

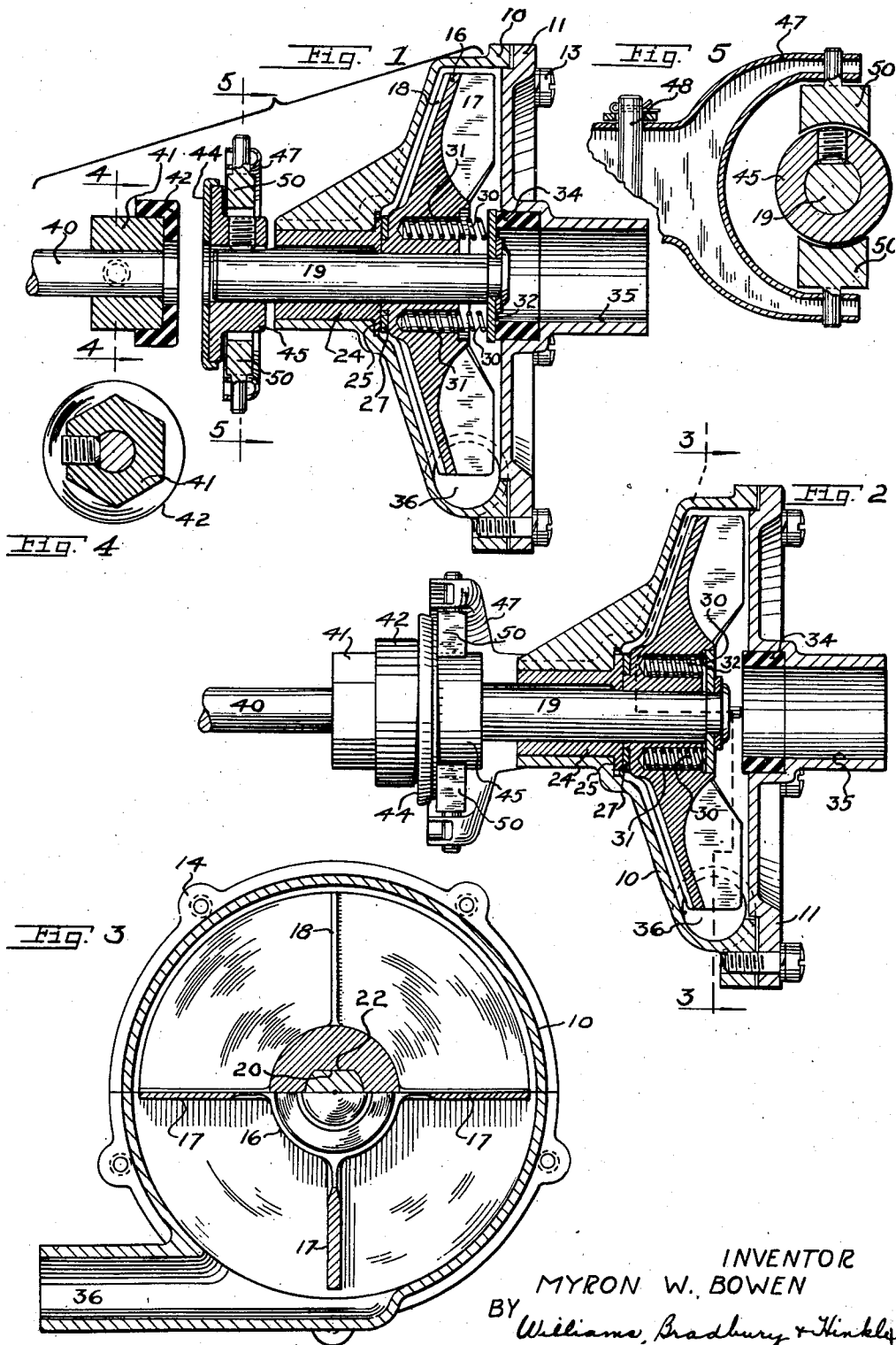
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COMBINED WATER PUMP AND VALVE

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COMBINED WATER PUMP AND VALVE

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This invention relates to a combined water pump and valve, primarily for controlling the discharge of water from washing machines. The drain pipe from a washing machine sometimes rises outside the washing machine for delivery of drain water into a laundry tub, and sometimes runs directly to a low-level sewer connection. Under either of these conditions it is important to have a valve in the waste water discharge line; in one condition to prevent water from running out of the tub and into the sewer when discharge of water is not desired, and in the other condition to prevent water from the waste water pipe from running backwards into the tub after the discharge operation.

