June 7, 1960 H. M. SNYDER ET AL 2,939,305

LINT FILTER FOR WASHING MACHINE

Filed Dec. 5, 1956 3 Sheets-Sheet 1

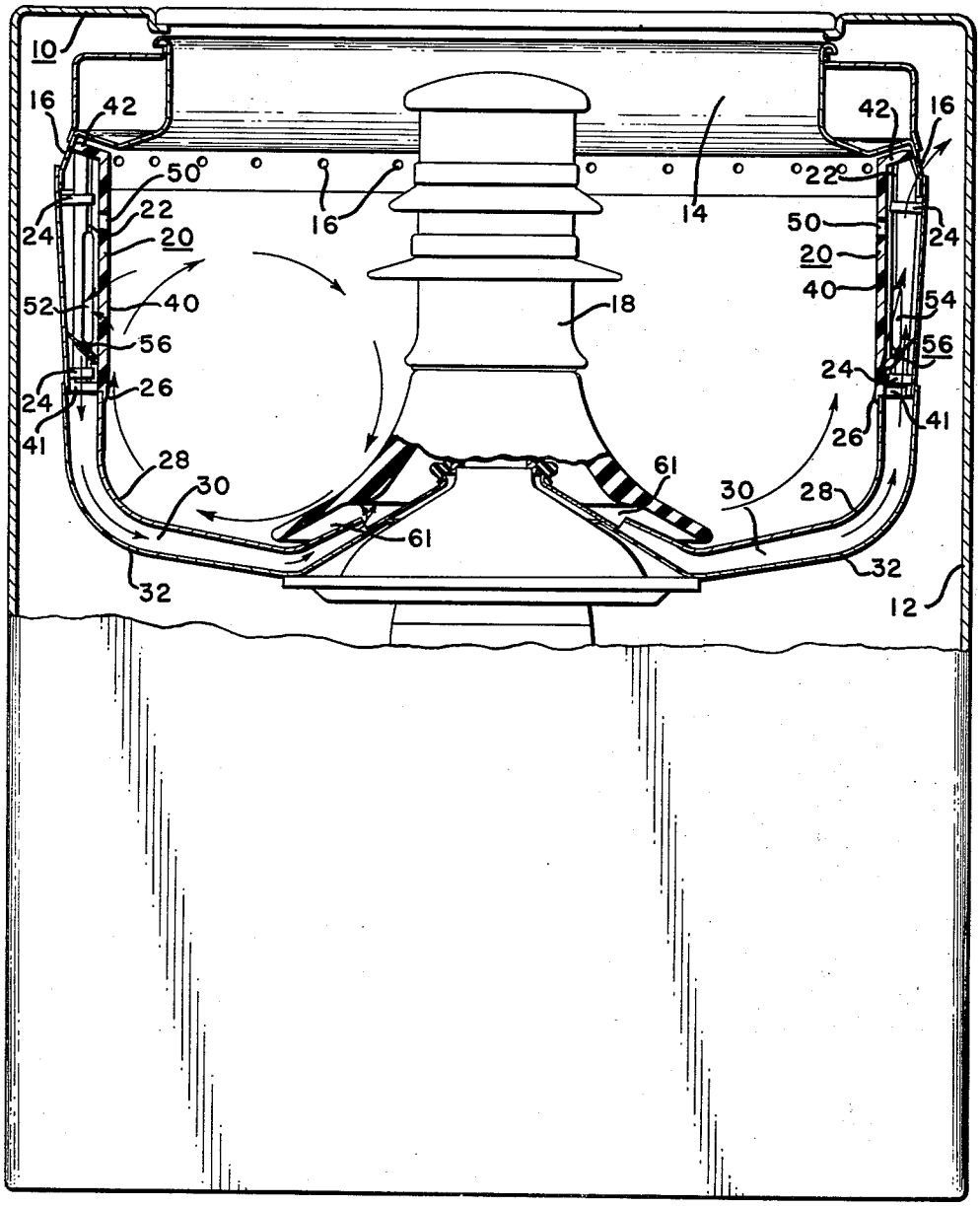


Fig. 1

INVENTORS
Harold M. Snyder
Robert F. Neidhart
BY Edwin S. Dybvig
Their Attorney

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Filed Dec. 5, 1956 3 Sheets-Sheet 2

