

July 28, 1942.

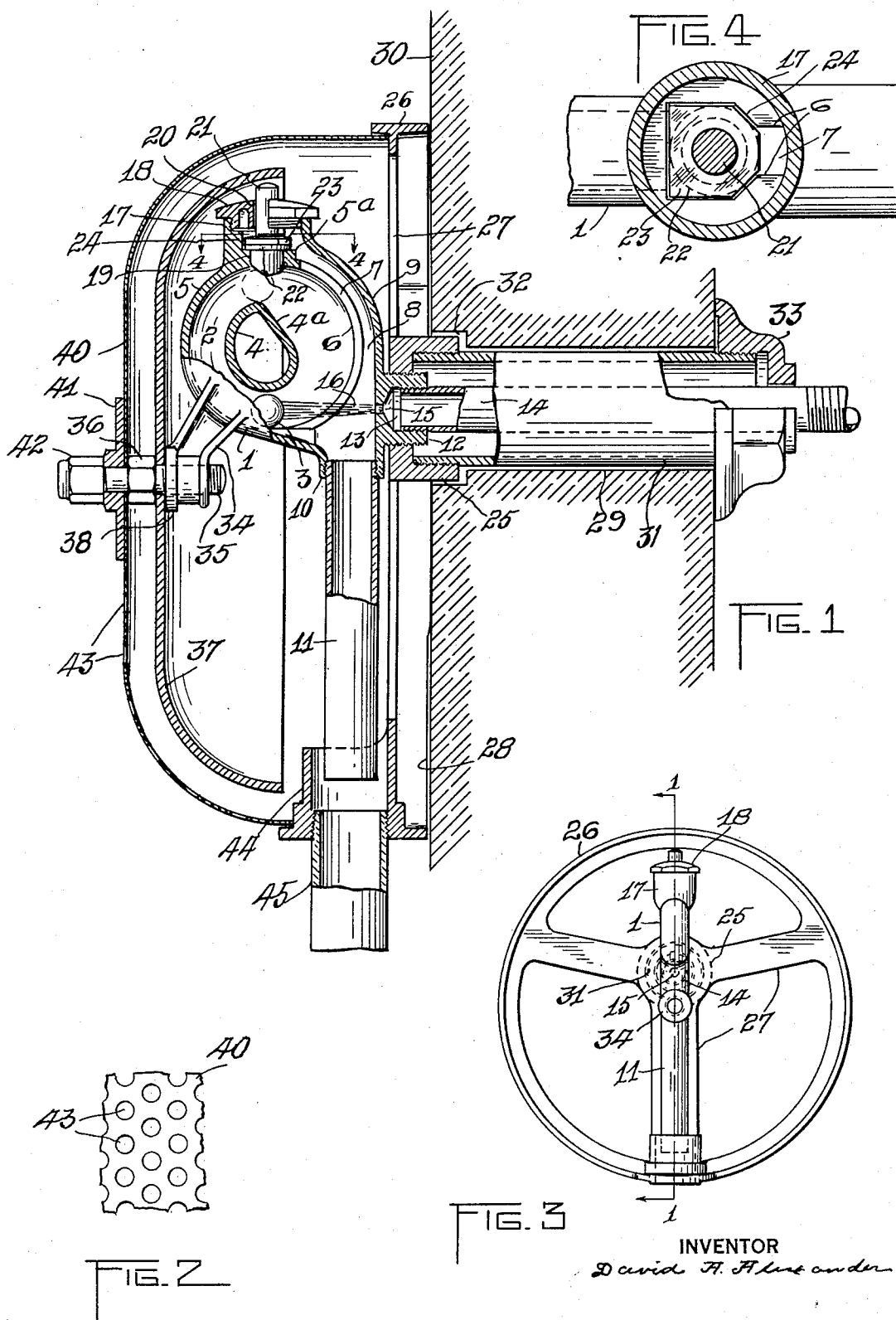
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FLUID MOTOR ALARM

