Dec. 28, 1937. T. W. BEHAN 2,103,966

WASHING MACHINE

Filed Dec. 1, 1934 3 Sheets-Sheet 1

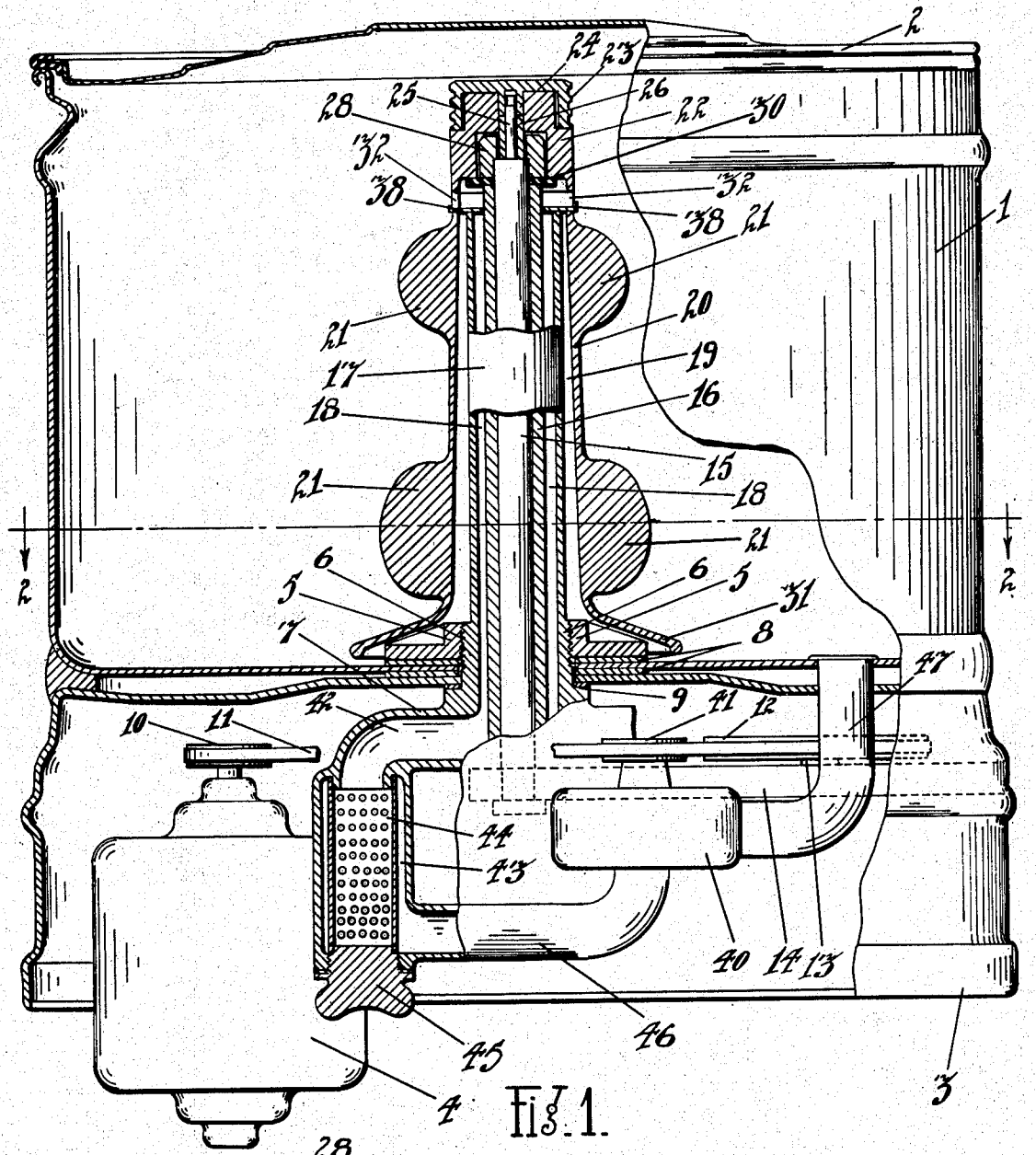


Fig. 1.

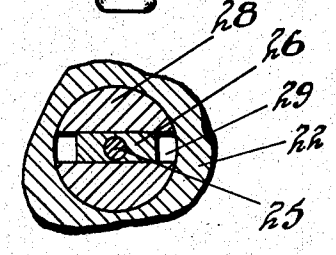


Fig. 6.

