Aug. 24, 1954 W. L. SHELTON 2,687,216

STRAINER FOR RECEPTACLE DRAINS

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Fig. 1.

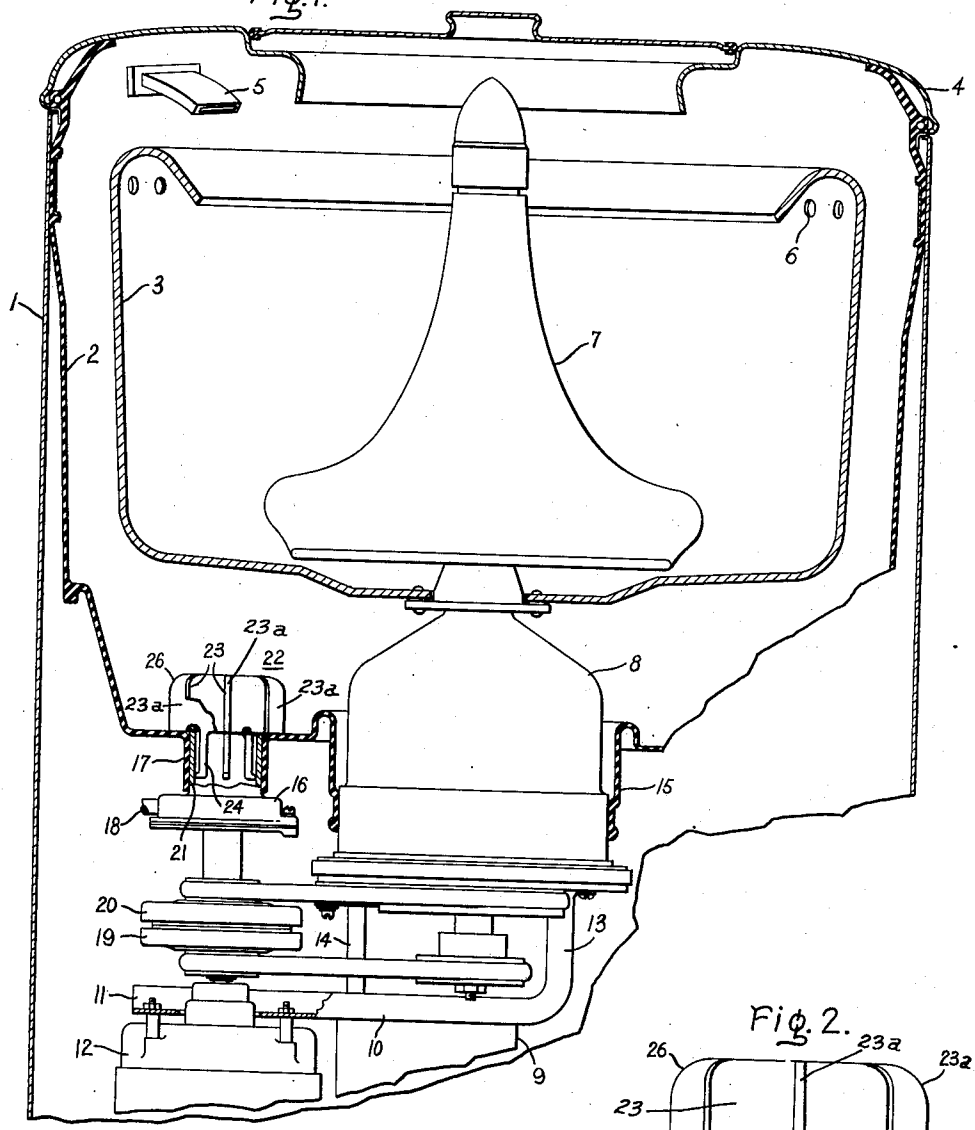


Fig. 2.

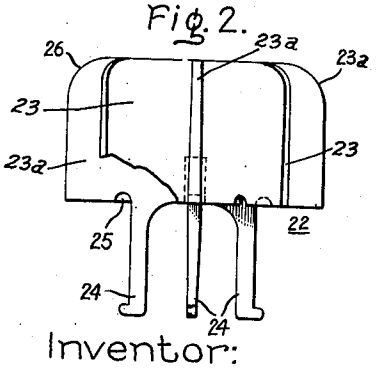
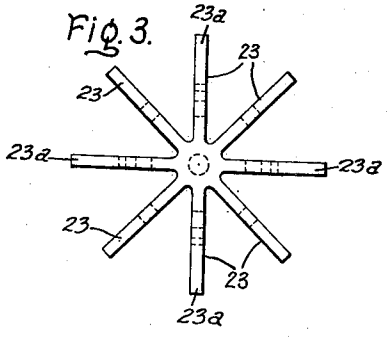


Fig. 3.



