

July 11, 1972

W. K. HODGMAN, JR

3,676,015

WATER MOTOR

Filed Oct. 28, 1970

FIG. 1

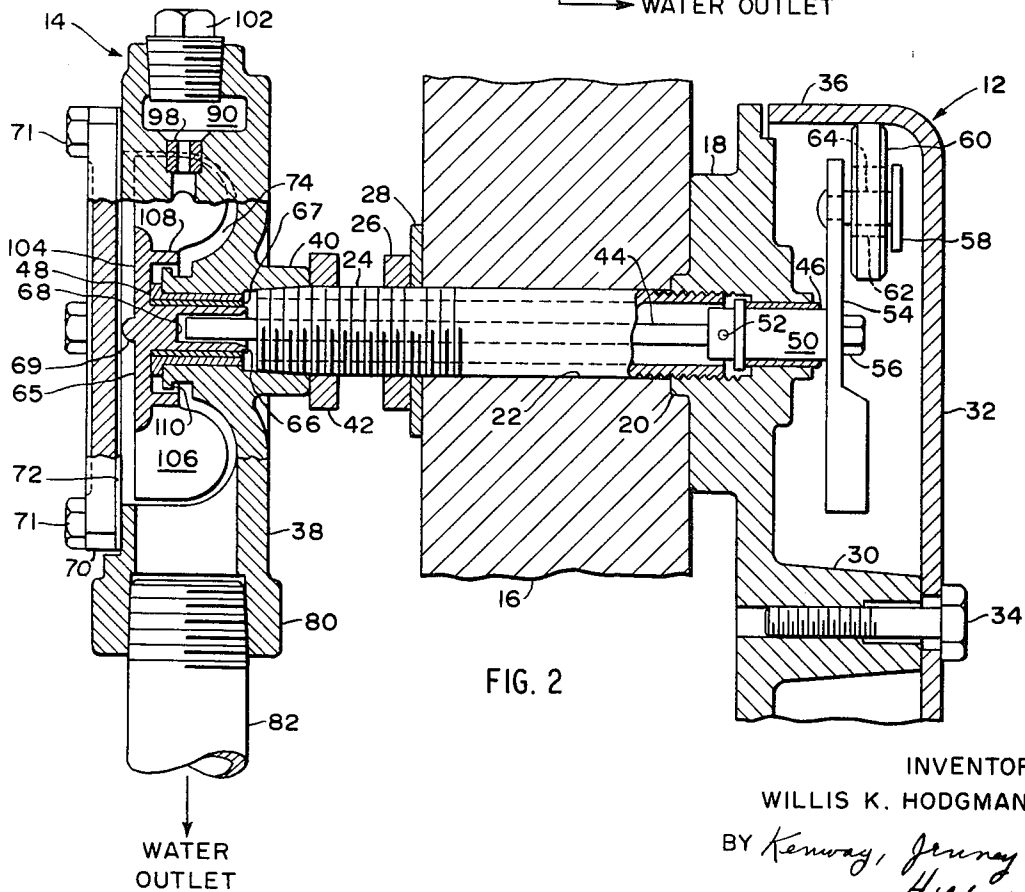
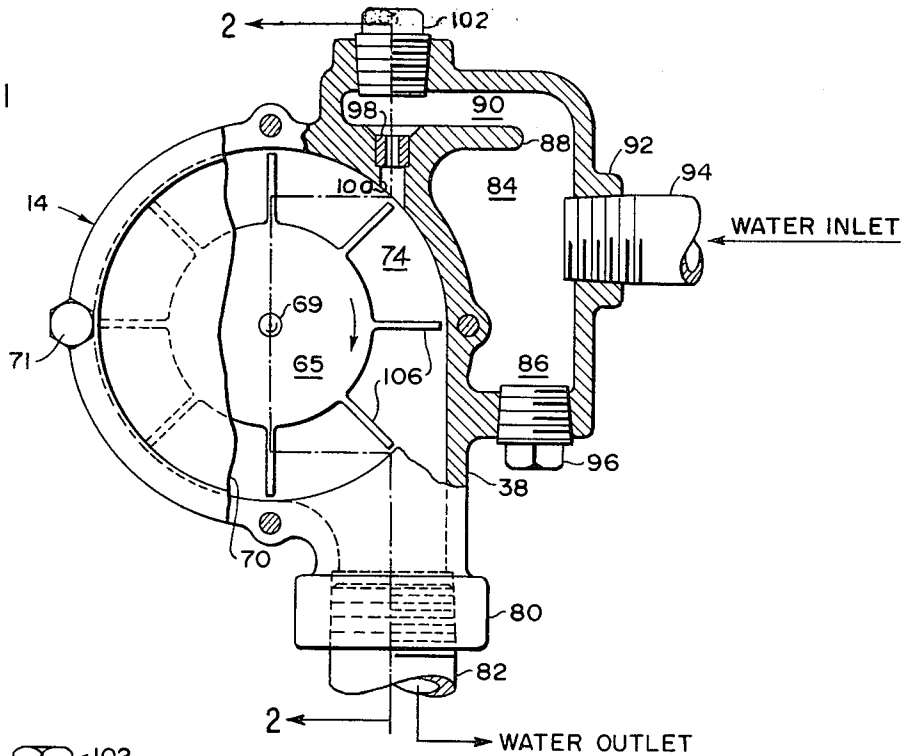


