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(54) **A WASHING MACHINE COMPRISING A FILTER**

(57) The present invention relates to a washing machine (1) comprising a body (2); a tub (3) which is disposed in the body (2); a drum (4) which is disposed in the tub (3) and wherein the washing process is performed; a housing (5) which is arranged on the body (2) and which is in fluid communication with the tub (3); a circulation line (6) which enables the water received from the tub (3) to be delivered to the housing (5); a dispenser (7) which is movably disposed into the housing (4); and a filter box (9) placed into the dispenser (7) so as to move together with the dispenser (7) and having at least one filter (8) through which the water coming from the circulation line (6) and which filters the fibers in the water.

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Description

[0001] The present invention relates to a washing machine comprising a filter for filtering the fibers in the washing water.

[0002] In washing machines, the laundry is loaded into a drum disposed in a washing tub supplied with detergent-water mixture and is washed in the drum which is rotated. During the washing process, fibers separated from the laundry subjected to both mechanical and chemical effects are discharged, together with the water discharged at the end of the washing process, to the waste water line whereto the washing machine is connected. In traditional washing machines, each washing process causes approximately 1 milligrams of fibers to be discharged to the waste water line. It is determined that more than half of microplastic accumulation in the nature is caused by waste waters originating from washing machines. Especially, taking into account the damage caused by synthetic fibers and particles in the nature, it is observed that waste waters originating from washing machines causes a critical environmental pollution. Therefore, the use of filtering members which filter the washing water is becoming widespread. One of the problems caused by the state of the art filtering members is that the filter cannot be accessed easily when clogged. Another problem caused by the state of the art filters is that the fibers are accumulated on the filter surface in the course of time and dry up, thus causing an unpleasant appearance. This appearance result in a perception of dirtiness and a decrease in the perceived quality.

[0003] In the state of the art Korean Patent Application No. KR20070063996, a washing machine is disclosed, comprising a filter which is positioned under the detergent dispenser.

[0004] In the state of the art Chinese Patent Application No. CN201172752, a washing machine is disclosed, comprising a filter which is disposed into the detergent compartment.

[0005] The aim of the present invention is the realization of a washing machine wherein the cleaning of the filter, which retains the fibers breaking off from the laundry during the laundry washing and/or drying process, is facilitated.

[0006] The washing machine realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body; a tub which is disposed in the body; a housing which is in fluid communication with the tub; a circulation line which transfers the water taken from the tub to the housing; a dispenser which is movably placed into the housing; and a filter box which is placed onto the dispenser so as to move together with the dispenser and which comprises at least one filter through which the water coming from the circulation line is passed and which filters the fibers in the water. The filter is a microfilter. The dispenser moves between an open position where the dispenser extends out of the housing and a closed position where the dispenser is almost completely in the housing. The filter box moves together with the dispenser. The washing machine of the present invention further comprises a cleaning member having an arm which is fixed to the housing and a headpiece which is provided on the arm and which scrapes the filter surface while the dispenser is moved with respect to the housing and sweeps the fibers on the filter. In a preferred version of the embodiment, the headpiece is fixed. The headpiece is kept fixed so as to contact the filter surface. When the dispenser is moved with respect to the housing, the filter box moves together with the dispenser. Thus, the headpiece scrapes the filter and accumulates the fibers on the filter at one point. When the dispenser is in the open position, the headpiece bears against the rear side of the filter box. When the dispenser is in the closed position, the headpiece bears against the front side of the filter box. As the dispenser is being shifted from the closed position to the open position, the headpiece sweeps the fibers on the filter and gathers the same at the rear side of the filter. Thus, when the user desires to clean the filter, he/she can easily remove the fibers gather at one point from the filter.

[0007] In an embodiment of the present invention, the arm is detachably fixed onto the housing. When the user desires to remove the dispenser, the arm can be also dislodged from the housing. When the user desires to clean the arm, he/she can dislodge and clean the arm and then fix the same into the housing.