Heretofore it has been common practice to include a magnetically operated discharge valve in the discharge conduit. In some constructions the discharge pump is permitted to run all of the time, the discharge being fully controlled by the valve. In some other constructions the discharge pump is caused to run periodically and only at times when discharge is desired, the flow, however, being also controlled by a valve.

In accordance with the present invention a discharge valve is incorporated within the pump structure and so arranged that the opening and closing of the discharge valve is caused to coincide with the starting and stopping of the water pump through physical connections between the shaft of the water pump and the valve head.

One object of the invention is to provide a simplified and inexpensive structure.

Another object of the invention is to provide a waste water valve in which there is relative rotation between the valve and its seat effective, for the dislodgment of solids found in the waste water stream which with the ordinary type of valve sometimes become lodged between the seat and the valve disc in such a way as to hold the valve open when it is important that it shall close.

My invention is illustrated in the accompanying drawing in which,

Fig. 1 is a vertical cross-section through the pump, valve and operating clutch for the pump and valve, showing the valve in its normal and closed position.

Fig. 2 is a similar view, partly in section, showing the valve in its open and the clutch in its closed position.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a section on the line 4—4 of Fig. 1, and

Fig. 5 is a section on the line 5—5 of Fig. 1.

My invention comprises a housing 10 and cover

11 fastened together in any conventional manner, such as by screws 13 passing through holes in the cover 11 and threaded into bosses 14 on the housing 10. An impeller 16 provided with blades 17 and 18 is mounted on the pump shaft 19 in a manner permitting the shaft 19 to move lengthwise within the hub of the impeller, the shaft and impeller hub being provided with registering flat portions 20 and 22 or their equivalent to compel the rotation of the impeller with the shaft. The shaft 19 is here illustrated as revolving within an Oillite bushing 24 provided with a flange 25 at its inner end against which abuts a gasket 27 rotating with the impeller. A slight pressure is maintained between the gasket 27 and the flange 25 through springs 30 located in recesses 31 in the hub of the impeller. The springs 30, through their pressure on the valve head 32, serving also to press the valve head 32 against the rubber or similar valve seat 34 to close off the pump intake 35 when the pump is not in operation. A pump discharge 36 leads tangentially from the periphery of the pump housing 10.

The blades 17 of the impeller perform the usual function of impelling the liquid within the pump by centrifugal force outwardly through the discharge 36. The blades 18 serve to create a slight suction on the bearing between the flange 25 and gasket 27 to insure the prevention of leakage of liquid outwardly between the shaft 19 and the bushing 24.

At the left end of Figs. 1 and 2 there is illustrated the end of a power driven shaft 40, preferably the motor shaft itself, on which there is mounted a collar 41 provided with a rubber clutch surface 42, all in axial alignment with the pump shaft 19. A corresponding clutch surface 44 is mounted on a collar 45 fixed on the end of the shaft 19. The shaft and valve head 32 and clutch member 44 are moved to the left, Figs. 1 and 2, by means of a yoke 47 pivoted at 48 and rocked on its pivot by a magnetic solenoid, or other power transmitting device, to cause the shoes 50 to press the flange of the collar 45 to change the clutch and associated parts from the position shown in Fig. 1 to that shown in Fig. 2 in which the clutch faces 42 and 44 are in operating contact.

In the operation of my combined pump and drain valve, water having been admitted to the washing machine tub is held against discharge by the contact of the valve head 32 on the rubber valve seat 34. The motor at this time is running and the clutch member 42 is revolving.