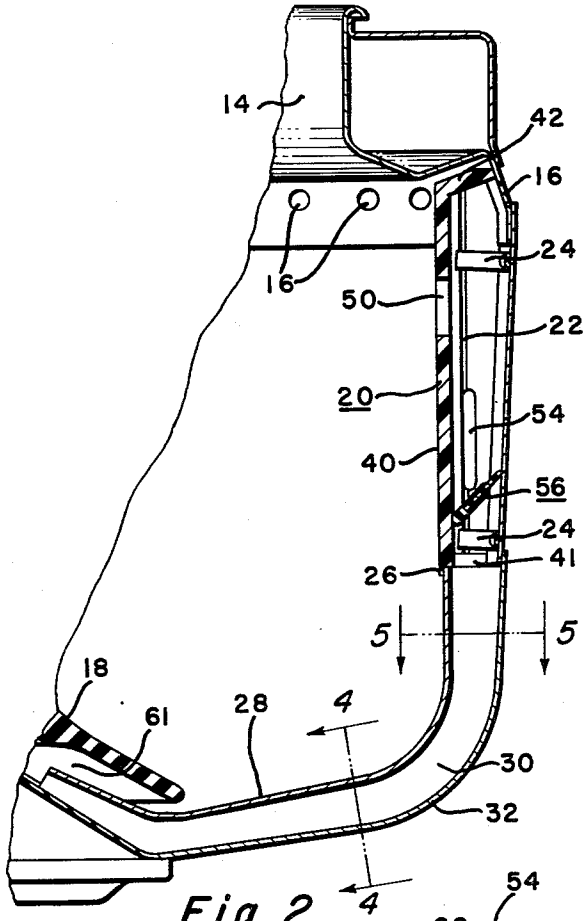


Fig. 2

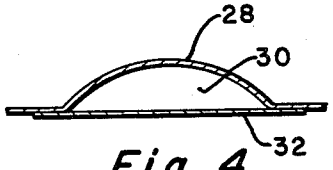


Fig. 4

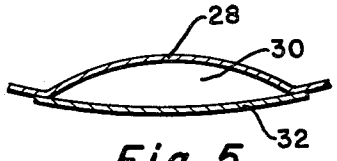


Fig. 5

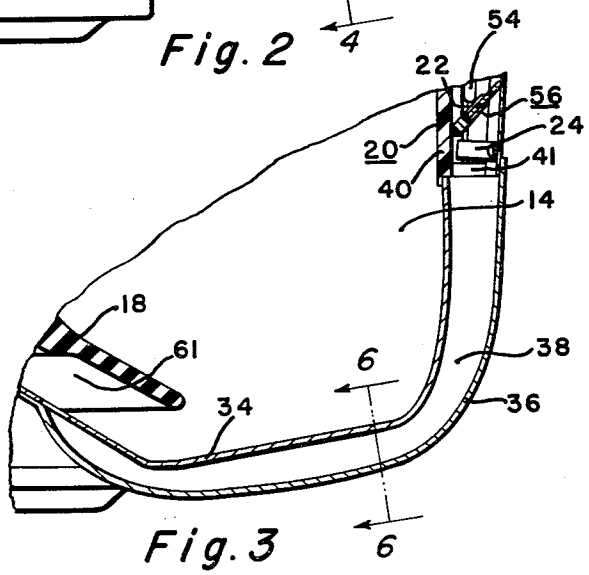


Fig. 3

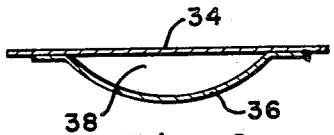


Fig. 6

INVENTORS
Harold M. Snyder
Robert F. Neidhart
BY Edwin S. Dybwig
Their Attorney

June 7, 1960 H. M. SNYDER ET AL 2,939,305

LINT FILTER FOR WASHING MACHINE

Filed Dec. 5, 1956 3 Sheets-Sheet 3

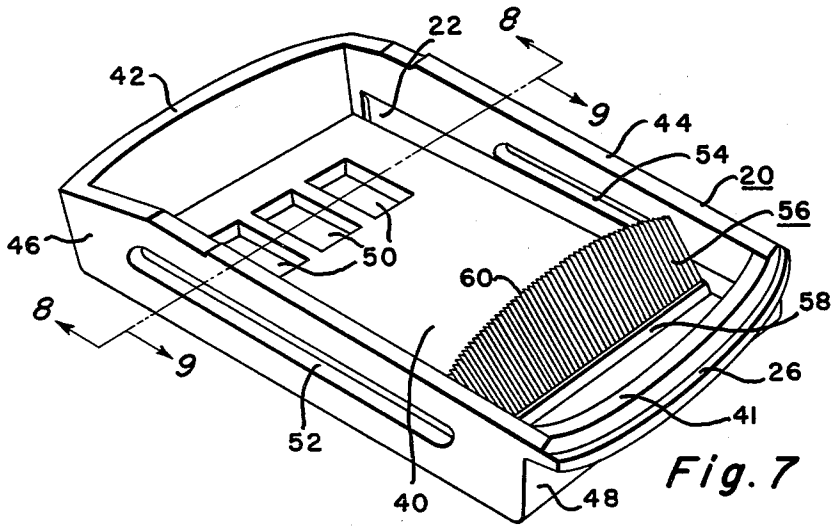


Fig. 7

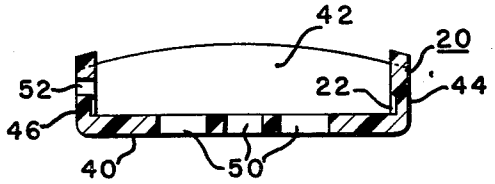


Fig. 8

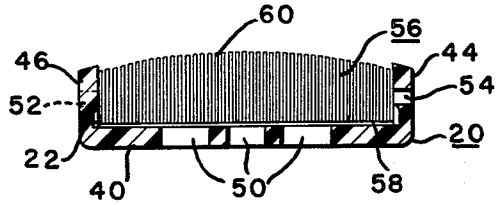


Fig. 9

INVENTORS
Harold M. Snyder
Robert F. Neidhart
BY Edwin S. Dybvig
Their Attorney

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LINT FILTER FOR WASHING MACHINE

Harold M. Snyder and Robert F. Neidhart, Springfield, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Dec. 5, 1956, Ser. No. 626,401

6 Claims. (Cl. 68—18)

This invention relates to a domestic appliance and more particularly to a lint filtering arrangement for a clothes washing machine.

An object of the invention is to provide a washing machine with a lint filtering system wherein the washing liquid used in washing clothes is circulated through a filtering element, and where the lint collected by the filtering element during the washing operation is spun off from the filtering element and disposed of when the tub of the machine is spun at high speed.

Another object is to provide the tub of a washing machine with a lint filter element that is removably secured to a wall of the tub and wherein washing liquid is circulated downwardly through the filter element.

Still another object is to provide a lint filter system wherein washing liquid in the tub of the machine is impelled through a filter member by movement of the agitator of the machine.

A further object is to provide a lint filtering element that is formed of closely spaced tines joined to a common base.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a front view with parts broken away of a washing machine provided with the lint filtering arrangement of this invention;

Figure 2 is an enlarged vertical sectional view showing a fragment of the tub shown in Figure 1;

