Sept. 16, 1969 J. B. REID 3,466,901

LAUNDRY APPARATUS

Filed Sept. 25, 1967

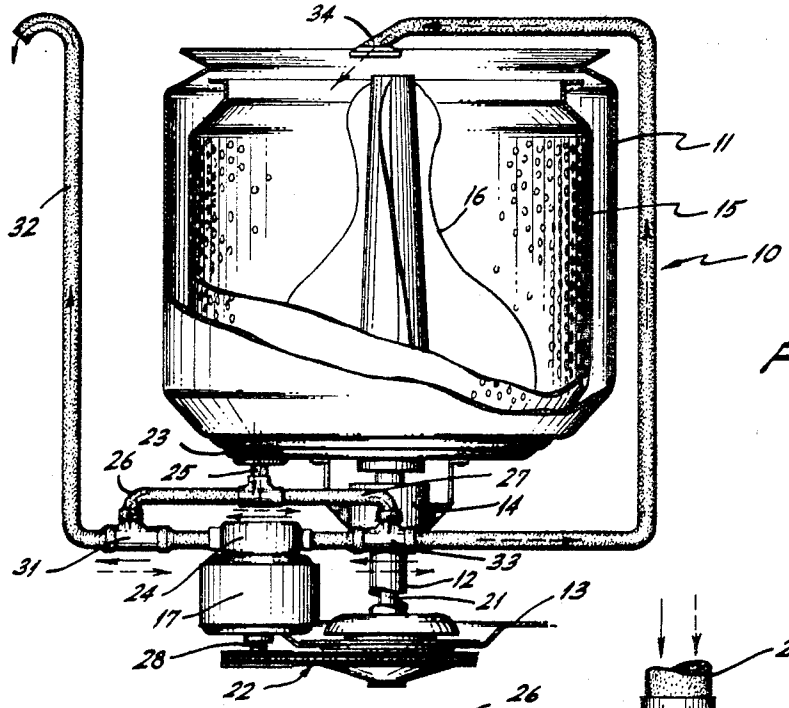



FIG. 1.

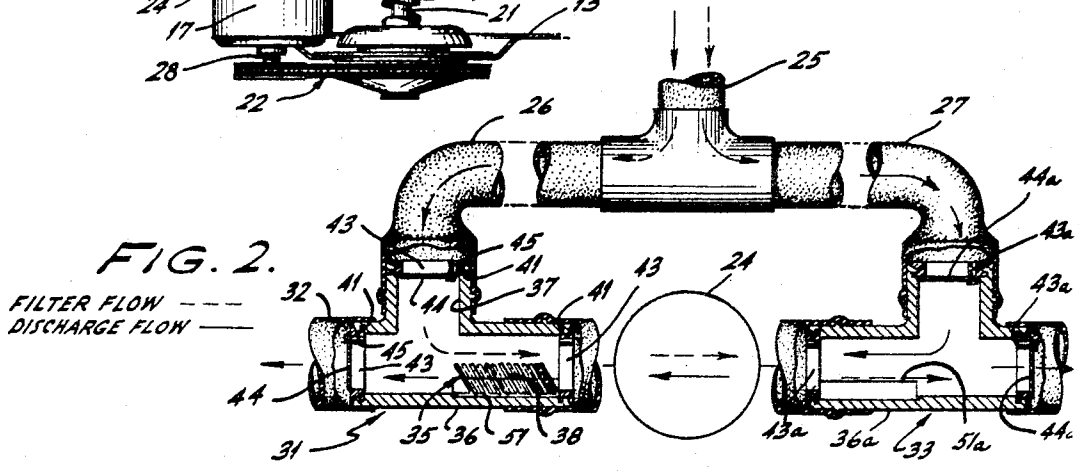



FIG. 2.