When discharge of the water is desired a timer and other mechanism not shown causes the yoke 47 to rock upon its pivot 48, opening the valve, then closing the clutch and causing the rotation of the impeller in a clockwise direction, Fig. 3. Waste water is thus drawn from the tub and either discharged into a sewer outlet at a level lower than the pump, or else lifted to a higher level through a discharge hose or pipe attached to the pump outlet 36. At the end of the discharge period the yoke 47 is released and the springs 30 cause a quick return of the valve head 32 upon the seat 34. The inertia of the impeller and associated parts rotating therewith will cause a very slight rotation of the valve head 32 on its seat 34, enough, however, to loosen and help discharge any solids which have adhered either to the valve head 32 or the valve seat 34. The relative rotation of valve head and valve seat, however, ceases very quickly after the two parts have engaged one another, since the friction of the valve head on the seat, coupled with the friction of the rotating waste water within the pump, is sufficient quickly to bring the impeller to rest.

When the pump is at rest neither the slight pressure from within the tub nor pressure outside the tub within a rising discharge pipe can cause any flow of waste water past the now closed valve into or out of the tub.

It will be seen that by the use of my invention one operating solenoid, or similar device, is caused positively to both start and stop the impeller and to open and close the valve. The slight rotation of one member of the valve upon the other serves to rid the valve of foreign matter and preserve its sealing condition.

Although I have shown and described my invention as applied to a specific structure and for a specific purpose, it is to be understood that it has a wide application and, therefore, I do not wish to be unduly limited to the details of the construction illustrated and described.

I claim:

1. In a combined waste water pump and waste pipe valve, a pump housing having inlet and discharge openings, a valve member within the housing normally closing the inlet opening, an impeller within the housing aligned with the valve member, a shaft for driving the impeller having axial movement relative to said impeller and carrying said valve member, and means for moving said shaft axially for opening and closing said valve, and means for rotating said shaft for rotating the impeller.

2. In a combined waste water pump and waste pipe valve, a pump housing having inlet and discharge openings, a valve member within the housing normally closing the inlet opening, an impeller within the housing aligned with the valve member, a shaft for driving the impeller having axial movement relative to said impeller and carrying said valve member, and means for moving said shaft axially for opening and closing said valve, and means for rotating said impeller and valve member.

3. In a combined waste water pump and waste

pipe valve, a housing, an impeller within the housing, said impeller being formed of a disc slightly less in diameter than the inner diameter of the housing and having impeller blades on one side of said disc and suction blades on the other side of said disc, a shaft journaled in the housing axially movable through the hub of said impeller, a valve part carried on the end of said shaft within the intake chamber of said housing, spring means between said valve part and the impeller tending to push the valve part towards the intake of the housing and the impeller towards the journal for the shaft, the housing and the impeller having abutting working faces surrounding the shaft and its journal bearing in a plane substantially normal to the axis of the shaft, said spring means serving to hold said abutting faces in contact with one another, the suction blades on said impeller serving to create a suction on said abutting faces whereby waste water which leaks along the shaft between the impeller hub and the shaft will be drawn away from the journal bearing between the shaft and the housing, and means for moving the shaft axially to move the valve part against and away from the waste water entrance to the housing.

4. In a combined waste water pump and waste pipe valve, an impeller for said pump, a shaft connecting said impeller with one member of said valve to cause their simultaneous rotation, and a connection between said shaft and impeller to drive said impeller but allowing sliding axial movement of said shaft relative to said impeller for opening said valve while said impeller is stationary, and for closing the valve while said impeller and said one member of the valve are rotating.

5. In a combined waste water pump and waste pipe valve, an impeller for said pump, a shaft carrying the impeller and one member of the valve and mounted for axial movement for opening and closing said valve, and a rotatable frictional contacting member positioned to contact and to rotate said shaft in the valve open position of the axial movement of said shaft.

6. In a water pump and waste pipe valve, an impeller for said pump, a housing, a shaft journaled in the housing for driving the impeller, an enlargement on the end of the shaft within the housing, a spring between the enlargement and the impeller, a sealing gasket surrounding the shaft and rotating with the impeller and held against a portion of the housing by the said spring, and a shaft connected to drive said impeller but slidable axially relative to said impeller and secured to said sealing gasket for moving said enlargement and said gasket relative to said impeller.

7. In a combined water pump and valve, an impeller, a shaft carrying said impeller and one member of said valve and mounted for axial movement relative to said impeller for opening and closing said valve, and a rotatable member positioned to contact and rotate said shaft in the valve open position of the axial movement of said shaft.

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