Filed July 11, 1941

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

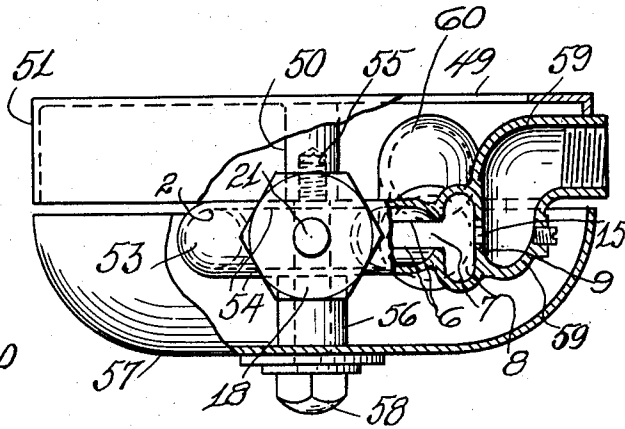
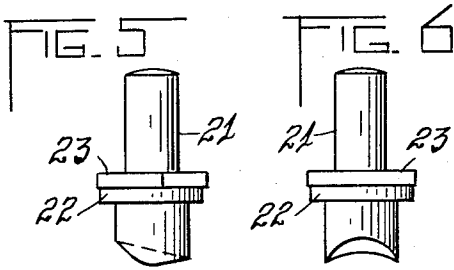