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STRAINER FOR RECEPTACLE DRAINS

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2 Claims. (Cl. 210—94)

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The present invention relates to protective devices for receptacle drain conduits, and more particularly to an improved strainer and vortex inhibitor for use in the drain outlet of a clothes-washer tub.

In a common type of domestic clothes washer, the articles to be laundered are placed within a clothes basket rotatably mounted within an enclosing tub. At the completion of each wash or rinse operation, the washing liquid is removed from the basket by centrifugal extraction, either through a suitable row of openings near the top of the basket, or over the basket rim. The lint which has accumulated in the washing of the clothes and occasionally certain small items of clothing, such as children's socks or articles of baby clothing which may be carried or thrown over the basket rim, are collected in the tub during the centrifugal extraction operation. Because of the presence of both lint and, at least occasionally, items of clothing, the problem of draining the receptacle has always been a difficult one. Since a rather large quantity of lint is gathered with each wash, it is desirable that the drain system automatically dispose of it with the outgoing water, but it is obviously objectionable to have a drain system which will dispose of clothing inadvertently thrown into the outer tub. Moreover, since most drain systems are equipped with a fluid pump in order to more rapidly exhaust the water collected in the tub, a drain permitting the passage of items of clothing will frequently result in the pump being rendered inoperative by clogging or jamming of the rotating parts. This not only results in damage to the clothing, but in addition requires a service call before the machine can again be operated. Consequently, there has been a need for a drain system which will permit the free passage of lint, which will prevent the passage of clothing items, and which will remain open to drain the water under any circumstances likely to arise.

Accordingly, it is an object of my invention to provide a protective device for a receptacle drain which will selectively pass foreign matter of a predetermined physical characteristic while restraining other foreign materials.

It is another object of my invention to provide a drain conduit strainer which is inherently self-cleaning and which is readily removable and replaceable for the recovery of articles restrained from entering the drain.

In carrying out my invention in a presently preferred form, I provide a strainer device comprising a plurality of radially extending flat fin members of such number and spacing that preferably each fin member forms an acute angle with each of its adjacent fin members. Depending from the radially extending fins are attachment means which may be in the form of leg members insertable into a drain conduit opening to connect the strainer in operating position. The attaching means are formed inwardly of the circle defined by the outer edges of the fin, since each strainer is made to fit a conduit of a diameter smaller than that of the protective circle afforded by the fin arrangement. The fins are connected together at their inner edges in such a manner that the space between adjacent fins near the apices thereof communicates with the drain conduit to provide a plurality of separate small drain passages, thereby limiting the articles which can be passed into the drain in accordance with their physical size, shape and other characteristics. The fin members, moreover, are provided with smooth exterior surfaces and preferably have rounded upper edges so that foreign matter in the liquid solution which is to be permitted to enter the drain system will be readily swept off the strainer surfaces by the flow of water.

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In the application to which my strainer device is peculiarly well suited, I place it in the upper opening of the drain conduit in a clothes washer outer tub, with the radially extending fin members reaching beyond the drain opening and preferably resting on the bottom of the tub to prevent lint from accumulating under their bottom edges. The depending securement members frictionally engage the drain conduit releasably to hold the strainer in place and resist the tendency of the turbulent wash water to dislodge the strainer as the fins divide its flow into separate channels. Commonly the drain conduit may serve as the intake to the drain pump and thus the strainer device may serve the combined purposes of preventing loss of clothing items, permitting passage of lint, protecting the pump against jamming of its impeller or gears, and inhibiting the vortex action of the turbulent wash liquid as it enters the drain.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, however, both as to its construction and application, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in which Fig. 1

is a sectional elevation of a typical clothes washing machine to which my invention has been applied; Fig. 2 is an elevation, with one of the fins broken away to show underlying structure, of my preferred form of strainer device; and Fig. 3 is a top plan view of the strainer shown in Fig. 2.