FILTER FLOW ---
DISCHARGE FLOW ——

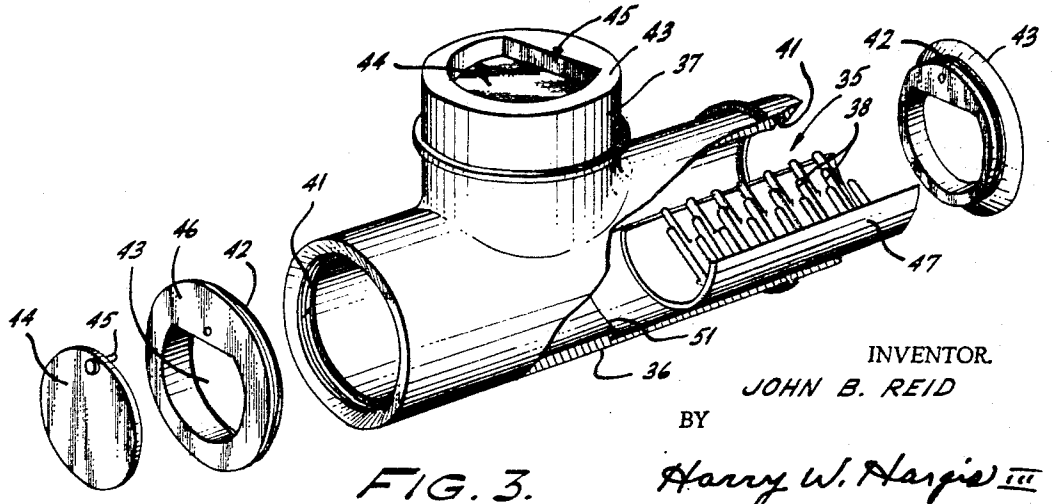



FIG. 3.

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3,466,901

# LAUNDRY APPARATUS

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U.S. Cl. 68—18 7 Claims

## ABSTRACT OF THE DISCLOSURE

A self-cleaning lint filter having a conduit through which wash fluid is caused to flow, first in one direction, then in an opposite direction. A plurality of spaced, parallel fingers extend from the inside wall and toward the center of the conduit. The fingers are inclined and their free end portions are presented generally opposite to the direction of fluid flow in achievement of a filtering action, and in the general direction of flow in the achievement of a self-cleaning action. Fluid-flow actuated valving associated with the conduit affords directional control of fluid flow through the filter.

## BACKGROUND OF THE INVENTION

This invention relates to laundry apparatus, and especially to improvements in filtering apparatus for wash fluid. While of broader applicability, the invention has particular utility in the filtering of lint from wash fluids in household washing machines.

In washing machines of the aforementioned type it is well known that lint is an undesirable, although inevitable, by-product of a washing cycle. Filters of the type requiring cleaning by the user of the machine have been provided for entrapping lint, and attempts have been made to provide self-cleaning filters. The latter, however, have tended to become clogged and to require attention. It is therefore a general objective of this invention to provide an improved lint filter that is self-cleaning and is substantially nonclogging.

## SUMMARY OF THE INVENTION

In achievement of the general objective, as well as other objectives, the invention comprises, in a preferred embodiment, a self-cleaning lint filter including a main, tubular body portion comprising a conduit having disposed therein a plurality of spaced fingers extending from the inside wall and into the bore of the body portion. The fingers are inclined so that their free end portions are presented generally opposite to the direction of fluid flow in achievement of a filtering action. Since the flow is reversed during cleaning of the filter, the fingers extend in the direction of fluid flow under such conditions. Fluid flow actuated valving is embodied in the body portion and affords directional control of fluid flow through the filter to achieve, selectively, a filtering or a self-cleaning action.

The manner in which the foregoing as well as other objectives and advantages of the invention may best be achieved will be more clearly understood upon consideration of the following description, taken in light of the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a diagrammatic elevational showing of a portion of a washing machine embodying the invention, with parts fragmented for the sake of clarity;



FIGURE 2 is an enlarged, partly sectional view of a portion of the apparatus shown in FIGURE 1, and illustrating details of construction of such portion; and

FIGURE 3 is an exploded view, on an enlarged scale, illustrating further specific details of construction.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference first to FIGURE 1, a washing machine **10** embodying the invention is of the household type, and includes a tub **11** supported upon a central column **12** that is mounted in known manner upon a base **13**. A conventional transmission **14** is also supported upon column **12** and its output mechanism provides, selectively, either for rotation of a perforate clothes basket **15** journalled within tub **11**, or for operation of an oscillatable agitator **16** while the basket is held stationary. The above-mentioned selective operation is achieved in response to forward or reverse rotation of an electrically reversible motor **17** which, through a pulley and belt arrangement **22**, drives a shaft **21** journalled within column **12** and connected to the input mechanism of transmission **14**.