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WASHING MACHINE

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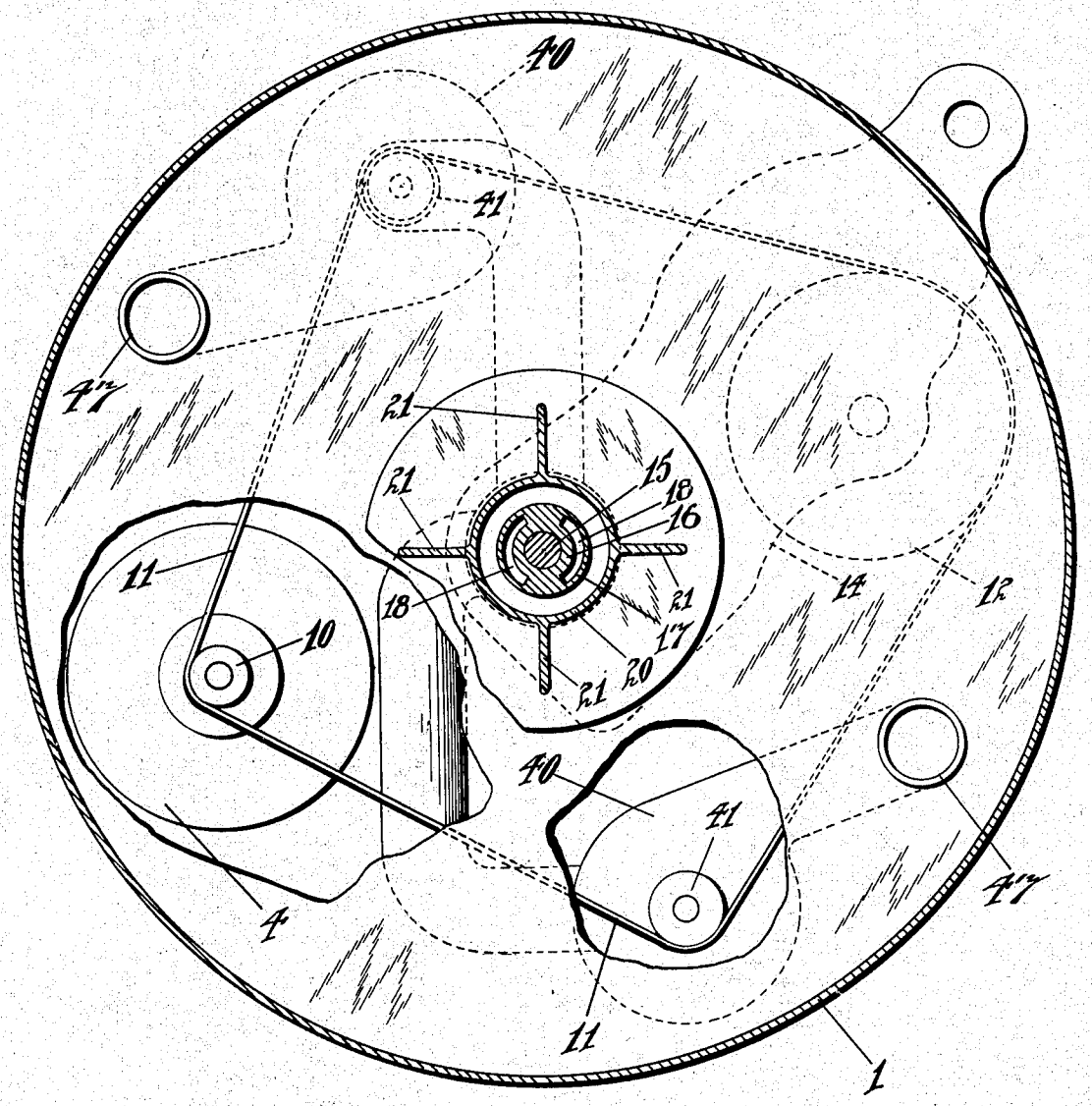


Fig. 2.

