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M. A. POWERS ET AL
WASHING MACHINE LINT CATCHER

2,536,087

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2 Sheets-Sheet 1

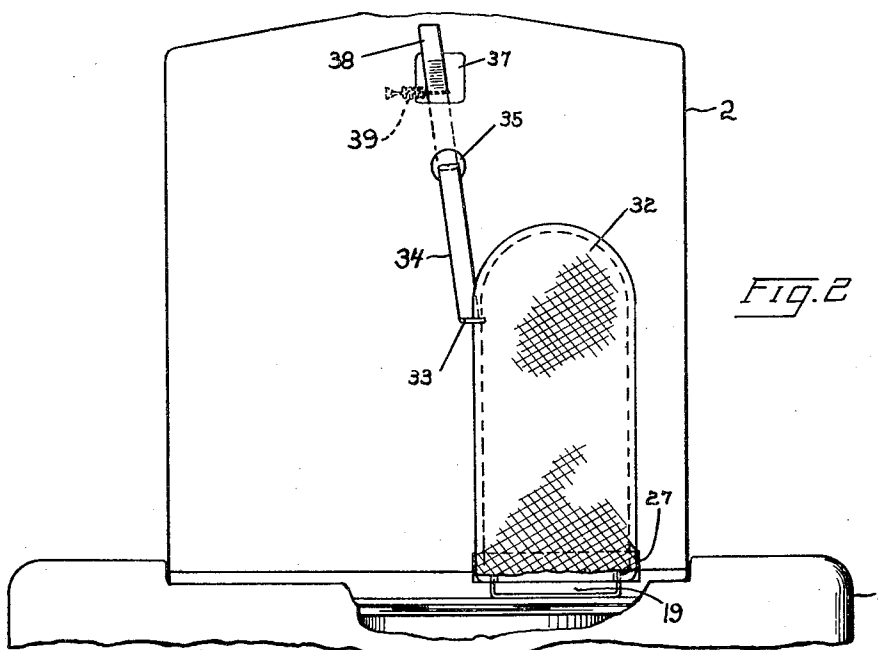


Fig. 2

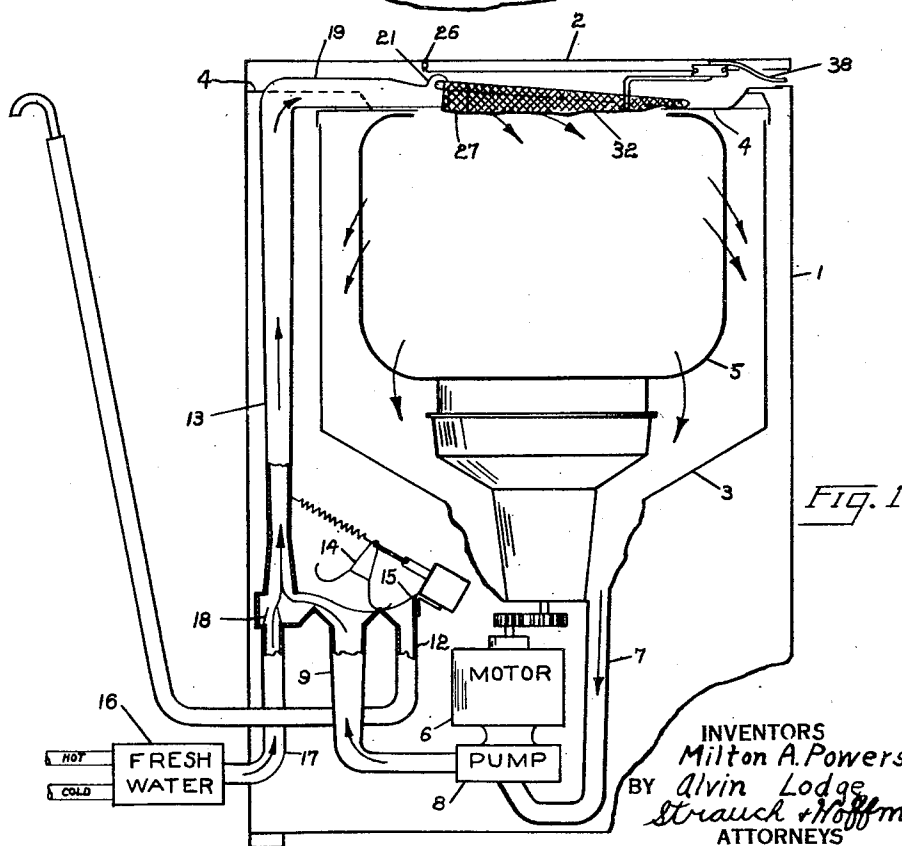


Fig. 1

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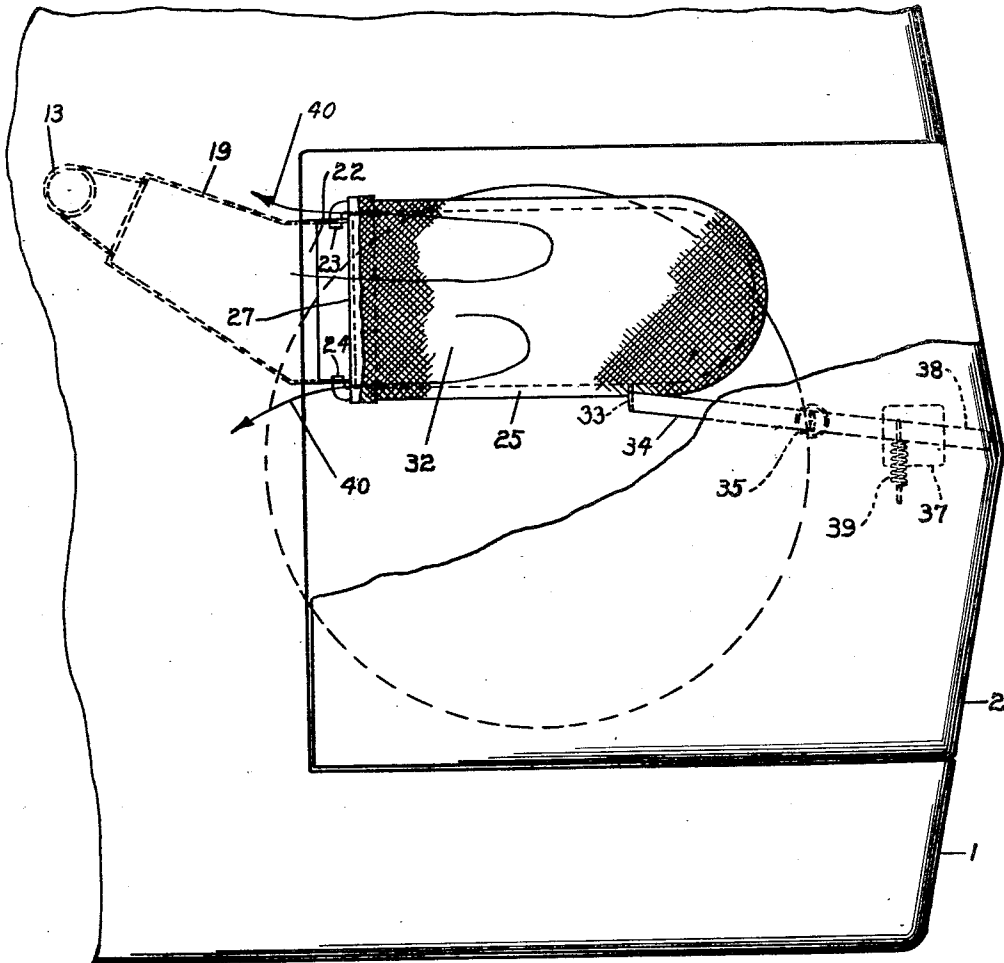