Tub **11** is provided with a drain sump **23** connected, by means hereinafter to be more fully described in relation to FIGURES 2 and 3, to a reversible pump **24** of the rotary impeller type conveniently disposed atop the motor **17** for drive by the upper end of motor shaft **28**. In particular accordance with the invention, fluid connection of drain sump **23** to pump **24** is provided by a conduit array including a common conduit **25** connected to the drain sump and branching into a pair of conduits **26** and **27**. As is seen in both FIGURES 1 and 2, branch conduit **26** is connected to a T **31**, one side of which is connected to a discharge conduit **32** and the other side of which is connected to one of the ports of pump **24**. The other branch conduit **27** is connected to another T **33**, one side of which is connected to a recirculation nozzle **34** directed into tube **11** and the other side of which is connected to another of the ports of pump **24**.

With particular reference to FIGURES 2 and 3, the T connectors **31** and **33** are identical, with respect to basic structure, differing only by the presence of the filtering element **35** in T connector **31**. For the sake of convenience, the ensuing detailed description will be directed primarily to connector **31**, and it will be appreciated that like plug elements **43** of T connector **33** are designated by reference numerals differing only from those used in describing connector **31**, by the suffix *a*.

T connector **31** includes a main tubular body portion **36**, and a tubular conduit portion **37** connected at a substantially right angle to portion **36**. The open end of portion **37** and the left and right hand open end sections of portion **36** are provided with internal, undercut annular grooves **41** that receive flanges **42** of apertured plugs **43**, to retain the latter. It will be understood that one or both of connector **31** and plug **43** will be made of a flexible and resilient material to afford interengagement, or snap fit, between a groove **41** and flange **42**. Polypropylene has been found suitable for this purpose. Each of the upper and the left hand plugs is provided with a flexible closure **44**, preferably of neoprene, mounted by a rivet **45** extending through both the closure **44** and a flat portion **46** of plug **43**. The upper closure **44** is positioned to the inner side of the upper plug, whereas the left hand closure is positioned to the outer side of the left hand plug. This arrangement affords check valving of the two fluid flow circuits to be described.

No closure is provided in the plug **43** inserted in the right hand section of body portion **36**. This plug, instead,

serves as a stop to hold the base portion 47 of filter element 35 in an undercut groove 51 extending along the length of body portion 36, and within which groove the base portion is slidably received. As illustrated in FIGURES 2 and 3, the filter media for element 35 comprises a plurality of spaced fingers 38 extending with angularity from base portion 47 retained by groove 51 in the side wall of body portion 36. Conveniently, filter element 35 may also be molded from polypropylene.

Operation of the hereinabove described apparatus will first be considered in light of the washing phase of a laundering cycle, which in this embodiment is characterized by rotation of motor 17 in a forward sense to drive agitator 16 while tub 11 and basket 15 contain wash fluid that immerses a clothes load disposed in the basket. Pump 24 at this time is driven in its forward sense to direct the wash fluid in accordance with the broken-line directional arrows applied to FIGURES 1 and 2, in which direction the fluid is filtered by element 35. Filter flow is through drain sump 23, common conduit 25, branch conduit 26, past upper closure 44, over counterflow directed media 38 of filter element 35, through pump 24, body portion 36*a*, past right hand closure 44*a*, thence through nozzle 34 into tub 11 and basket 15. It will be appreciated that the developed fluid pressures will maintain left hand closure 44 and upper closure 44*a* in their closed positions, while upper closure 44 and right hand closure 44*a* will be held open. As wash fluid is caused to flow from the basket and tub, past inclined fingers 38, thence back into the basket and tub, lint and other similar foreign matter becomes impaled on the inclined fingers. It will be appreciated that the fingers do not extend fully across the bore of body portion 36, so that in the event they become clogged the passage of fluid will not be impaired.

Upon completion of a washing phase, motor 17 is halted and again energized for rotation in its reverse sense to spin basket 15 and to drive pump 24, also in its reverse sense, to drain fluid from the tub and basket. Such reverse rotation of the pump effects discharge flow of spent wash fluid, in accordance with the solid-line directional arrows, sequentially through drain sump 23, common conduit 25, branch conduit 27, past upper closure 44*a*, through body portion 36*a*, pump 24, then through body portion 36 past left hand closure 44, and discharge hose 32 into suitable drain means. Under this condition it will be appreciated that fluid pressures developed by reverse rotation of the pump cause upper closure 44*a* and left hand closure 44 to be opened, and upper closure 44 and right hand closure 44*a* to be closed.