FIG. 2

INVENTOR

WILLIS K. HODGMAN, JR.

BY *Kenway, Jensen & Hildreth*

ATTORNEYS

1

3,676,015

WATER MOTOR

Willis K. Hodgman, Jr., Taunton, Mass., assignor to
Hodgman Manufacturing Company, Inc., Taunton,
Mass.

Filed Oct. 28, 1970, Ser. No. 84,750

Int. Cl. F01d 15/06, 9/00

U.S. Cl. 415—202

3 Claims

ABSTRACT OF THE DISCLOSURE

An easily maintained, efficient, low turbulence water motor in which water is projected from a nozzle to the blades of an impeller and expelled through an outlet in straight alignment with the nozzle. The water enters the nozzle through an inlet chamber integral with the body of the motor and providing a sump for retention of dirt or other particulate matter in the water.

BACKGROUND OF THE INVENTION

The field of this invention generally comprises water motors, and this invention is more particularly concerned with a motor suitable for rotating the striker arm of a fire alarm gong or the like.

In the typical alarm gong application the gong is mounted on the wall of a building, such as the outside wall. The motor is mounted on the opposite side or inside of the wall, and a shaft from the motor to the striker arm passes through a tube or pipe that provides a convenient means for supporting the bodies of the motor and gong. Water pipe connections are made to the motor, and the motor is fitted with an inlet nozzle for projecting water against an impeller. There is also an inlet chamber having a sump for retention of particles of dirt or other foreign matter in the water to prevent the possibility of clogging the inlet nozzle. The inlet nozzle is adapted to restrict, shape and direct the water jet or stream in a desired manner against the blades or vanes of the impeller.

Prior water motors of the foregoing general type are limited in terms of their efficiency of operation because energy is lost as a result of turbulence which has a braking effect on the impeller. In a typical motor the impeller takes the form of an overshot or undershot wheel, with the nozzle directing the jet or stream in a horizontal direction against the blades or vanes and being discharged and drained in a vertical direction from the bottom of the motor body or housing. This change in the direction of water flow, coupled with the dispersion of the stream by the blades or vanes, absorbs substantial energy and makes necessary a substantial flow of water to obtain a sufficiently audible and reliable operation of the gong. This in turn results in the substantial size and cost of the water motor gong as a unit.

It is a principal object of this invention to improve the efficiency of operation of the water motor, thereby permitting the use of a much smaller water motor for the gong, the smaller motor requiring a lower rate of water flow for proper operation of the gong.