Figure 3 is a fragmentary enlarged vertical sectional view of a modified tub construction employing the lint filtering arrangement of this invention;

Figure 4 is a sectional view taken along line 4—4 of Figure 2;

Figure 5 is a sectional view taken along line 5—5 of Figure 2;

Figure 6 is a sectional view taken along line 6—6 of Figure 3;

Figure 7 is a perspective view of a lint filter member made in accordance with this invention;

Figure 8 is a sectional view taken along line 8—8 of Figure 7; and

Figure 9 is a sectional view taken along line 9—9 of Figure 7.

Referring now to the drawings and more particularly to Figure 1 a washing machine generally denoted by reference numeral 10 is shown and includes an outer cabinet 12 enclosing a tub 14. The tub 14 is imperforate except for a plurality of closely spaced apertures 16 located circumferentially of the tub 14 and extending entirely around the tub in a well known manner. The apertures 16 provide an outlet passage for water leaving the tub 14 when the tub is spun at high speed. A vertically reciprocable agitator 18 is disposed within the tub 14 and is vertically reciprocated in a conventional

manner by an electric motor not shown. The agitator 18 and tub 14 are connected with the electric motor through suitable gearing not shown. This connection is preferably of the type disclosed in the patent to Clark 2,366,236. As shown in this patent the agitator 18 is vertically reciprocated during the washing cycle of the washing machine, while the tub 14 is rotated at high speed during the spin dry period of the washing machine. The washing machine may also be provided with suitable water control means for controlling the flow of water into the tub and with suitable pump means for pumping water out of the outer cabinet 12 after the water has been spun out of the tub 14 into the cabinet 12. The water control means and the pumping means are not shown and may be as shown and described in the above mentioned Clark patent. It will thus be apparent that the agitator 18 is vertically reciprocated during the washing cycle of the washing machine and that the water is spun out of tub 14 through apertures 16 during the spin dry cycle of the washing machine.