FIG. 8

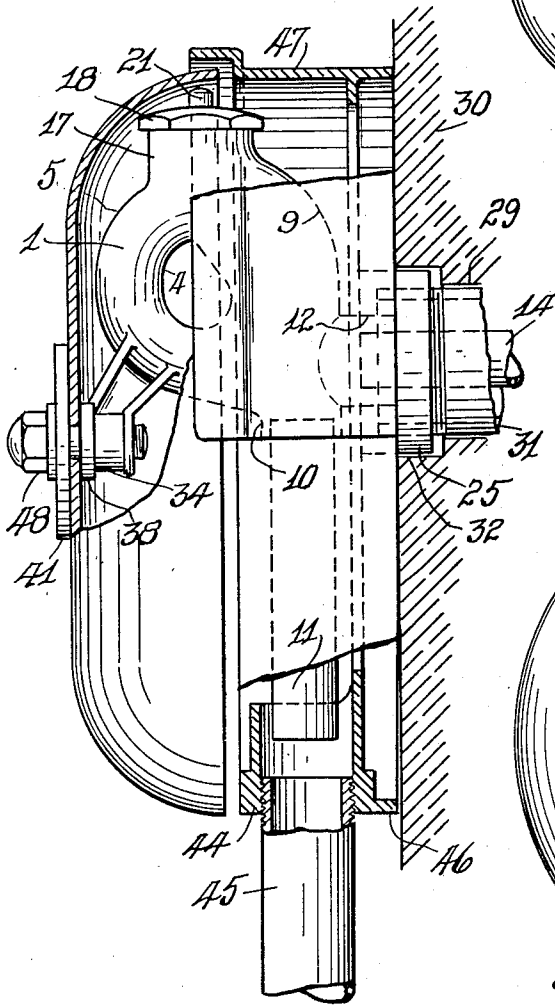


FIG. 7

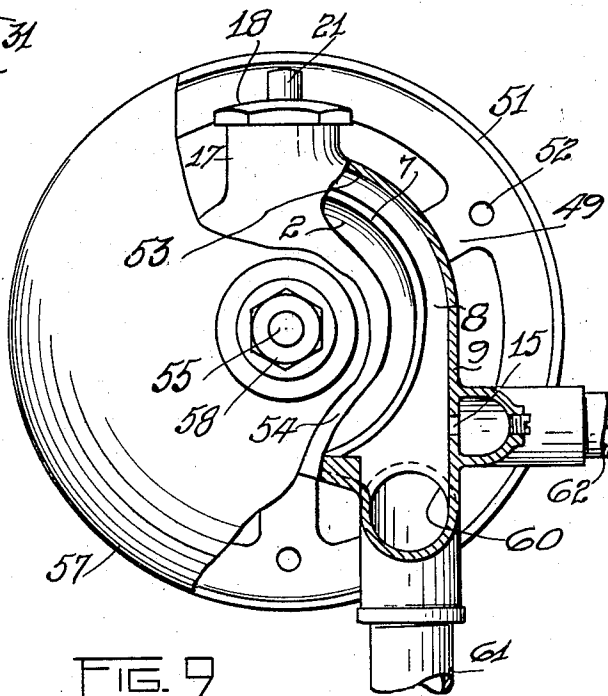


FIG. 9

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FLUID MOTOR ALARM

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The present invention relates to that class of alarm devices in which fluid under pressure is the motive force for operating a gong striking member such, for instance, as water motor alarms used in connection with automatic sprinkler systems; an object of the invention being to provide certain new and novel features of construction and operation for an alarm device of the character described in Patent No. 1,501,260 granted to me July 15, 1924.

In accomplishing the aforesaid object, I provide a fluid motor having a substantially circular raceway around which a spherical piston comprising a ball is caused to travel by the impingement of a jet of fluid entering the cylinder at a tangent to the center of the raceway, another object of the invention being the provision of a movable striking member comprising, preferably, a reciprocating plunger arranged radially of and extending slightly into the path of the ball, the repeated striking of the ball against the plunger and the plunger against a gong causing a steady alarm.

Another object of the invention is, without the use of stuffing boxes or packing, to provide a construction whereby the plunger is guided for reciprocating movement and which prevents the motive fluid from escaping around the plunger.

Another object of the invention is to so relatively arrange the intake and outlet that the impinging jet passes through the waste fluid as the latter is discharging from the motor.

A further object of the invention is to provide a motor construction in which the waste fluid has a siphonic action which tends to accentuate the travel of the spherical piston.

A further object of the invention is to make provision for the positive operation of the motor in the event of stoppage in the drain pipe.

The sounding member is a gong, and a further object of the invention is, in one embodiment of the invention, to arrange the motor transversely thereof and to employ the motor as the means for supporting the gong.

A further object of the invention is to provide a simple and strong mounting for the device, when used as a water motor alarm for sprinkler systems, that may be quickly and securely attached to a wall with but little labor required.

In mounting the device upon a wall, an opening is made through the latter for receiving a tube threaded at each end and through which the water inlet pipe extends, the inner end of this tube having a cap nut threaded thereon which engages the inner face of the wall, while

threaded on the outer end of the tube is the hub portion of a wall plate, and a further object of the invention is to employ this plate as a support for the motor and its drain pipe.

A further object of the invention is to provide an alarm device of the character described which is of simple and rigid construction, light in weight, and in which there are but two movable parts both being positive in operation under any and all atmospheric conditions, such as extreme cold, and by a motive force as low as five pounds pressure.

A further object of the invention is the provision of a modification of the device in which the gong and wall plate form, in combination, a hood for the motor, thus eliminating the necessity of the usual weather-proof hood.

In automatic sprinkler systems there is employed, besides an outside water motor alarm, an inside electric alarm which sounds simultaneously with the outside gong and which necessitates the use of a circuit breaker in the electrical connections; and a further object is, in providing a water motor alarm for automatic sprinkler systems, to so construct the device that the invention may also be embodied in an alarm adapted for inside use, thus taking the place of the circuit breaker and electric alarm and making the equipment more positive in that water alone is depended upon to ring both the inside and outside gongs, the possibility of a failure in water supply at a time of fire being very remote as compared to the possibility of an electrical alarm not functioning.

And, a still further object of the invention is to so form the inner or ball engaging end surface of the plunger that neither contacting members will be worn or pounded out of shape when subjected to the most severe tests, a recent demonstration in which the device was operated continuously for nearly one hundred hours, disclosing the plunger as showing but little wear and the ball as still being perfectly round and to within a few thousandths of its original diameter.