SUMMARY OF THE INVENTION

This invention accomplishes the above and other objects that will be evident from the following detailed description, by a substantial improvement in the control of the jet or stream of water as it passes through the motor. This stream is directed vertically by a nozzle in a straight line toward the water outlet from the motor, and no change of direction is imparted to the stream within the region of the impeller except for the effect of the impinge-

2

ment of the water upon the vanes or blades of the impeller itself.

This improvement in operation is achieved by a novel location of the water nozzle and water outlet in a straight line configuration horizontally offset with reference to the axis of the striker arm shaft, through an improved inlet chamber configuration including a passage for directing the water to the nozzle in direct alignment with the water outlet, and at the same time providing ready access to the nozzle for inspection, cleaning and replacement.

Other features of the invention will be apparent from the following description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an end elevation of the water motor, partially broken away and partially in section, viewed in the direction of the axis of the striker arm shaft.

FIG. 2 is a side elevation in section taken on line 2—2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The water motor gong in the preferred embodiment of FIGS. 1 and 2 is of the type used in connection with automatic water sprinkler systems for fire protection. It comprises a gong designated generally at 12 and a water motor designated generally at 14, respectively mounted on opposite sides of a building wall 16, usually an exterior wall. The gong has a cast aluminum wall plate 18 having a tapped boss 20 in alignment with a round hole 22 passing transversely through the wall. The plate 18 is threaded to a mounting pipe 24, and the pipe is held fast to the wall by means of a lock nut 26 and washer 28.

The wall plate 18 has an outwardly projecting boss 30 having a central tapped hole, and upon this boss a cast aluminum bell or gong 32 is mounted by means of a machine screw 34. Preferably, the plate 18 is of circular shape and the boss 30 is central to it, accommodating a circular gong 32, and the gong has a flange or rim 36 projecting toward the wall into close proximity with the plate 18 without touching it.

The water motor 14 has a cast aluminum body 38 having a tapped boss 40 received on a projecting threaded end of the pipe 24, being located and held in place on the pipe by a lock nut 42.

A rotatable striker arm shaft 44 is journaled in bearings respectively mounted in the body 38 and wall plate 18. An oil-impregnated bronze bushing 46 is fitted in a bore in the wall plate 18, and a flanged oil-impregnated bronze bushing 48 is similarly fitted in a bore in the body 38.

A molded plastic driver 50 is connected to the shaft 44 by a pin 52 and rotatably received within the bushing 46. A cast bronze striker arm 54 is fastened by a machine screw 56 to the driver 50, and has a steel striker holder 58 secured near its end, the holder loosely retaining a laminated phenolic resin striker 60 in position to strike the skirt or flange portion 36 of the gong. The striker has a circular peripheral shape with a central bore 62 substantially larger in diameter than a stem portion 64 forming part of the holder 58, whereby the rotation of the arm 54 imparts a centrifugal force to the striker causing it to move radially a sufficient distance to strike the gong, being deflected radially inwardly by the gong until the arm 54 has passed its point of closest proximity to the gong during each rotation.

Turning next to a more complete description of the water motor 14, cast aluminum impeller 65 has a hub 66 over which a brass journal sleeve 67 is push-fitted, the sleeve 67 being in sliding contact with the bushing 48. The hub 66 has a central hole 68 with one or more flats en-

gaging corresponding flats on the shaft 44, whereby rotation of the impeller causes rotation of the shaft. The impeller also has a central axially projecting button 69. This button engages the surface of a flat access plate 70 mounted to the body 38 by four machine screws 71 and a rubber sealing gasket 72. The access plate holds the impeller in position to engage the end of the shaft 44 for rotation as above described, and provides a means for readily gaining access to the impeller for inspection, removal and cleaning.

The body 38 defines a semi-toroidal shaped impeller channel 74 closed by the plate 70. The body 38 also has a water outlet comprising a boss 80 with a tapped opening in communication with the channel 74 and normally oriented downwardly in a position permitting it to drain the channel completely. A suitable water outlet pipe 82 may be threaded into this opening for conducting the water to a drain.