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WASHING MACHINE

Filed Dec. 1, 1934 3 Sheets-Sheet 3

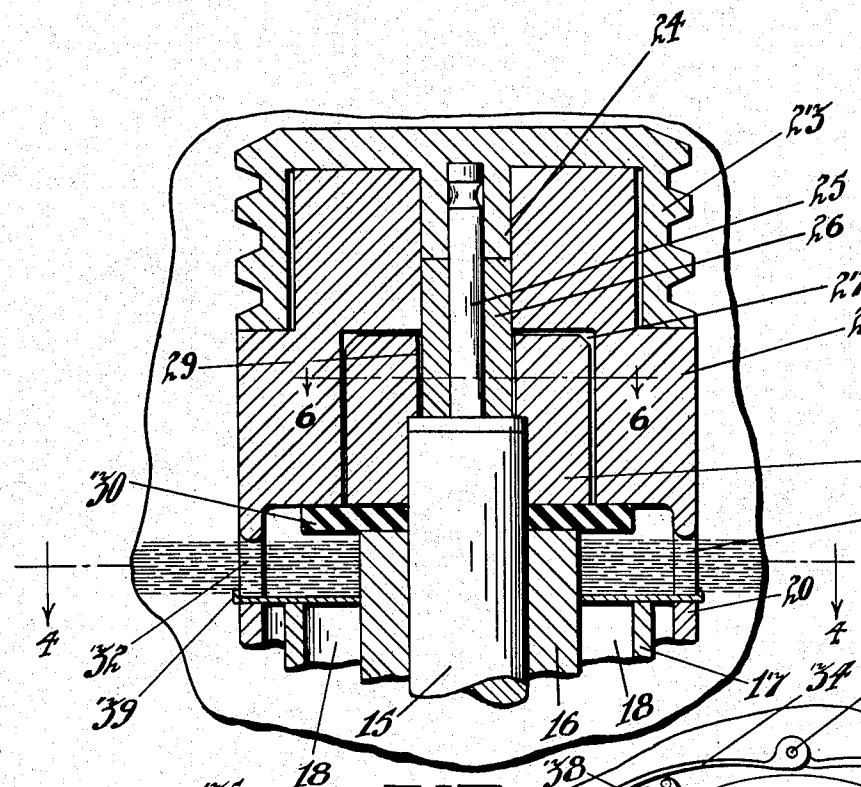


Fig. 3.

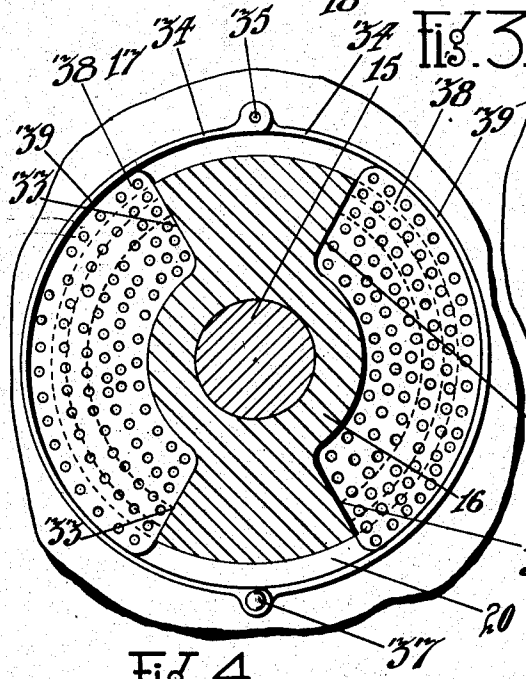


Fig. 4.

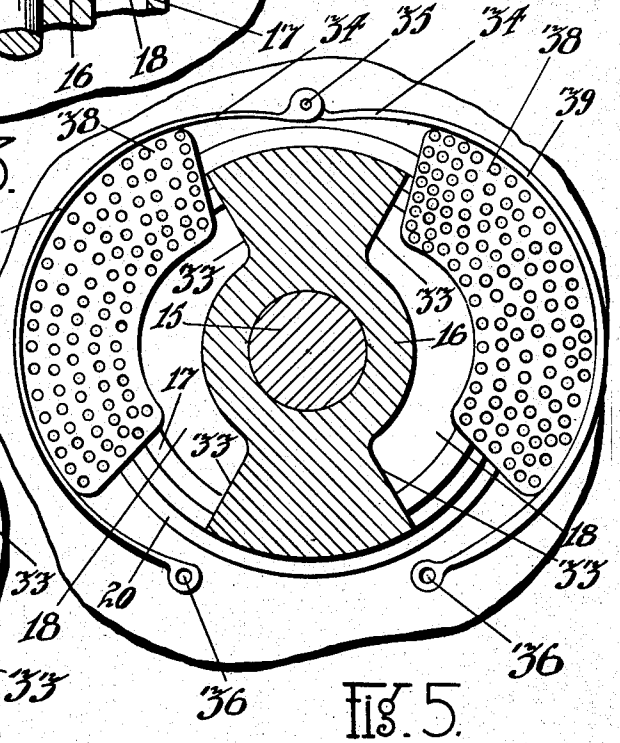


Fig. 5.