[0008] In another embodiment of the present invention, the arm is fixed to the housing by means of at least two magnetic members. The magnetic members can be two magnets with opposite poles at the facing surfaces, one being placed onto the arm and the other onto the housing. As the opposite poles face each other, the magnets create an attraction force with respect to each other, and thus the arm is kept fixed on the housing. In another preferred version of the present invention, a magnet is provided on the arm and a ferritic stainless steel is used on the housing. By means of the magnetic members, the position of the arm in the housing is centered.

[0009] In another embodiment of the present invention, the washing machine comprises the cleaning member wherein the part of the headpiece touching the filter is partially or completely produced from a flexible material The headpiece scrapes the filter as the dispenser is moved. By producing the headpiece from a flexible material, the economic life of the filter is increased.

[0010] In an embodiment of the present invention, a sweeper which is produced from a flexible material is attached onto the headpiece. The sweeper scrapes the filter as the dispenser is moved, and removes the fibers from the filter surface. The sweeper is preferably produce from rubber material, and is in the form of a rubber band or brush. In a preferred version of the present invention, the sweeper is detachably attached onto the headpiece. Thus, the damaged sweeper can be removed and replaced by the user.

[0011] In an embodiment of the present invention, the filter box comprises an active carbon filter. The active carbon filter absorbs the microbial residues on the fibers and detergent residues on the carbon surface thereof. Thus, formation of bad odor in the filter box is prevented. In a preferred version of the present invention, the active carbon filter comprises a contact surface wide enough not to affect the filtering rate.

[0012] In an embodiment of the present invention, the active carbon filter is detachably attached onto the filter box. Thus, the active carbon filter which is clogged or not efficiently working can be removed and replaced.

[0013] In an embodiment of the present invention, the active carbon filter comprises a handle. By means of the handle, the active carbon filter can be easily detached from/attached to the filter box.

[0014] In an embodiment of the present invention, the washing machine comprises a vibration means. The vibration means is disposed between the dispenser and the filter box. Thus, the water sent into the filter box is enabled to be vibrated such that the fibers homogeneously spread over the filter surface. The vibration means is activated as the water is sent into the dispenser and is operated during the filtering process.

[0015] By means of the present invention, a washing machine is realized, having the cleaning member which enables the fibers accumulated on the filter of the filter box to be gathered at a certain point in the box. Thus, the user can easily clean the filter.

[0016] The washing machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the schematic view of the washing machine related to an embodiment of the present invention.

Figure 2 - is the schematic view of the housing, the dispenser and the filtering box related to an embodiment of the present invention.

Figure 3 - is the schematic view of the filter box related to another embodiment of the present invention.

Figure 4 - is the schematic view of the filter box comprising the active carbon filter related to another embodiment of the present invention.

Figure 5 - is the schematic view of the filter box comprising the vibration means related to another embodiment of the present invention.

[0017] The elements illustrated in the figures are numbered as follows:

1. Washing machine
2. Body
3. Tub
4. Drum
5. Housing
6. Circulation line
7. Dispenser
8. Filter
9. Filter box
10. Arm
11. Headpiece
12. Cleaning member
13. Magnetic member
14. Sweeper
15. Handle
16. Active carbon filter
17. Vibration motor

[0018] The washing machine (1) comprises a body (2); a tub (3) which is disposed in the body (2); a drum (4) which is disposed in the tub (3) and wherein the washing process is performed; a housing (5) which is arranged on the body (2) and which is in fluid communication with the tub (3); a circulation line (6) which enables the water received from the tub (3) to be delivered to the housing (5); a dispenser (7) which is movably disposed into the housing (4); and a filter box (9) placed into the dispenser (7) so as to move together with the dispenser (7) and having at least one filter (8) through which the water coming from the circulation line (6) and which filters the fibers in the water. In a preferred version of the embodiment, the filter (8) is a microfilter. Fibers may contain microplastics. By means of a filter (8) which is a microfilter, the microplastics in the fibers can be filtered. The fibers breaking off from the laundry treated in the washing machine (1) mix into the washing water. The washing water is transferred from the circulation line (6) into the housing (5) and from the housing (5) into the dispenser (7). In the dispenser (7), the washing water is passed through the filter (8) such that the fibers therein are filtered.