As the wash fluid flows from the tub and basket, past fingers 38, and through discharge 32, any lint or foreign matter impaled on fingers 38 is washed therefrom and out the discharge hose, since the fingers are inclined in the direction of discharge fluid flow. The hereinabove described fluid handling means enhances removal of lint and other foreign matter from the tub and basket because both the discharge flow branch and the filter flow branch originate at the tub drain sump, and it is in the region of the drain sump that such matter has a tendency to accumulate.

It will be appreciated that the present invention affords an improved self-cleaning and non-clogging lint filter for a washing machine. Moreover, the invention contemplates an improved fluid-flow circuit wherein the filter media is subjected to flow of both recirculated wash fluid and discharged wash fluid whereby sequential filtration and filter media cleansing is achieved automatically in response to such flow of fluid.

I claim:

1. In a washing machine having the tub means for containing wash fluid within which fabrics are washed, self-cleaning filter means for removing lint from the wash fluid, comprising: a conduit through which the wash fluid is caused to flow in one direction, and thereafter in the opposite direction, in the course of a washing cycle, said conduit including an inner wall having a groove extending longitudinally and toward an open end of the conduit; a base member retained in said groove and including a plurality of spaced fingers supported thereon and extending into said conduit, said fingers being inclined so that free end portions thereof are presented generally in opposition to the flow of fluid in said one direction, in achievement of a filtering action, and in the direction of fluid flow in achievement of a filter cleaning action; and means for effecting flow of wash fluid in said directions selectively.

2. A washing machine according to claim 1, and characterized further by the inclusion of open plug means retained in the recited open end of said conduit and engaging said base member to retain it in said groove.

3. In a washing machine of the type including tub means for containing wash fluid within which fabrics are washed, and a drain sump for said tub means, self cleaning filter means for removing lint from the wash fluid comprising: a conduit through which wash fluid is caused to flow in one direction, and thereafter in the opposite direction, in the course of a washing cycle; a plurality of spaced fingers extending into said conduit, said fingers being inclined so that free end portions thereof are presented generally in opposition to the flow of fluid, and in said one direction in achievement of a filtering action, and in the direction of fluid flow, in achievement of a filter cleaning action; means providing for flow of wash fluid from said drain sump means through said conduit in said directions, selectively, including reversible rotary impeller pump means and reversible motor means for driving the impeller of said pump means; and wash fluid conduit means interconnecting said pump means, said drain sump means, and said first recited conduit, the construction and arrangement being such that rotation of the motor means in one direction drives said impeller to effect wash fluid flow from said drain sump through said conduit means in achievement of the recited filtering action, and rotation in the other direction drives said impeller to effect wash fluid flow from said drain sump through said conduit means in achievement of the recited filter cleaning action.

4. In a washing machine having tub means for containing wash fluid within which fabrics are washed, drain sump means for said tub means, fluid handling means for removing lint from said wash fluid, and for disposing of said lint automatically, comprising: a filter element through which wash fluid may flow in one direction to entrap and retain lint, and through which wash fluid may flow in the opposite direction to flush retained lint therefrom; wash fluid conduit means including a fluid recirculation circuit for accommodating fluid flow from said drain sump means and back into said tub means through said filter element in the recited one direction, and a fluid discharge circuit for accommodating discharge fluid flow from said drain sump means through said filter element in the recited opposite direction; and reversible pump means operable automatically to provide the recited filter flow when rotated in one direction, and to provide the recited discharge flow when rotated in the other direction.

5. A washing machine according to claim 4, and characterized in that said filter element comprises a tubular member through which wash fluid may flow and including a plurality of spaced fingers extending into the bore of said body portion, said fingers being inclined so that free end portions are presented in opposition to the direction of filter fluid flow and in the direction of discharge fluid flow.

6. A washing machine according to claim 5, and characterized further in that said spaced fingers extend from the inner wall of said tubular body portion.

7. A washing machine according to claim 6, and characterized further in that the recited inner wall of said body portion includes an undercut groove extending longitudinally toward an open end of said body portion, and

in that a base member supports said fingers and is received in said undercut groove.


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WILLIAM I. PRICE, Primary Examiner

U.S. Cl. X.R.

210—136, 167

PO-1050
(5/69)

# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,466,901 Dated September 16,1969

Inventor(s) John B. Reid

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 71, "the" should be deleted.

Column 4, line 25, "fluid, and in" should read

-- fluid in --.

SEALED
JAN 20 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents