upwardly inclined portions and comprising a housing including upper and lower casings forming a water-tight chamber including a horizontally disposed annular recess and a portion substantially circular in cross section disposed above and in communication with said recess, said lower casing having inlet and outlet ports communicating with said recess tangentially thereof, an elongated sprinkler head having one end thereof swivelly connected to said upright bearing and the other end thereof swivelly connected to said housing adjacent said outlet port, a unitary plastic impeller rotatably supported in said annular recess and including a horizontally disposed circular skirt and a plurality of vertically disposed substantially circular flat paddles unitary with and projecting radially outwardly from said skirt in right angular relation thereto, said impeller further including a vertical shaft unitary with said skirt and disposed centrally thereof, said shaft being provided with a helical thread adjacent the upper end thereof, a plastic spur gear rotatably supported in said housing and being in driving engagement with said helical thread, and linkage connections between said gear and said sprinkler head.

6. A device according to claim 1 wherein said liquid impeller, said spur gear and said first shaft are of nylon plastic material of a resilient type having the characteristic of a return to alignment of any of said parts deformed by any outside mutation, and having a further characteristic of resistance to the absorption of water and freedom from swelling of bearings, and having a still further characteristic of a low co-efficient of expansion and contraction caused by temperature changes of the impelling liquid, thus effecting a quiet and uniform rotation of said parts.

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