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Patented Dec. 28, 1937 2,103,966

UNITED STATES PATENT OFFICE

2,103,966

WASHING MACHINE

Thomas W. Behan, Binghamton, N. Y.

Application December 1, 1934, Serial No. 755,625

6 Claims. (Cl. 68—15)

My invention relates to improvements in washing machines.

The principal object of my invention is to provide a washing machine in which means are provided for creating a very turbulent water action independent of the vanes or agitator and wherein such vanes are useful largely for the purpose of turning the clothes to present the different surfaces thereof frequently to the action of the independently agitated water. By this means the harmful action of the usual type of agitator is eliminated.

More specifically my invention provides for a means for circulating the water through the tub of the machine, drawing it into the tub in forceful jets or streams with sufficient power to force the dirt out of the clothes as the water passes through them, the agitator being used largely for assisting in turning the clothes without harmful rubbing engagement therewith.

A further and important object of my invention lies in the provision of means for collecting and retaining the dirt loosened by the action of the turbulent water whereby it does not remain in suspension in the tubful of water, thus making possible a cleaner wash and also rendering it possible to use the same water a greater number of times. The economy and convenience of this under many conditions is readily apparent.

My invention includes the important feature of a straining or filtering means for the water in the circulatory system whereby the dirt which collects in scum by flotation in the tub is collected and largely retained, permitting free circulation of the clean water through the system.

Other objects and advantages will be apparent as the description proceeds, reference now being had to the figures of the accompanying drawings forming a part of this application and wherein like reference numerals indicate like parts.

In the drawings:

Figure 1 is a side view of a washing machine tub equipped with my invention, certain parts being broken away and other parts shown in section for clearness of illustration.

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail cross sectional view illustrating the assembly of one of the strainers or screens.

Figure 4 is a detail cross sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view similar to Figure 4 showing the screen in its open or removable position.

Figure 6 is a detail cross sectional view taken on the line 6—6 of Figure 3.

The reference numeral 1 indicates a wash tub which may be of conventional type, provided with a cover 2. Secured to the underside of the tub is a depending flange or apron 3 within which is suitably disposed the electric motor or other source of power 4 and the various elements making up the operating mechanism for the washing machine to be described in detail.

The apron member 3 may be secured to the underside of the tub 1 by a screw nut 5 threadably engaging a boss 6 provided on a casing 7 and extending upwardly through an opening provided in the bottom of the tub 1 and in the upper side of the apron 3. Suitable spacing washers 8 are provided on each side of the bottom of the tub 1 and the lowermost of such washers lies between such bottom and the upper side of the apron 3, which in turn rests upon a shoulder 9 provided on the casing 7 whereby tightening the lock nut 5 serves to clamp these parts securely together.

The motor 4 drives through the pulley 10 and belt 11 a pulley 12 mounted upon a shaft 13 extending into a casing 14 within which is disposed any desired or suitable speed reduction and motion translating mechanism, (not shown), by means of which an oscillating movement is imparted to a vertical shaft 15 projecting upwardly into the tub 1 through a casing 16. Also projecting upwardly into the tube 1 and surrounding the casing 16, is a casing 17 which may be an upwardly projecting extension of the boss 6. Spaces 18 between the housings 16 and 17 are provided on opposite sides of the housing 16 for a purpose to be described.

Surrounding the casing 17 and spaced therefrom as at 19 is an agitator housing 20 provided at a plurality of points with outwardly extending fins 21 smaller in size than the conventional or commonly used fins in washing machines, the same being designed for the purpose of gently agitating the water in the tub with a force sufficient to turn the clothes therein in order that the surfaces thereof may be changed frequently to the action of the water. By making these fins relatively small, the danger of rubbing action between such fins and the clothes is reduced to a minimum and the useful life of the clothes thus prolonged. Furthermore, greater speed of operation of the agitator is possible with the available power due to the reduced resistance of the vanes.