To these ends the invention consists of certain parts and combinations of parts as will be firmly set forth in the following description and particularly defined in the appended claims.

The accompanying drawings illustrating the invention and forming a part of the specification are as follows:

Figure 1 is a partial side elevation and partial vertical sectional view, as on line 1—1, Fig. 3, of the invention shown mounted on a building wall which is also shown in section.

Fig. 2 is a fragmentary view of the lower portion of the hood.

Fig. 3 is a front view of the wall plate and motor cylinder, the gong and hood being removed.

Fig. 4 is an enlarged sectional detail on line 4-4, Fig. 1.

Figs. 5 and 6 are detail side elevations of the plunger, the views being at right angles to each other.

Fig. 7 is a view partly in side elevation and partly in vertical section of a modification of the invention in which the hood is eliminated.

Fig. 8 is a top plan view, with parts shown in section, of a modification of the invention intended for use as an inside alarm.

And, Fig. 9 is a face view of the device shown in Fig. 8, a portion of the gong being broken away.

In the drawings similar reference numerals refer to similar parts throughout the several views.

Referring first to Figs. 1 to 6, inclusive, the invention as therein illustrated embodies a water motor gong for use, in connection with automatic sprinkler systems, the gong being mounted on the exterior of a building for the purpose of giving an alarm in the event of the sprinkler system being set in operation by the fusing of a sprinkler head.

The motor frame or cylinder 1 is substantially a hollow ring having a bore which provides a circular path of travel or raceway 2 for the spherical piston which is a ball 3, the inner peripheral wall of the raceway being indicated by the numeral 4 while 5 represents the outer peripheral wall. The ball in its travel around the raceway contacts with a movable striking member, later to be described, and from a point adjacent but beyond the striking member with respect to the starting position of the ball, that is, where it receives the impact of the water jet, the outer wall 5 is cut away to provide tracks 6 for guiding the ball and a comparatively wide slot opening 7 through which the waste water, the latter becoming waste after the ball contacts with the striking member, discharges into a chamber 8 partly surrounding the raceway and formed by a wall 9, this chamber terminating at its discharge, lower end in a tubular extension 10 which is threaded to receive the upper end of a waste pipe 11. Formed on the wall 9 is a laterally extending boss 12 having a bore 13 which is threaded to receive the fluid inlet pipe 14, the bore 13 terminating in a much smaller aperture 15 through which a jet of water, indicated at 16, is projected through the chamber 8 into the raceway 2, the axis of this aperture being tangential to the center of the raceway and at a point above the discharge end of the said chamber.

At the top of the cylinder 1 and forming an integral part of the wall portions 5 and 9 is an upstanding tubular extension 17 which is internally threaded to receive a screw cap 18, and at the bottom of the extension is a flat-faced portion 5^a of the wall 5, such portion 5^a having a bore 19 axially aligned with but of greater diameter than that of a central opening 20 through the cap. The walls of the opening 20 and bore 19 comprise outer and inner guides, respectively, for a plunger 21, which, intermediate its ends, is formed with an annular flange 22 providing a shoulder which normally rests upon the outer face of the wall part 5^a. Integral with such flange 22 is an irregular portion 23, in this in-

stance partly rectangular and partly hexagonal, which is guided in a similarly conformed upstanding ridge 24 on the wall part 5^a, such ridge functioning to hold the plunger against rotation while the irregular contour of the co-operating parts 23 and 24 assures a proper positioning of the plunger. The plunger on opposite sides of the flange 22 is of different diameters to avoid the possibility of its being placed wrong end uppermost. The inner and larger end of the plunger projects slightly into the raceway 2 and is bevelled in the direction of travel of the ball 3 and concaved at right angles to such direction of travel, the curvature being substantially that of the transverse curvature of the raceway. Thus the ball has a wiping action over a considerable surface as it strikes the end of the plunger, the result being that wear of the ball and plunger is reduced to a minimum.