Fig. 3

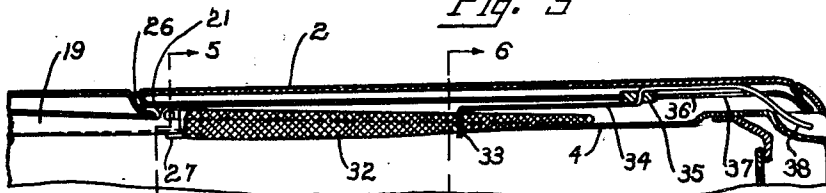


Fig. 4

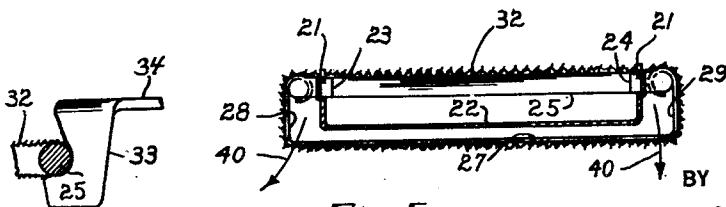


Fig. 6

Fig. 5

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WASHING MACHINE LINT CATCHER

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12 Claims. (Cl. 68—18)

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This invention relates to improvements in washing machines, in particular to those which recirculate the cleaning fluid through the cleansing space or tub.

The invention is shown applied to a washing machine of the type described in our co-pending application Serial Number 587,474 filed April 10, 1945, now abandoned, which discloses and claims novel washing machine construction and methods of washing.

In our machine the tub in which the clothes are washed is made with perforations so that there is continuous discharge of the washing fluid therefrom. The number and size of the perforations control the amount of leakage and a recirculating pump is provided of sufficient capacity to insure rapid removal of all leakage, returning it immediately to the tub through the pump and recirculating line thereby maintaining the water level at the desired height at all times. The holes are made larger in size or number above the water line so that an excess of water can be circulated with the result that a large percentage goes out through the holes near the top without increasing the operating level of the water in the tub. This also provides a skimming action which removes any floating particles from the tub as the surface water at all times is moving steadily toward the overflow holes around the periphery as the tub oscillates.

Clothes to be washed usually contain quantities of lint as well as particles of soil which are loosened by the action of the cleaning fluid being agitated through and against the fabric. Other solids including the curd or scum which results from the action of the soap on the chemicals in the water and clothes are also suspended or floating on this liquid. Due to our skimming action, a large portion of the foreign matter is immediately and continuously carried into the circulating system with the liquid.

It is of great importance if possible to remove lint, soil particles and scum from the water during the washing action, thereby reducing the amount which will be re-precipitated upon the clothes when the water is removed. Obviously, if all or most of this waste material which we may term "dross" is already removed before the water starts to drain, little or no dross can remain on the clothes.

In the conventional automatic washing machine it is customary to provide some straining means, but this is usually limited in effectiveness to removal of large particles of lint, buttons and the like—and essentially is intended to protect

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the moving parts against damage and to prevent a gradual clogging of the passages in the machine. Such screening arrangements are frequently located where they are inaccessible for easy cleaning, and in practice are cleaned only at intervals, usually when they become so filled that the operator's attention is called to the necessity for cleaning by impaired action of the machine.

Somewhat improved devices for accomplishing the general purpose of removing the heavier forms of lint and waste have been used before, as for instance those illustrated by the Patent 2,270,750 to Bariffi and the Patents 1,798,730, 2,274,402 and 2,298,096 to Dunham. Our device, however, is of much improved construction and effectiveness including an easily removable, disposable filter element of large capacity which is so designed as to permit free passage of the recirculated fluid back into the washer in the event that so much dross is accumulated during one wash cycle as to cause clogging of our filter element.

Our method of filtering greatly exceeds in effectiveness any previous efforts in this direction with which we are familiar. In addition to removal of the lint and larger particles of soil, we are particularly concerned with trapping of all of the extremely fine particles of scum, and similar precipitates resulting from various chemical actions of the soap, soil and water. It is this form of dross which is responsible for the tiny specks and a gray cast in the white color of clothes cleaned by ordinary methods. No ordinary filter will accomplish this purpose.