The upper end of the agitator housing 20 is formed as a block 22 over which fits a cap 23

rigidly secured to the block 22 by means of a driving fit between a central downward extension 24 provided on the underside of the cap and a central opening through the upper end of the block. The upper end of the shaft 15 is reduced as at 25, this reduced end extending upwardly through a block 26 of squared or rectangular cross section also having a driving fit into the opening through the block 22 whereby the same is rigidly secured to such block.

The underside of the block 22 is recessed as at 27 to loosely receive a clutch block 28, the underside of which is centrally recessed to receive the upper projecting end of the shaft 15 for securing the same thereto, and the upper side of which is provided with a squared groove or notch 29 into which the block 26 is adapted to freely engage. A bearing washer 30 is disposed on the upper end of the casing 16 encircling the shaft 15, the upper side of this washer supporting the clutch block 28 and the block 22. Obviously upon oscillation of the shaft 15, the block 22 and the agitator casing 20 with the fins 21 will also be oscillated by virtue of the clutch connection between the block 26 and the recessed block 28. It will also be clear that if desired the entire agitator casing including the block 22, cap 23, and block 26, may be lifted bodily upward and out of the tub.

The lower end of the agitator housing 20 is flared outwardly as at 31 overlying the fastening nut 5.

It will be noted with reference to Figures 1 and 3, that the upper end of the casing 17 is spaced below the upper end of the casing 16 and the supporting washer 30. In alignment with this space the agitator housing 20 is provided at oppositely disposed points with openings 32. The normal level of the water in the tub is in substantial alignment with the upper edge of these openings.

It will be noted with reference to Figures 4 and 5 that the housing 16 is cut away as at 33 on opposite sides in registry with the openings 32, these cutaway portions providing the spaces 18 between the housings 16 and 17 on opposite sides, these spaces providing channels the full length of such housings, as shown clearly in Figure 1.

Supported upon the upper end of the housing 17 is a strainer or screen shown clearly in Figures 4 and 5. The strainer comprises a pair of half rings 34 pivoted together at 35 and provided at their opposite ends with openings 36 adapted to receive a pin 37 when the openings are brought into registry with each other, as shown in Figure 4. Located at points in registry with the cutaway portions 33 of the housing 16, are inwardly extending perforated strainer members 38, of such shape as to snugly fit against the housing 16 within such cutout portions and in which position the openings 36 are in registry to receive the pin 37 whereby the strainer is held in position. When it is desired to remove the strainer for cleaning, the pin 37 is removed whereupon the half rings 34 may be separated by rocking upon their pivot 35 as shown in Figure 5, whereupon the same may be withdrawn entirely from the machine. The strainer extends outwardly through the openings 32 to a point just outside the agitator housing 20 and are provided with upturned lips or flanges 39 giving to the strainers a shallow cup shape.

The function and operation of this strainer will now be described. During the washing operation, it will be understood, of course, that the heavy dirt such as sand, grit, etc. will by gravity drop to the bottom of the tub 1 where it will remain. The lighter dirt, lint, and the like will float to the top of the water where with the light soapsuds it forms a scum. This scum is drawn inwardly through the openings 32 over the strainer 38 in a manner to be described, the clean water passing inwardly through the perforations in the strainer through the channels 18 and the scum and dirt carried thereby remains in the cuplike strainer which can be readily removed at frequent intervals and cleaned.

Located on the underside of the tub 1 and within the apron 3 is one or more pumps 40, two of which are shown in Figure 2 of the drawing although it will be understood that more may be provided as desired or necessary. The pumps may be of any desired or conventional form and are driven by means of the motor belt 11 passing over pulleys 41 provided on the pumps.

The casing 7 on the underside of the tub, which communicates with the channels or passages 18, also communicates with each of the pumps 40. In Figure 1 is shown one such communication comprising the passage 42 through which the water from the channels 18 passes into a chamber 43 through a perforated screen or strainer 44 located therein. The lower end of the chamber 43 is provided with a screw block 45 supporting the strainer 44 and by means of which the strainer can readily be removed for cleaning. These strainers 44 serve to again filter the water from the tub, taking out additional dirt and foreign matter which may have escaped the strainer 38 at the top of the machine. The water then passes through pipes 46 to the pumps 40 by means of which it is forced outwardly and upwardly through pipes 47 passing through suitable openings provided in the top of the apron 3 and the bottom of the tub 1 back into the tub. The pumps 40 are so geared that the water is forced into the tub through the pipes 47 with great force, this providing the necessary agitation and energy to the water to adequately force the dirt from the clothes in the tub. The direction of the water streams from the pipes 47 into the tub may be controlled and determined in accordance with best washing efficiency.