[0019] The washing machine (1) of the present invention further comprises a cleaning member (12) having an arm (10) which is fixed to the housing (5) and which extends from the housing (5) into the dispenser (7), and a headpiece (11) which is provided on the arm (10) and which scrapes the filter (8) while the dispenser (7) is moved with respect to the housing (/) and sweeps the fibers on the filter (8). The arm (10) extends from the housing (5) into the dispenser (7). The headpiece (11) is disposed on the arm (10). By moving the dispenser (7) with respect to the housing (5), the filter box (9) moves together with the dispenser (7). As the filter box (9) moves, the headpiece (11) rubs against the filter (8) and moves the fibers away from the filter (8). Thus, the fibers moved away from the filter (8) are gathered at one point. Consequently, the user can easily clean the filter box (9). In another preferred embodiment of the present invention, the arm (10) passes through an opening arranged on the filter box (9) and extends into the filter box (9). The headpiece (11) provided on the arm (10) is positioned in the filter box (9) and contacts the inner surface of the filter (8). During the movement of the filter box (9) together with the dispenser (7), the headpiece (10) rubs against the filter (8) and gathers the fibers on the filter

(8) at one point.

[0020] In an embodiment of the present invention, the washing machine (1) comprises the arm (10) which is detachably attached into the housing (5). Thus, the user can remove the arm (10) from the housing (5) if he/she does not desire to the same, preventing the same from occupying unnecessary space.

[0021] In an embodiment of the present invention, the washing machine (1) comprises at least two magnetic members (13) one positioned on the housing (5) and the other on the arm (10), which apply force onto each other so as to attract each other such that the arm (10) is fixed onto the housing (5). The magnetic members (13) can be a pair of magnets or a pair of magnet and ferritic stainless steel the opposite poles of which are arranged so as to attract each other. By means of the magnetic members (13), the arm (10) is fixed onto the housing (5). Moreover, if a force greater than the attraction force between the magnetic members (13) is applied in the opposite direction, the arm (10) can be removed from the housing (5).

[0022] In another embodiment of the present invention, the washing machine (1) comprises a headpiece (11) of which the part contacting the filter (8) is produced from flexible material. The part of the headpiece (11) contacting the filter (8) is produced from flexible material. Thus, the filter (8) is prevented from getting worn down or deformed in the course of time. In a preferred version of the present invention, the headpiece (11) is a band produced from rubber material. In another preferred version of the present invention, the headpiece (11) is a brush having flexible bristles.

[0023] In another embodiment of the present invention, the washing machine (1) comprises a sweeper (14) which is attached onto the headpiece (11) so as to contact the filter (8). The sweeper (14) is produced from flexible material. Thus, the filter (8) is prevented from being damaged while being swept.

[0024] In another embodiment of the present invention, the washing machine (1) comprises the filter box (9) comprising an active carbon filter (15). The active carbon filter (15) is disposed into or at the lower part of the filter box (9). By disposing the active carbon filter (15) into the filter box (9), the water cleansed of fibers is filtered. Thus, by means of the adsorption of the microorganisms to the carbon surface of the active carbon filter (15), formation of odors during the rest period is eliminated, facilitating the cleaning of the filter box (9) by the user.

[0025] In another embodiment of the present invention, the washing machine (1) comprises the active carbon filter (15) which is detachably attached to the filter box (9). When required to be replaced, the active carbon filter (15) can be removed from the filter box (9). Moreover, the user can remove the active carbon filter (15) from the filter box (9) and regenerate the same, then attach the same back into the filter box (9) when desired to be used.

[0026] In another embodiment of the present invention, the washing machine (1) comprises the active carbon filter (15) which has a handle (16). By means of the handle (16), the user can easily grip and move the active carbon filter (15).

[0027] In another embodiment of the present invention, the washing machine (1) comprises a vibration means (17) which is disposed between the dispenser (7) and the filter box (9) and which vibrates the water to be sent into the filter box (9). The vibration means (17) vibrates the water sent into the filter box (9) and prevents the fibers and detergent residues from sticking onto the filter and clumping. Moreover, the vibration means (17) provides that foam formation in the filter box (9) is reduced or the formed foam is absorbed. Thus, the headpiece (11) can easily sweep the fibers on the filter (8). The vibration means (17) can be a vibration motor or ultrasonic transducer.

