United States Patent

[11] 3,580,508

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[54] **MOTOR FOR ROTATING JET SPRINKLER**
2 Claims, 5 Drawing Figs.

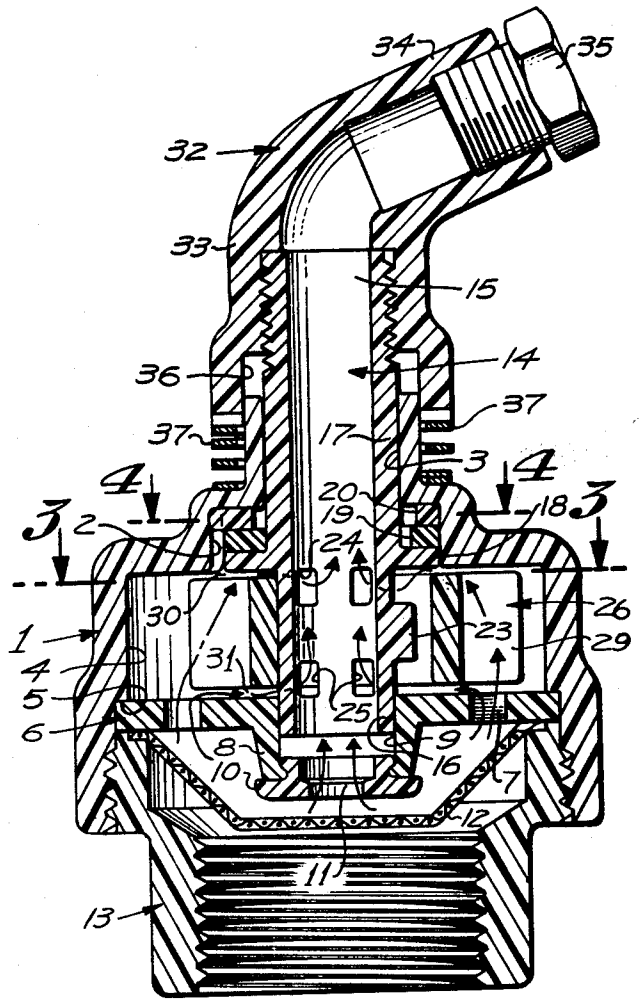
[52] **U.S. Cl.** **239/241,** 239/206, 239/230
[51] **Int. Cl.** **B05b 3/04**
[50] **Field of Search** 239/206, 241, 230, 260

[56] **References Cited**
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3,515,351	6/1970	Costa	239/206
3,523,647	8/1970	Radecki	239/206
3,272,437	9/1966	Coson	239/206
3,315,898	4/1967	Costa	239/206X
3,448,660	6/1969	Malcolm	239/206X

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ABSTRACT: An impact type motor for rotating jet sprinklers in which impact lobes protruding from a rotor member are engaged by a polygonal impact ring; more particularly, to the construction in which the motive water is caused to flow over the axial ends of the impact ring thereby suspending the impact ring essentially friction free in the motor chamber.



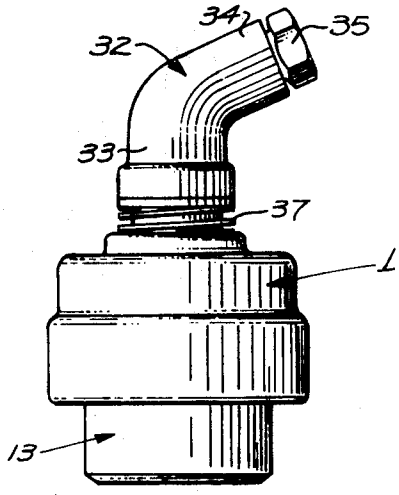


FIG. 1

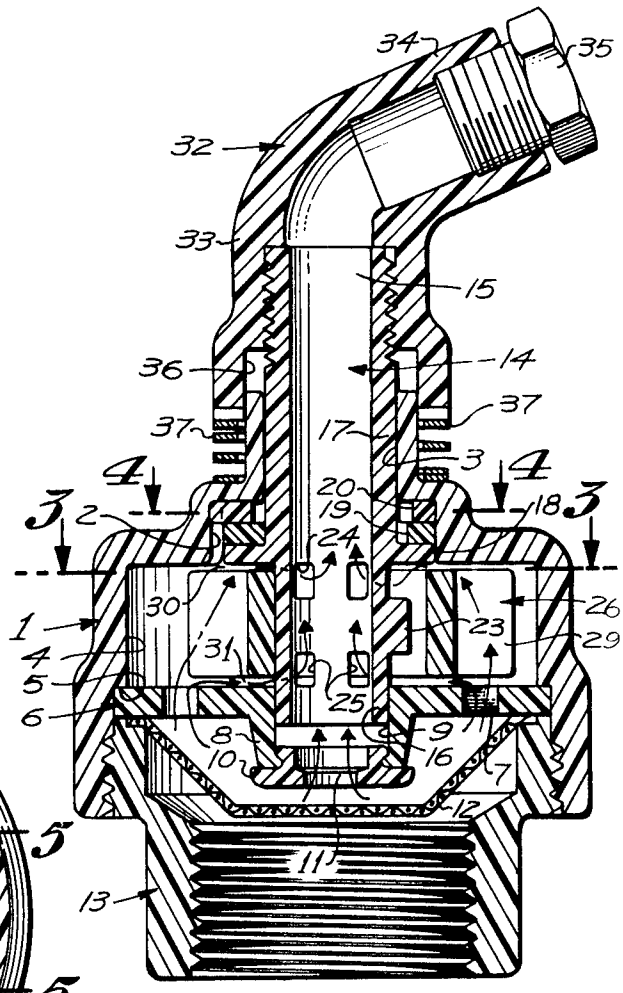


FIG. 2

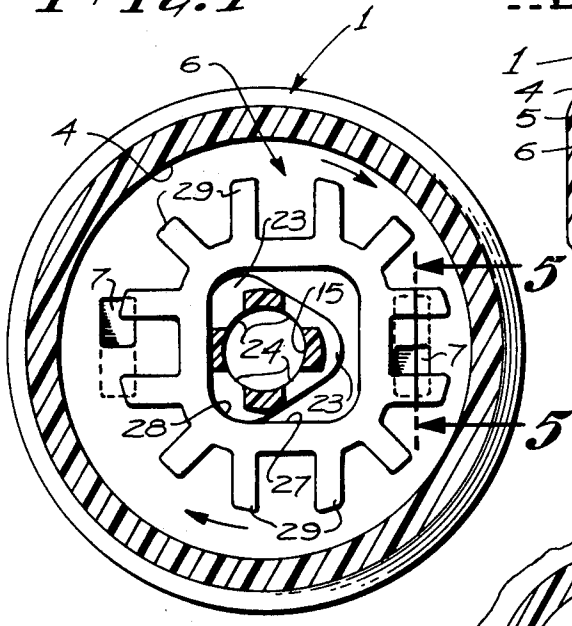


FIG. 3

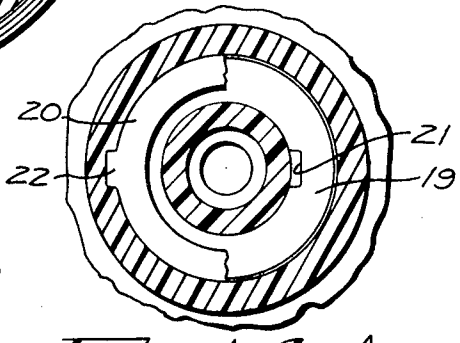


FIG. 4

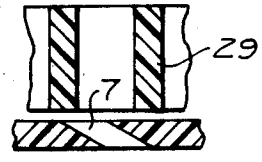


FIG. 5

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MOTOR FOR ROTATING JET SPRINKLER

BACKGROUND OF THE INVENTION

This invention is related to water motors of the type disclosed in Pat. No. 3,315,898, and in copending applications, Ser. No. 758,961, filed Sept. 11, 1968, now U.S. Pat. No. 3,515,351 and Ser. No. 809,190, filed Mar. 21, 1969. Motors of this type include a motor chamber into which water is introduced in a swirling pattern to cause a polygonal impact ring to engage progressively the mating lobes of a central which includes a central bore from which the water is discharged as the rotor slowly turns.

SUMMARY OF THE INVENTION

The present invention is directed to an improved motor having increased efficiency and greater torque for its size, and is summarized in the following objects:

First, to provide a water motor for sprinklers which is so arranged that, when in operation, the impact ring is suspended in the motive water free from contact with the walls or end surfaces of the motor chamber, thereby minimizing frictional contact, except the nominal friction occasioned by impact or turning forces applied to the rotor lobes, so that the motor operates with high efficiency.

Second, to provide a water motor of this type wherein the impact ring is provided with vanes engaged by the swirling motive water which increases the force available to effect rotation.

Third, to provide a water motor of this type in which the size required to produce a given output torque may be reduced.

DESCRIPTION OF THE FIGURES

FIG. 1 is a side view of a sprinkler incorporating the invention.

FIG. 2 is an enlarged longitudinal sectional view thereof, taken from the same aspect as FIG. 1.

FIG. 3 is a transverse sectional view thereof, taken through 3–3 FIG. 2.

FIG. 4 is a fragmentary sectional view, taken through 4–4 of FIG. 2.

FIG. 5 is a fragmentary sectional view, taken through 5–5 FIG. 3.

The sprinkler includes a hollow body 1, constricted at its upper end to form a thrust bearing cavity 2 and a sleeve bearing 3. Below the thrust bearing cavity, the body is enlarged to define a cylindrical motor chamber 4, which is terminated at its lower end by a shoulder 5.

Fitted against the shoulder 5 is a swirl plate 6, having a set of swirl passages 7. These passages extend upwardly at an angle in a substantially helical path so that water flowing upwardly through the passages is caused to swirl or move in a circular path within the motor chamber. The central portion of the swirl plate 6 is provided with a depending hub 8, the inner walls of which form a bearing 9. The lower extremity of the hub is provided with a rudimentary inturned flange so that a mating orifice disc 10 may be snapped in place. The orifice disc 10 is provided with an inlet port 11.