The motor cylinder 1 is supported by the boss 12 being threaded into the hub portion 25 of a wall plate which also includes a rim 26 and a plurality of radial arms 27, the latter being reinforced by ribs 28. In order to support the wall plate an opening 29 is cut through the wall 30 and a section of pipe 31 extended therethrough, this pipe being of greater length than the thickness of the wall and projecting from both faces thereof. One end of the pipe 31 is threaded into a bore in the hub 25, the latter seating in a counter bore 32 in the outer face of the wall, and the plate is drawn firmly against the wall by means of a screw cap 33 threaded on the inner end of the pipe. It will thus be observed that the wall plate is securely held in place without the use of bolts or other such fastening devices, and that but little labor is required in mounting it.

Extending forwardly and downwardly from the motor cylinder which, it will be understood lies in a vertical plane, is an arm 34 having a horizontal bore therethrough the axis of which lies in the plane of the cylinder, this bore being threaded to receive the inner end of a stud 35 on which, intermediate its ends, there is a head 36. Supported on this stud 35 is a gong 37, the stud passing through an axial opening in the gong which is clamped against an end face 38 of the arm 34 by the bolt-head 36 with the outer face of such head forming an abutment for a sheet metal hood 40, the hood being clamped against the head or spacer, 36 by means of a reinforcing plate 41 which in turn is held in position by a retaining nut 42 on the outer threaded end of the stud, the inner end of this hood, which is concentric of and in spaced relation to the gong, being seated within the rim 26 of the wall plate and abutting the web thereof. The relative positions of the motor and gong are such that the outer, rounded end of the plunger 21 is spaced slightly from the edge of the gong at the top thereof and adjacent its inner surface. The upper half of the hood 40 is imperforate as a protection to the enclosed parts against the weather and foreign substance, while the lower half is perforated, as at 43, for the emission of sound.

On the lower end of the vertically extending radial arm of the wall plate is a cylindrical housing 44 into which the waste pipe 11 extends, this housing being internally threaded at its lower end for connection with a drain pipe 45 which conducts the waste water to any suitable outlet. The adjacent ends of the pipes 11 and 45 are spaced apart and the housing 44 is of such greater diameter than the pipe 11 as to provide

an overflow for the waste water should the drain 45 become stopped.

In the operation of the device, water from the inlet pipe 14 is projected in a jet 16 through the aperture 15 and striking the spherical piston 3 causes the ball to travel continuously around the raceway 2, striking the plunger 21 each time it passes the latter and forcing it upwardly into contact with the gong, the plunger being loose in its mounting and dropping by gravity after each operative movement. When striking the plunger 21 the ball is deflected from its course and to prevent consequent wear of the ball and the pounding thereof against the inner peripheral wall 4 of the raceway such wall, from a point slightly in advance of the axial line of the plunger drops away angularly, as indicated at 4^a, the enlarged space thus provided for the ball permitting such member to return into the path of the jet with but little contact with either the inner or outer peripheral walls of the raceway. After the ball strikes the plunger 21 the water becomes waste and loses its force as it passes through the slot opening 7 into the chamber 8 and falls into the waste pipe 11 from which it is discharged into the drain pipe 45. The jet 16, it will be observed, is projected through the waste water, and it will also be observed that the water column in the waste pipe 11 creates a siphonic action which tends to accentuate the return of the ball into the path of the jet and also prevent leakage around the plunger 21. Should the drain pipe 45 become clogged the water will back up through the tubular extension 44 on the wall plate and overflow therefrom. Due to the fact that no water remains in the motor or in the waste pipe 11, after the supply through the inlet pipe 14 has been turned off, it is impossible for the motor to freeze during extreme cold weather and thus fail to operate. Possibly a film of water on the ball will cause the latter to freeze to the wall of the raceway but it would be instantly broken away by the impact of the water jet.