[0028] By means of the present invention, a washing machine (1) is realized, wherein the fibers on the filter (8) are swept by means of the cleaning member (12) having the arm (10) fixed to the housing (5) and the headpiece (11) on the arm (10) as the dispenser (7) is moved with respect to the housing (5) and gathered at a point in the filter box (9), thus facilitating the cleaning of the filter box (9) by the user.

Claims

1. A washing machine (1) comprising a body (2); a tub (3) which is disposed in the body (2); a drum (4) which is disposed in the tub (3) and wherein the washing process is performed; a housing (5) which is arranged on the body (2) and which is in fluid communication with the tub (3); a circulation line (6) which enables the water received from the tub (3) to be delivered to the housing (5); a dispenser (7) which is movably disposed into the housing (4); and a filter box (9) placed into the dispenser (7) so as to move together with the dispenser (7) and having at least one filter (8) through which the water coming from the circulation line (6) and which filters the fibers in the water, **characterized by** a cleaning member (12) having an arm (10) which is fixed to the housing (5) and which extends from the housing (5) into the dispenser (7), and a headpiece (11) which is provided on the arm (10) and which scrapes the filter (8) while the dispenser (7) is moved with respect to the housing (5) and sweeps the fibers on the filter (8).

2. A washing machine (1) as in Claim 1, **characterized by** the arm (10) which is detachably fixed onto the housing (5).

3. A washing machine (1) as in Claim 1 or 2, **characterized by** at least two magnetic members (13) one positioned on the housing (5) and the other on the arm (10), which enables the arm (10) to be fixed onto the housing (5).

4. A washing machine (1) as in any one of the above claims, **characterized by** a headpiece (11) of which the part contacting the filter (8) is produced from flexible material.

5. A washing machine (1) as in any one of the Claims 1 to 3, **characterized by** a sweeper (14) which is attached onto the headpiece (11) so as to contact the filter (8).

6. A washing machine (1) as in any of the previous claims, **characterized by** the filter box (9) which comprises an active carbon filter (15).

7. A washing machine (1) as in Claim 4, **characterized by** the active carbon filter (15) which is detachably attached to the filter box (9).

8. A washing machine (1) as in Claim 6 or 7, **characterized by** the active carbon filter (15) which comprises a handle (16).

9. A washing machine (1) as in any one of the above claims, **characterized by** a vibration means (17) which is disposed between the dispenser (7) and the filter box (9) and which vibrates the water to be sent into the filter box (9).