We are successful by providing a special filter element of large area capable of removing the scum particles by adsorption, one to the other, as well as to the fabric of the filter. Thus by continuous collection of scum particles immediately after they are formed in the tub, we maintain the wash water in a relatively clean condition at all times and thereby accomplish a quality of washing heretofore impossible. In view of the large volume of scum accumulated in a single washing, we provide a very large filter area. Furthermore at times we find even this is not adequate, and therefore provision is made for free bypassing of the water returning to the tub under such abnormal conditions.

Our system of operation is predicated upon applying a clean filter element for each washing, and the location is such as to make the need for this to be both obvious and easy to accomplish. However, no harm, other than a poor quality wash, will result if the user fails to put on a clean filter or leaves it off altogether.

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It is therefore a major object of our invention to provide novel and improved means for removing all forms of dross from recirculated cleaning and/or rinsing fluid in a washing machine.

Another object of our invention is the provision of an improved filter of simple construction, ample area and efficient operation.

It is another object to provide a novel filter system for a washing machine, utilizing an inexpensive disposable filter element.

Another important object is the provision of a filter system for the recirculating fluid in a washing machine, including means for bypassing the filter in the event of its becoming clogged by dross or waste.

Another object is the provision in a filter for the recirculating fluid in a washing machine of means for automatically swinging it out of the way when the washing machine top is opened, so that it will not obstruct the opening through which the clothes are placed in and removed from the machine.

Other objects will become apparent as the description proceeds in connection with the accompanying drawings, wherein:

Figure 1 is a diagrammatic side elevation of a washing machine showing the circulatory system of the cleaning fluid and showing the filter in its operating position;

Figure 2 is a front elevation view of the upper portion of the washing machine, with the top open and the filter raised so that clothes may be inserted or removed from the tub;

Figure 3 is a top plan view of the washing machine with a portion of the cover cut away to show the filter in operating position;

Figure 4 is a sectional view showing details of the upper portion of Figure 1;

Figure 5 is an enlarged sectional view, taken substantially along 5-5 of Figure 4; and

Figure 6 is an enlarged sectional view taken substantially along line 6-6 of Figure 4, showing in detail the member that releasably retains the filter in a fixed position with respect to the hinged top of the machine.

As shown in Figure 1, the machine comprises an outer casing 1 having a top with a hinged lid 2 which is raised in order to insert clothes and to remove them from the machine. Within casing 1 is a fixed well 3 having a top 4 which slopes toward a central opening for the insertion and removal of clothes into and out of a perforated tub 5 which is driven with either an oscillatory or continuous rotary movement about a vertical axis by a motor 6.

A conduit 7 drains the well 3 and connects with the inlet of a pump 8 through which the water can flow, even with the pump stationary, to a conduit 9 from which it enters either a discharge pipe 12 or an inlet conduit 13, depending upon the position of a rocker 14 which presses against either of two spaced portions of a flexible diaphragm valve 15 to determine the path of the water leaving the conduit 9. Fresh water for filling the machine is admitted through a mixer 16, conduit 17 and injector 18 to the inlet conduit 13. During the period that fresh water is being admitted it aspirates and recirculates water entering the injector from conduit 9 before the pump 8 is actuated, all as described and claimed in our aforesaid copending application. Also, as described in said application, when the fresh water supply from the mixer 16 is cut off, the water drained from the well 3 is recirculated by the pump 8. The water, fresh or recirculated,

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leaves the top of the inlet conduit 13 and enters a flaring horizontal conduit 19 of large cross sectional area where its velocity is reduced before it enters the filter and returns to the tub 5.

The flaring conduit 19 terminates in a short rectangular spout 22 having parallel vertical side walls each of which is provided with a vertical perforated lug 21 to receive the intumed ends 23 and 24 of a metal U-shaped frame 25, the frame being thereby hinged for pivotal movement about a horizontal axis at the discharge end of the conduit 19. It will be noted that the pivotal axis of the frame 25 is close to but slightly horizontally spaced from the hinge point 26 of the lid 2 so that they can be raised together to the position shown in Figure 2.