In the modification of the invention shown in Fig. 7 the protection hood 40 is eliminated, the rim, indicated at 46, of the wall plate having a broader face which terminates just short of the inner edge of the gong. And, formed on the outer or forward edge of the rim 46 is a semi-circular off-set extension 47 which overlaps the edge of the gong, the wall plate and the gong thus forming a housing for the motor. In this instance the gong is supported upon a cap screw 48 threaded into the motor arm 34, the gong being clamped against the face 38 of such arm by the plate 41 and head of the cap screw 48.

Refer now to Figs. 8 and 9 which show a modification of the invention embodying a, preferably, smaller device and one adapted for use as an inside alarm. The wall plate, in this instance, comprises arms 49 extending radially from a hub portion 50 and terminating in an annular rim 51 which projects forwardly from the plane of the arms, and has its outer edge spaced slightly from the edge of the gong, the arms having openings 52 for receiving lag screws or other means for fastening the plate to a wall or other suitable support.

The motor, indicated generally by the numeral 53, is practically the same as that shown and described with reference to Figs. 1-6, inclusive, with the exception that, instead of being arranged at right angles to the gong, it is housed with the gong parallel to the plane thereof and provided with side walls 54 which are apertured

to receive a supporting stud 55. This stud is threaded into the hub 50 of the wall plate and carries a spacing sleeve 56 interposed between the gong 57 and the outer wall 54 of the motor, the end of the stud being threaded to receive a clamping nut 58. This compact arrangement of the parts necessitates an offset or elbow construction of the intake and discharge extensions 59 and 60, respectively, which correspond to the parts 12 and 10 of the motor shown in Figs. 1 to 6, inclusive, in order that the intake and discharge members will project through the rim 51 of the wall plate and clear the edge of the gong. The waste pipe 61 is connected directly to the discharge 60 of the motor, no provision being made in this modification for an overflow of the waste water as it would be impractical in an inside alarm.

The inlet pipe 62 for an inside alarm and the corresponding pipe 14 for the outside alarm are connected to the same source of water supply at a point beyond the valve which controls the supply of water to the alarms. Consequently, when water is released for ringing the outside alarm, the inside one will also be caused to ring. And, it will readily be observed that an inside water motor alarm will be more sure of operation, in case of fire, than one which is electrically controlled.

It is believed that from the foregoing the construction and operation of the several modifications of the invention have been made sufficiently clear to call for no further explanation. It may be stated, however, that the invention may be employed for other purposes than as an alarm for automatic sprinkler systems, such for instance, as a gong used on a motor vehicle, in which event compressed air would be the motor fluid.

What I claim is:

1. In a device of the character described, the combination with a sounding member of a motor including a cylinder having a substantially circular raceway, an inlet for fluid under pressure and an outlet, a ball caused to travel continuously around the raceway by pressure of fluid from said inlet, a striker for said sounding member comprising a plunger guided for reciprocating movement, said plunger normally extending slightly into the path of and being actuated by said ball, co-operating means on said plunger and its guide for limiting movement of the plunger into position for contact with said ball and for preventing rotary movement of the plunger, the inner end face of the plunger being beveled in the direction of travel of said ball and concaved transversely of such direction of travel.

2. In a device of the character described, a motor including a cylinder having a substantially circular raceway, a restricted inlet opening for fluid under pressure, an outlet, a chamber partly surrounding said raceway and communicating with said outlet, and an opening in the wall of the raceway into said chamber; a ball caused to travel continuously around the raceway by a jet of fluid from said inlet, and a member in the path of said ball in advance of said raceway opening adapted to be struck by the ball, said jet being projected through the waste fluid in said chamber.

3. A device such as described in accordance with claim 2 characterized by said inlet and outlet being at right angles to each other.