Obviously also the suction force of the pumps through the strainers 44 and through the passages 18, serves to suck the water into and through such passages, through the openings 32, with greater force. As these openings 32 are located at approximately the water level, it is obvious that dirt carrying scum, normally on top of the water, will be pulled through the strainers or filters 38 and 44 whereby a very substantial amount of the dirt is removed, thus providing a continuous circulation of relatively clean water for washing purposes.

Thus I have provided a washing machine which utilizes water ejected into the tub under great pressure as the agitating means for washing, which utilizes the fins or mechanical agitators for turning the clothes, and which strains and filters the water as it circulates through the system, whereby a large percentage of the loosened and removed dirt from the clothes is trapped and retained out of continued circulation.

Of course, changes may be made in details of construction and arrangement of parts without departing from the spirit and scope of my invention. I do not limit myself, therefore, to the

exact form herein shown and described other than by the appended claims.

I claim:

1. A washing machine comprising a tub, an agitator therein above the clothes supporting portion of the tub for turning the clothes, a circulatory water system for effecting turbulency including a pump positioned below said tub, a passage for water communicating at one end with the suction side of the pump and at its other end with the tub centrally thereof and substantially at normal operating water level, a passage communicating with the pressure side of said pump and with said tub at a point below the normal operating water level thereof, means in said first passage substantially at water level for removing and retaining dirt carried by the water, and a common source of power for driving said agitator and said pump.

2. A washing machine comprising a tub, a centrally and vertically disposed agitator shaft therein, an agitator connected thereto for turning the clothes, a housing surrounding said shaft, a casing around said housing, a water pump positioned below said tub, a passage for water between said housing and casing communicating at one end with the suction side of said pump and at its other end with said tub substantially at normal operating water level, and a passage communicating with the pressure side of said pump and with said tub below the normal operating water level thereof.

3. A washing machine comprising a tub, a centrally and vertically disposed agitator shaft therein, an agitator connected thereto for turning the clothes, a housing surrounding said shaft, a casing around said housing, a water pump positioned below said tub, a passage for water between said housing and casing communicating at one end with the suction side of said pump and at its other end with said tub substantially at normal operating water level, a passage communicating with the pressure side of said pump and with said tub below the normal operating water level thereof, and means in said first named passage for removing and retaining dirt carried by the water.

4. A washing machine comprising a tub, a centrally and vertically disposed agitator shaft therein, an agitator connected thereto for turning the clothes, a housing surrounding said shaft, a casing around said housing, a water pump positioned below said tub, a passage for water between said housing and casing communicating at one end with the suction side of said pump and at its other end with said tub substantially at normal operating water level, and a passage communicating with the pressure side of said pump and with said tub below the normal operating water level thereof, and strainer means in the intake end of said first named passage for removing and retaining dirt carried by the water.

5. A washing machine comprising a tub, a centrally and vertically disposed agitator shaft therein, an agitator connected thereto for turning the clothes, a housing surrounding said shaft, a casing around said housing, a water pump positioned below said tub, a passage for water between said housing and casing communicating at one end with the suction side of said pump and at its other end with said tub substantially at normal operating water level, a passage communicating with the pressure side of said pump and with said tub below the normal operating water level thereof, and a removable screen over the intake end of said first named passage for removing and retaining dirt carried by the water.

6. A washing machine comprising a tub, a centrally and veritcally disposed agitator shaft therein, an agitator connected thereto for turning the clothes, a housing surrounding said shaft, a casing around said housing, a water pump positioned below said tub, a passage for water between said housing and casing communicating at one end with the suction side of said pump and at its other end with said tub substantially at normal operating level, a passage communicating with the pressure side of said pump and with said tub below the normal operating water level thereof, a removable screen over the intake end of said first named passage for removing and retaining dirt carried by the water, and a second removable screen in said first named passage between said intake end and said pump.

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