The lint filtering system of this invention contemplates circulating water downwardly through a filter element, the water being impelled or set in motion by vertical reciprocation of agitator 18. To this end a pair of identical lint filter boxes 20 are removably attached to the side walls of tub 14 with the open sides of the filter boxes covering at least one outlet passage 16. The lint filter 20 as more particularly shown in Figure 7 is provided with internal grooves 22 that engage spring clip members 24 secured to the inner wall of tub 14. The spring clip members 24 preferably snap in to the grooves 22 in order to tightly hold the filter boxes 20 against the inner wall of tub 14. The lint filter box 20 has a lower grooved portion 26 that interfits with the top edge of lower inwardly bent portions 28 of the tub 14. The portions 28 of the tub are inwardly bent as more particularly shown in Figure 4 and form fluid conducting passages 30 with sheet metal members 32 that are welded or otherwise secured to the tub 14. The passages 30 as shown in Figure 1 connect the lower open ends of the filter boxes 20 with the area immediately below the lower end of agitator 18. During vertical reciprocation of agitator 18, washing liquid is pulled downwardly through filter boxes 20, through passages 30, and back to the tub as is more particularly set forth hereinafter.

An alternative arrangement for connecting the filter box in fluid flow relationship with the under side of the agitator 18 is shown in Figure 3. In this figure the lower wall of the tub denoted by reference numeral 34 is not bent inwardly. A sheet metal channel member 36 is welded or otherwise secured to the tub 14 and forms a passage 38 connecting the bottom of the filter box 20 with the area immediately below the agitator 18. In this modification shown in Figure 3, the lower wall of the tub is flat as contrasted to the structure of Figure 2 wherein the lower end of the tub is bent inwardly at 28.

The lint filter box 20 of this invention as more particularly shown in Figure 7 has a lower open end 41 and a wall 40 bounded by an upper wall 42, a pair of side walls 44 and 46, and a lower wall 48. The front wall 40 is provided with passages 50 while the side wall 46 is provided with a passage 52 that extends very nearly the entire length of the filter box. The side wall 44 is provided with a passage 54 that is shorter in length than passage 52. A comb-like filter element generally denoted by reference numeral 56 is secured to the wall 40 and extends between walls 44 and 46. The filter element comprises a base portion 58 that supports a plurality of closely spaced tines 60. The tines 60 are located in the same plane and the filter element is tilted upwardly as more particularly shown in Figures 1, 2 and 3. The filter element 56 is preferably made of metal or of a

suitable plastic material that will withstand the temperature of the washing liquid used in washing the clothes. The filter box **20** may also be formed of a suitable metal or plastic material.

In operation vertical reciprocation of agitator **18** circulates the water in a manner indicated by the arrows on the left side of the agitator **18** in Figure 1 when the tub has been filled with washing liquid to a point above the passages **50** on filter box **20** prior to the beginning of the washing or agitating operation. This vertical reciprocation produces a negative pressure beneath the agitator **18** at points **61** which coincide with the open ends of passages **30**. With negative pressure at points **61** washing liquid is pulled downwardly into the filter box **20** through passages **50** and through passages **52** and **54**. The liquid moves downwardly through the filter boxes **20**, through the filter elements **56**, through the lower open ends of the filter boxes, and thence through the passages **30** to the points **61** beneath the agitator where the water finds its way back into the tub adjacent the agitator **18**. This downward circulation of water through the filter element **56** and back to the tub via passages **30** continues as long as the agitator **18** is vertically reciprocated. Any lint contained in the water being circulated is caught by the tines **60** of the filter element **56**, the tines acting as a very efficient filter for lint particles.

The circulation of water during the spin dry period when the tub **14** is rotated at a high speed is depicted by the arrows at the right side of agitator **18** in Figure 1. When the tub **14** is spun at high speed, the lint particles tend to move upwardly away from the filter element **56** and are aided in this movement by washing fluid moving upwardly through passage **30** and by washing fluid moving from within the tub **14** upwardly through the passages **50** and **52**. The water being spun out of the tub thus effectively cleans the lint off from the filter element **56** and carries the lint outwardly through the apertures **16** that communicate with the interiors of lint boxes **20**. The lint and water extracted from the tub fall into the lower end of cabinet **12** and are pumped out of the cabinet by suitable pumping means not shown.