Figure 1

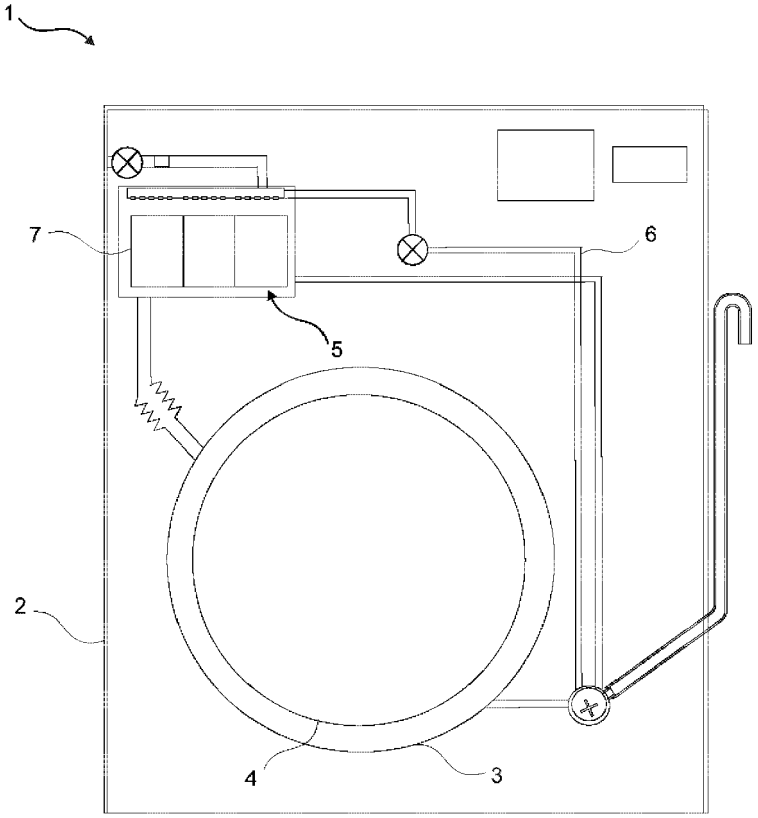


Figure 2

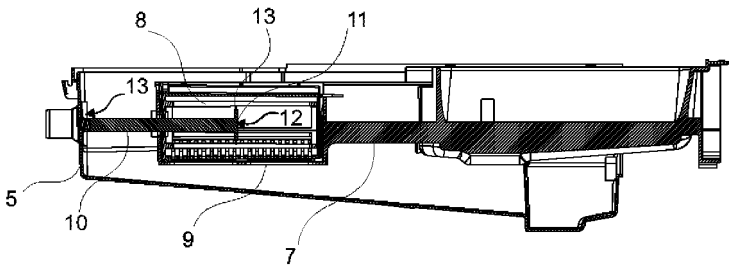


Figure 3

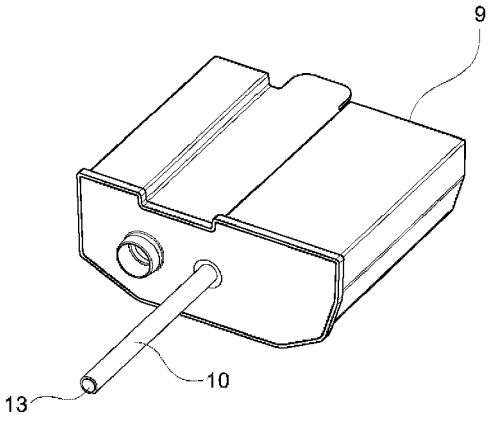


Figure 4

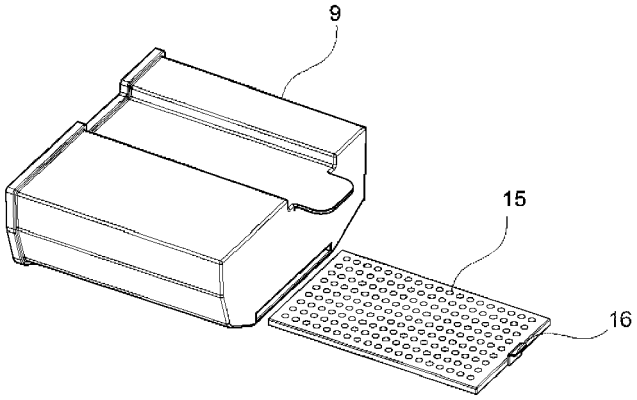
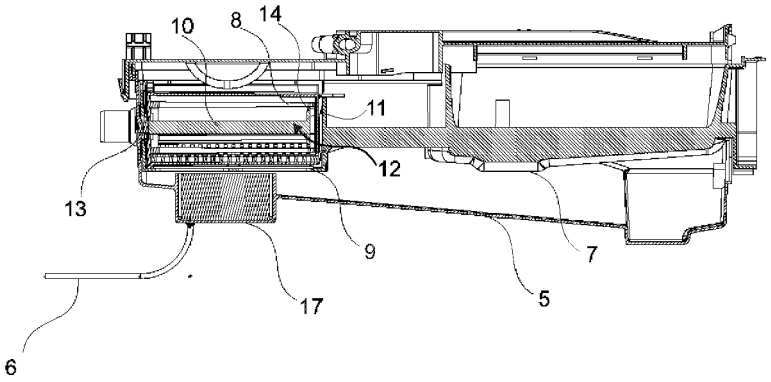


Figure 5



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EUROPEAN SEARCH REPORT

Application Number
EP 20 21 0293

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* figures 3,4 *	2-9	D06F39/08
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A	* claims 1-2; figures *	2-9	
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TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 May 2021	Stroppa, Giovanni

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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05-05-2021

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- CN 201172752 **[0004]**