Disposed under the swirl plate 6 is a filter screen 12 which is held in place by an inlet fitting 13, joined by screwthreads to the lower end of the body 1.

Journaled within the body 1 is a rotor 14, having a bore 15, a lower journal 16 fitting within the hub 8, and an upper journal 17 fitting within the sleeve bearing 3. The rotor is provided with a thrust bearing flange 18, set in the thrust bearing cavity 3 with its underside essentially flush with the upper wall of the motor chamber 4. Within the thrust bearing cavity 2 is a pair of thrust bearing discs 19 and 20, which are keyed as indicated by 21 and 22 to the rotor 14 and to the body 1 respectively. One or both of the discs may be formed of low friction plastic material.

Within the motor chamber 4, the rotor is provided with a set of impact lobes 23, projecting radially from the rotor and in the construction illustrated, defining a three-sided figure with rounded apices. The walls of the rotor 14 are pierced by an upper set of inlet ports 24 located immediately above the lobes 23, and a lower set of inlet ports 25 located immediately below the lobes. The inlet ports 24 and 25 are located respectively adjacent the upper and lower walls of the motor chamber.

Mounted within the motor chamber 4, and surrounding the impact lobes 23, is an impact or drive ring 26, having a polygonal opening defined by sides 27 and rounded corners 28. In the construction illustrated, the opening defined by the drive ring is square within rounded corners and each side is approximately the same dimension as each side of the triangular figure formed by the impact lobes 23. Externally, the drive ring is provided with outwardly extending ribs 29, the extremities of which may define a common circle concentric with the opening formed by the ring.

The axial dimension of the drive ring is less than the axial dimension of the motor chamber so that when the drive ring is suspended in the motor chamber, upper and lower radial flow passages 30 and 31 formed between the extremities of the drive ring and the confronting walls of the motor chamber, including the thrust bearing flange 18.

The upper end of the rotor 14 extends above the body 1 and is screw-threaded to receive a discharge or elbow fitting 32, and a vertical portion 33 which receives the upper end of the rotor, and an angular portion 34 in which is fitted a nozzle 35. The vertical portion 33 is provided with an enlarged lower end 36 extending over the sleeve bearing 3. A thrust spring 37 is provided between the lower end 36 of the elbow fitting and the upper extremity of the sleeve bearing 3. The force of the spring 37 is carried by the thrust bearing discs 19 and 20 and the thrust bearing flange 18.

Operation of the sprinkler and its motor is as follows:

The motive water which flows through the swirl passages 7 constitutes a predetermined portion of the total water which flows through the sprinkler. The remainder flows upwardly through the inlet port 11. The volume of water supplied to the motor is such as to be distributed between the passages 30 and 31 so as to suspend the drive ring 26 as shown in FIG. 2. Tests have shown that this does occur with the result that the drive ring moves essentially friction free except for the effect of its impact on the lobes 23. Each impact turns the rotor only a slight amount, with the result that although the drive ring rotates rapidly, the rotor itself turns slowly. Suspension of the drive ring is enhanced by the fact that all of the flow past the drive ring and to the rotor must occur past the axial extremities of the drive ring and into the upper and lower sets of ports 24 and 25. Rapid upward flow occurs in the bore 15 even though there be a constricted orifice in the nozzle 35. This upward flow tends to produce a pressure condition which draws the water radially inward through the ports 24 and 25 and through the flow passages 30 and 31 at opposite axial ends of the drive ring. As a result, the drive ring remains suspended.

It is not necessary for its operation that the drive ring be provided with the ribs 29. However, it has been found that operation is improved with the use of the ribs 29.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the details of the constructions set forth, but instead, the invention embraces such changes, modifications and equivalents of the various parts and their relationships as come within the purview of the appended claims.

I claim:

1. A water motor for sprinklers, comprising:
   a. a body structure defining a cylindrical motor chamber;
   b. means defining ports communicating through a wall of said motor chamber in a direction tending to cause water entering said motor chamber to move in a circular path therein;
   c. means forming bearings at the axial extremities of said motor chamber;
   d. a tubular rotor journaled in said bearings and having a water outlet bore therein extending upwardly from its lower end and at least one radial inlet port through the tu-

bular wall of the rotor at the upper end of said chamber, said rotor including a set of impact lobes defining a polygonal figure on the outer surface of the tubular wall thereof and within said chamber;

e. and a drive ring having impact walls loosely surrounding said lobes;

f. said drive ring having an axial dimension less than said motor chamber whereby the upper and lower axial ends of said drive ring defines, with the corresponding axial end wall of said motor chamber, radially inwardly directed relatively narrow annular flow passages, the upper flow passage communicating directly with said radial inlet port; and

g. the water flowing in said passages being operable to suspend the drive ring between and free of the end walls of said motor chamber.

2. A water motor, as defined in claim 1, wherein:

a. said set of lobes is approximately centered between the ends of said motor chamber; and

b. and a set of radial inlet ports is located at each axial end of said set of lobes adjacent the corresponding axial end of said motor chamber.