As noted hereinbefore the passage **52** is made longer than the passage **54**. Moreover, the lint filter box **20** is attached to the tub **14** with the passage **52** facing in the direction of rotation of the tub **14** when the tub is spun at high speed during the spin dry cycle of operation. The passage **54** is made shorter in order that washing liquid rushing through passage **52**, as the tub is spun, will not carry the lint outwardly through the passage **54** and back into the tub. Thus the water passing through passage **52** and upwardly through the filter element **56** from the passage **30** always moves upwardly and outwardly so that lint is not carried back into the tub through passages **50** or **54**. The provision of a filter element **56** formed of closely spaced tines **60** is an important factor in the operation of the lint filtering system. The lint particles have a tendency to collect on the top of the tines **60** rather than between the tines and thus the lint is easily washed off of the tines when the tub **14** is rotated at high speed. Moreover the lint particles themselves have a tendency to move of their own accord when the tub is spun at high speed due to the fact that they do not adhere to the tines **60**. In the event all of the lint is not removed from tines **60** during the spin dry operation, the filter boxes **20** may be removed by grasping the same. The lint may then be cleaned therefrom and the box once more attached to the tub by engagement of the ends of spring clips **24** in the grooves **22**.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A washing machine having a single wall tub adapted to contain liquid, said tub having an imperforate bottom, a vertically reciprocable agitator within said tub, means forming a conduit extending between a point on the inner wall of said tub to a point underlying the agitator, said conduit being open at both ends adjacent said points, and a filter box having an upper opening and a lower open end removably attached to the inner wall of said tub with said lower open end communicating with the open end of said conduit at the point on the inner wall of said tub, a lint filtering element in said filter box disposed above the lower open end of the filter box, passage means on said filter box connecting the area immediately above said filter element with said tub, and means for vertically reciprocating said agitator, said vertical reciprocation producing a sequential flow of washing liquid through said upper opening of said filtering box, said filter and said lower open end.

2. A lint filtering system for a washing machine having a cylindrical single wall tub with an imperforate bottom and an agitator in said tub comprising, a filter element housing attached to the inside of said tub and enclosing closely spaced tines, said housing having an upper and a lower opening, means for actuating said agitator for circulating washing liquid within said tub into said upper opening, downwardly through said tines, and out of said lower opening during the agitation cycle of said machine whereby lint is collected on said tines, and means for centrifuging the lint from said tines subsequently to said agitation cycle.

3. A washing machine having a tub adapted to contain liquid, an agitator in said tub, a generally rectangular filter box within said tub having an open side secured to an inner wall of said tub with the open side facing said inner wall, said box having an upper and lower opening facing into said tub, a filtering element between said upper and lower openings extending between laterally spaced walls of said filter box, and means including said agitator for circulating washing liquid sequentially from said tub into said box through said upper opening, downwardly through said filtering element and back to said tub through said lower opening.

4. A washing machine having a tub adapted to contain liquid, a generally rectangular removable filter box within said tub having an open side secured to an inner wall of said tub with the open side facing said wall, said box having an upper and lower opening, a filtering element in said filter box extending between laterally spaced filter box walls and having a first edge abutting a rear filter box wall located opposite from said open side, said filtering element having a second edge tilted upwardly from the horizontal to form a lint collecting pocket with said rear filter box wall, and agitator means for circulating a washing liquid from said tub into said box through said upper opening, downwardly through said filtering element and back to said tub through said lower opening.

5. A washing machine having a single wall tub with an imperforate bottom and an upwardly extending generally cylindrical side wall and adapted to contain liquid, a vertically reciprocable agitator in said tub, a filter housing attached to said tub side wall, said housing having a rear wall facing radially inwardly into said tub and formed with an inlet opening in an upper portion thereof, a housing bottom wall formed with an outlet opening therein, a first housing side wall with a first slot therein, and a second housing side wall with a second slot smaller than said first slot, a conduit within said tub connecting said bottom wall opening to the underside of said agitator, a filter element of spaced tines between said housing side walls angularly attached at one end to said rear wall and at the other end spaced from said tub side wall, said element forming with said rear wall a collecting pocket, and means for vertically reciprocating said agitator to circulate said liquid sequentially through said inlet opening, said filter element, said outlet opening and said conduit to trap foreign matter on said tines and for rotating said tub to circulate said liquid sequentially through said

conduit, said outlet opening and said filter element to remove said foreign matter from said tub.

6. A washing machine having a single wall tub with an imperforate bottom and an upwardly extending side wall and adapted to contain liquid, a vertically reciprocable agitator in said tub, a filter housing attached to said tub side wall, said housing having a rear wall facing radially inwardly into said tub and formed with an inlet opening in an upper portion thereof and a housing bottom wall formed with an outlet opening therein, a conduit connecting said bottom wall opening to the underside of said agitator, a filter element angularly attached at one end to said rear wall and at the other end spaced from said tub side wall, said element forming with said rear wall a collecting pocket, and means for vertically reciprocating said agitator to circulate said liquid sequentially through said inlet openings, said filter element, said outlet opening and said conduit to trap foreign matter on said tines.

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