A metallic spreader member 27 (Figure 5) has upwardly extending legs 28 and 29 which are bent over the frame 25 adjacent its pivotal axis to fasten the spreader member to the frame. The spreader member 27 is stiff enough to retain the ends 23 and 24 of the frame 25 in the perforated lugs 21. The horizontal portion of the spreader member 27 is below the bottom wall of the rectangular spout 22 and the legs 28 and 29 are spaced from the side walls of the spout as best shown in Figure 5, and for a purpose to be described.

A glove or bag like filter cloth 32 is so dimensioned that the U-shaped frame 25 may be inserted into its open end. The filter bag is pulled over the frame 25 and its open end is stretched and kept in open position over the end of the rectangular spout 22 by the spreader member 27. The material of the filter bag 32 is preferably a loosely woven fibrous cloth with a mesh fine enough to filter dross from the recirculated fluid yet large enough to not appreciably obstruct the flow of the fluid. A mesh having eighteen threads to the lineal inch has been found to be satisfactory.

We have noted a peculiar phenomena in the action of our filtering medium in the removal of extremely fine particles of scum carried in suspension in the water following chemical precipitation during the washing action. As just described, the mesh of our cloth through which the water is filtered is comparatively coarse. While long, stringy particles of lint might be expected to be retained by such a filter, there would presumably be no removal of the very tiny particles of scum and the like. On the contrary, we were surprised to find that scum was removed quite effectively by the widely spaced threads of the filter. In fact, when continued long enough, or when sufficient scum or curd is present, the entire opening between fibers will soon become entirely blocked by a gradual bridging over of the scum accumulation. Under such circumstances the water will no longer flow through that particular opening, but will move on to a new free passageway elsewhere.

We have tried to explain this phenomena without too much success. It seems to be due first of all to an adsorption effect on the scum particle by the nearby fiber of the filter. Thereafter the action seems to be an adsorption action by an already adsorbed particle which attracts and holds the passing particle. This accumulation continues to occur until the filter is filled or the water entirely cleaned.

Furthermore we were surprised to find that later passage of fresh clean water through or over the partly loaded filter, such as will occur during the rinsing cycle following the washing

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cycle, does not dislodge any or at least not a noticeable amount of the scum accumulations in the filter. Further, the cohesion of the scum is such as to cement and hold the trapped lint and other foreign matter and thereby prevents it also from being removed from the filter and re-entering the circulating water stream.

The filter bag and frame are held in a substantially horizontal position as shown in Figures 1 and 4 by a hook 33 (Figure 6) on the inner end of a lever 34 which is pivotally attached to the lid 2 by a grommet-like bearing 35 rotatable in the lower wall 36 of the two spaced walls forming the lid 2. The lever passes through the bearing 35 into the space between the walls of the lid 2, and then passes back through the lower wall 36 through an opening 37, and terminates in a handle 38 which is accessible so that it can be operated without lifting the lid 2, as shown in Figure 4.

A tension spring 39 having one end fastened to the lever 34 adjacent the handle 38 and its other end fastened to the wall 36 biases the lever 34 so that the hook 33 continually engages the filter bag and frame until released by operating the handle 38. Thus when the lid 2 is raised to place clothes in or remove them from the tub 5 the filter is simultaneously raised out of the way. If, however, it is desired to merely observe the operation of the machine the filter may be disengaged from the hook 33 by operating the handle 38, whereupon the filter will be released and its outer end will rest upon the top 4.

In operation, as the dross separated from the recirculated fluid clogs any one portion of the filter bag 32 the fluid can change its course and flow through a different portion thereof since the bag has a large area affording passage to the liquid. In the event of the filter bag becoming so clogged as to prevent the passage of fluid therethrough, the fluid can readily flow back out of the mouth of the bag between it and the outer walls of the spout 22 in the manner indicated by the flow lines 40 of Figure 3.