4. In a device of the character described, a motor including a cylinder having a substantially

circular raceway, a restricted opening as an inlet for fluid under pressure, an outlet, a chamber partly surrounding said raceway and communicating with said outlet, and a circularly extending slot in the wall of the raceway and opening into said chamber; a ball caused to travel continuously around the raceway by a jet of fluid from said inlet, and a member in the path of said ball adapted to be struck by the ball, said member being arranged substantially diametrically opposite the starting position of the ball, that is, where the latter enters the path of the jet, said slot extending from a point adjacent but beyond said member to be struck with respect to the direction of travel of the ball to said starting point of the ball, and said jet being projected through the waste fluid in said chamber.

5. In a device of the character described, a motor including a cylinder having a substantially circular raceway, a restricted inlet opening for fluid under pressure, an outlet comprising a vertically extending tubular extension, a chamber partly surrounding said raceway and discharging into said outlet, and an opening in the wall of the raceway into said chamber; a ball caused to travel continuously around said raceway by a jet of fluid from said inlet, and a member in the path of said ball in advance of said raceway opening adapted to be struck by the ball, said jet being projected through the waste fluid in said chamber and the water column in said outlet exerting a siphonic action in the motor.

6. A device of the character described in accordance with claim 5 and including an overflow for the waste water comprising a drain of greater diameter than said tubular outlet extension and into which the latter extends.

7. In a device of the character described, the combination with a support, as a wall, having an opening therethrough, of a wall plate, a tube extending through said opening and secured to said wall plate, means as a cap nut on the other end of said tube for holding said wall plate against the adjacent surface of the wall, a motor including a cylinder having a substantially circular raceway, a restricted inlet for fluid under pressure and an outlet; a boss on said cylinder threaded into said wall plate, a fluid inlet pipe extending through said tube and threaded into said boss, said pipe discharging through said restricted inlet, a ball caused to travel continuously around said raceway by a jet of fluid from said inlet, a plunger mounted for reciprocating movement in said cylinder, a gong so arranged with respect to the motor that said plunger strikes the inner surface of the gong adjacent the edge thereof and means carried by the motor for supporting the gong.

8. A device of the character described in ac-

cordance with claim 7 and including a tubular housing formed on said wall plate, a waste pipe having one end threaded into said outlet and its other end extending into said tubular housing, and a drain pipe connected to said housing, the adjacent edges of the drain and waste pipes being spaced apart and the tubular housing being of such greater diameter than the waste pipe as to provide an overflow as and for the purpose set forth.

9. In a device of the character described, the combination with a sounding member of a motor including a cylinder having a substantially circular raceway, a ball in the raceway, a restricted inlet, an outlet, and a striker pin mounted for reciprocating movement with its inner end normally extending slightly into the raceway, said ball being caused to travel continuously in one direction by action of fluid under pressure from said inlet and once during each cycle to contact said striker pin and effect an outward movement thereof.

10. In a device of the character described, the combination with a sounding member of a motor including a cylinder having a substantially circular raceway, a ball in the raceway, a restricted inlet, an outlet, and a striker pin mounted radially with respect to said raceway with its inner end normally extending slightly into the raceway, said ball being caused to travel continuously in one direction by action of fluid under pressure from said inlet and once during each cycle to contact said striker pin and effect an outward movement thereof, return movement of the striker being by gravity.

11. In a device of the character described, the combination with a sounding member of a motor including a cylinder having a substantially circular raceway, a ball in the raceway, a restricted inlet, an outlet, a striker pin mounted radially with respect to said raceway with its inner end normally extending slightly into the raceway and presenting a cam surface to said ball, and means for guiding said striker pin for reciprocating movement and holding it against axial rotation, said ball being caused to travel continuously in one direction by action of fluid under pressure from said inlet and once during each cycle to contact said striker pin and effect an outward movement thereof, return movement of the striker being by gravity.

12. A device such as described in accordance with claim 11 characterized by the inner wall of the raceway, from a point slightly in advance of the axial line of the plunger, dropping away angularly into a flattened portion, thus providing an enlarged space for the ball to facilitate the return of said ball.

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