An inlet chamber 84 is formed integrally with the body 38, and has a lower portion forming a sump 86 and an upper portion comprising a baffle 88 and a passage 90 above the baffle. The inlet chamber has a boss 92 with a tapped opening for receiving a water inlet pipe 94. The water enters the inlet chamber in such a direction that it is initially baffled to permit solid particles to settle into the sump 86, the water then bypassing the baffle 88 and entering the passage 90. The sump may be periodically drained and cleaned by removal of a threaded cleanout plug 96.

A brass nozzle or orifice 98 is fitted in a countersunk, counterbored hole 100 in the upper portion of the body, the nozzle having a central hole coaxial with the hole 100, the latter connecting the passage 90 with the impeller channel 74. The aperture of the nozzle or orifice, as well as that of the hole 100, is on a straight vertical line passing through the axis of the water outlet pipe 82. Access to the nozzle for inspection, cleaning and replacement is provided by a threaded plug 102 threaded into the body 38. The axis of this plug is also in a straight line with the nozzle and the outlet pipe.

The impeller 65 has an integral hub portion 104 and a number of equally spaced radial blades or fins 106 each of which fills a substantial portion of the cross section of the channel 74. The outer portion of the hub 104 has an annular cylindrical flange portion 108 passing over and in close contiguity with a radially-extending annular flange 110 on the body 38, thus forming a baffle preventing the forcible projection of the stream of water on to the bushing 48 and bearing sleeve 67.

The operation of the water motor will be evident from the foregoing description. It will be noted in particular that the incoming water is initially baffled within the inlet chamber 84, then bypasses the baffle 88 into the passage 90, then passes through the nozzle 98 into contact with the blades 106, thereafter passing directly out of the water outlet pipe 82. This straight-line impingement with the impeller results in minimal turbulence of the water, thereby minimizing the braking effect of turbulence on the impeller and greatly increasing the efficiency of the motor.

It will be noted that in the usual application the water motor is operated by the water supply of a sprinkler sys-

tem. The alarm sounds continuously during the period that water is flowing out of the sprinkler system as a result of the operation of one or more sprinkler heads because of fire, and operation of the alarm also occurs in cases of accidental flow of water from the sprinkler system.

It has been found that the increase in the efficiency of operation of the water motor over prior types permits it to be constructed to a substantially smaller scale than water motors previously used for operating similar gongs.

Servicing of the impeller, as well as inspection or replacement thereof, are readily permitted by removal of the screws 71 and the plate 70, thus permitting the impeller to be slidably pulled from engagement with the shaft 44 and the bushing 48. Thus all of the parts of the water motor are readily accessible for maintenance purposes.

I claim:

1. A water motor for operating an alarm gong or the like having, in combination,

a body having a shaft bushing, annular impeller channel coaxial with said bushing, an inlet chamber vertically positioned in said body external to said impeller channel, said inlet chamber having a lower portion forming a sump, an upper portion including a generally horizontal baffle with a passage bypassing the baffle and a water inlet entering said inlet chamber between said lower portion and said baffle, said passage having a nozzle for direction of water to said impeller channel, said body having a water outlet in a straight line with the direction of water flow through said nozzle, said line being generally parallel to a vertical line between said upper and lower portions of said inlet chamber,

a shaft rotatable in and extending from said bushing, and an impeller secured to the shaft and having plural mutually spaced radial blades within said impeller channel.

2. The combination according to claim 1, in which the inlet chamber is integral with the body and a partition in said body comprises a wall portion of said impeller channel and said inlet chamber.

3. The combination according to claim 1, with access means in the wall of the passage, said access means being located in a straight line with said nozzle and water outlet and providing access to said nozzle.

References Cited

UNITED STATES PATENTS

661,512	11/1900	Fullmer	415—202
959,352	5/1910	Kellett	415—202
1,940,344	12/1933	Broderick	415—203

FOREIGN PATENTS

199,560	11/1938	Switzerland	415—202
---------	---------	-------------	---------

HENRY F. RADUAZO, Primary Examiner

U.S. Cl. X.R.

415—503, 213, 212