Our device therefore provides a novel means for removing dross from washing machines of the type described. The filter bag is of low cost and is easily removed for disposal and replacement. There is substantially no impediment to the free flow of recirculated fluid, even when the filter becomes clogged, since it is then bypassed by the fluid.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In a washing machine, a clothes container; a pump, a drain connecting said container and the inlet of said pump; a horizontal spout disposed over said container and connected to the outlet of said pump; an elongated substantially U-shaped frame horizontally disposed over said container and having its free ends attached to said spout; a second substantially U-shaped frame perpendicular to said elongated frame and spaced from the side and bottom walls of

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said spout, the free ends of said frames being fastened together; and a filter bag having its body portion stretched over said elongated frame and its mouth held open by said second frame, the mouth of said bag overlapping the end of said spout.

2. In a washing machine, a clothes container, a spout for discharging fluid into said container, a relatively long narrow filter bag having an open mouth at one end, and means for supporting said filter bag in substantially horizontal position over said clothes container with its open mouth in the path of the fluid discharge from said spout.

3. The combination described in claim 2, wherein said spout is smaller than said mouth and extends therinto leaving a passageway between said spout and said mouth.

4. In a washing machine, a clothes receptacle; a spout above said clothes receptacle for delivering fluid into said receptacle; and a shiftable filter support in said machine mounted for movement between a position in the path of fluid discharge from said spout and a position out of said path.

5. In a washing machine, a clothes receptacle, a spout above said clothes receptacle for delivering fluid into said receptacle, and a filter support pivotally mounted in said machine for movement between a position in the path of fluid discharge from said spout and a position out of said path.

6. In a washing machine, an outer casing having an openable lid movably mounted on the top thereof, a clothes tub within said casing, a spout above said tub for delivering fluid into the tub, and a filter support adapted to hold a filter movably mounted within said casing for movement between a position where the filter thereon is disposed in the path of fluid discharge from said spout and a position where said filter is out of said path, and means for selectively interconnecting said lid and said filter support whereby the filter support may be selectively moved with said lid when the latter is opened.

7. In a washing machine, an outer casing having a hinged lid on the top thereof, a clothes tub within said casing, a spout above said tub for delivering fluid into the top of the tub, and a filter support adapted to hold a filter hingedly connected to said casing for movement between a position where a filter thereon is disposed in the path of fluid discharge from said spout and a position where said filter is out of said path.

8. In a washing machine, an outer casing having a hinged lid on the top thereof, a clothes tub within said casing, a spout above said tub for delivering fluid into the top of the tub, a filter support adapted to hold a filter hingedly connected to said casing for movement between a position in the path of the fluid discharged from said spout and a position out of said path, the pivotal axis of said filter support being substantially parallel and adjacent to the pivotal axis of said lid, and means for selectively connecting said filter support to said lid for movement therewith.

9. In a washing machine, an outer casing having a hinged lid, a clothes tub within said casing, a spout above said tub, a frame adapted to hold a filter element pivotally connected to said spout, and means connecting said frame to said lid for movement therewith when said lid is lifted.

10. In a washing machine, an outer casing having a hinged lid, a clothes tub within said

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casing, a spout above said tub, a frame adapted to hold a filter element pivotally connected to said spout, and means releasably attaching said frame to said lid whereby said frame may be raised with opening movement of said lid, or said lid may be raised independently of said frame. 5

11. In a washing machine, a rotatable receptacle having an open top adapted to receive material to be washed, an inlet conduit having a discharge end extending over the open top of said receptacle for supplying cleaning fluid thereto, means for recirculating overflow fluid from said receptacle through said inlet conduit for discharge into the open top of said receptacle, a casing about said receptacle, a lid pivotally mounted on said casing, a pivoted filter support for mounting a filter in the path of fluid discharged through said conduit discharge end, and 10

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means releasably connecting said support to said lid for movement therewith.

12. In the washing machine defined in claim 11, said last named means comprising a manually operable latch on said lid adapted to operably connect said support to the lid.

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