Referring now to Fig. 1 of the drawing, I have shown my invention used in conjunction with a currently popular domestic clothes washer comprising an outer casing 1, a tub 2 suitably secured within the casing, and a clothes receiving basket 3 rotatably mounted within the tub. As illustrated, the tub is molded from rubber or the like and is flexible; it should be understood, however, that it may be made rigid by the use of sheet metal, the particular tub construction not constituting any part of my invention. A cover 4 with a removable lid completes the outer casing structure.

Suitable filling means, not shown, are customarily provided for automatically supplying washing liquid through a nozzle 5 to the clothes basket. Several times during the conventional cycle, the washing liquid is removed from the basket by centrifugal extraction, during which operation it flows through a row of openings 6 in the basket wall, or over the upper basket edge, into the outer tub 2. A bladed agitator 7 is provided within the basket for vigorously agitating the clothes and washing liquid in the conventional manner. The agitator and clothes basket are supported by shafts, not shown, extending upwardly from a drive mechanism casing 8 in which the transmission is housed. This drive mechanism casing and its associated motor, belts and sheaves may be constructed as shown and described in the pending application of Jacob W. McNairy, Serial No. 164,427, filed May 26, 1950, now a Patent Number 2,639,794, May 26, 1953, for Drive Clutch for Washing Machines or the Like, and its mounting arrangement may be similar to that disclosed in the pending application of Clifford L. Reitz et al., Serial No. 164,382, filed May 26, 1950, for Supporting Frame for Clothes Washer Mechanism, both of which applications are assigned to the General Electric Company, assignee of the present invention.

Briefly stated, this drive means and its mounting arrangement comprise a resilient mounting pedestal 9 on which is fixed an angular support member 10, having an overhanging end portion 11 on which a reversible drive motor 12 is supported. The member 10 may support the gear casing 8 by a connection between its upwardly extending extremity 13 and a base plate of the casing and by employing studs or equivalent spacer means 14. The gear casing 8 extends into the tub 2 by passage through a neck portion 15 thereof. As will be obvious, this neck portion is suitably fastened to the cylindrical wall of the casing 8 by conventional clamping means, not shown, which insure against leakage from the tub. The motor 12 is drivingly associated with a pump 16 having an inlet tightly fitted within a depending drain neck portion 17 of the tub 2. This pump may be unidirectional and upon rotation in a predetermined direction will automatically discharge the contents of the tub 2 through a conduit 18 connected to any suitable disposal means, not shown. Obviously, the pump could be made to operate by conventional timed switch means whenever emptying of the tub 2 is desired, and the showing of a unidirectional continuously driven pump for operation only when the driving is in a predetermined direction, is for purposes of illustration only. In fact, my invention can be applied to a tub having a gravity drain system, although it is particularly useful with a drain pump arrangement because of the special protection required by the pump.

As explained in the aforementioned McNairy application, the motor 12, in addition to driving the pump 16, supplies torque to the mechanism, not shown, within the casing 8, by means of a pair of unidirectional clutches 19 and 20 and a suitable arrangement of belts and sheaves.

The details of the clothes washer structure described above are not a part of my invention, as previously pointed out, and it should be understood that my improved strainer and protective device can be advantageously employed in any receptacle drain. It is illustrated in the drain of a clothes washer tub because of its peculiar suitability when both lint and small clothing articles are present in the liquid to be drained.

Because the tub 2 is illustrated as a flexible container, I have shown a rigid conduit 21 extending upwardly from the intake opening of the pump 16, through the tub neck portion 17, and into the space above the tub bottom. Were a rigid tub used, either the depending neck portion or the upwardly extending conduit could be eliminated. It should be understood, moreover, that my strainer can be suitably attached in the drain opening without the drain conduit being extended above the tub bottom, but it has been found that this extension aids in the making of a secure connection.

Removably inserted in the drain conduit 21 is a strainer 22 comprising a plurality of radially extending fins 23 and 23*a* and a plurality of leg members 24 depending from certain fins, as best seen in Figs. 2 and 3. The strainer 22 may be of any suitable material; satisfactory ones have been molded of several common thermo-plastic materials. As shown in Fig. 1, the leg members 24 frictionally grip the inner surface of the drain conduit 21 to releasably secure the strainer in place. In the illustrated embodiment, I have shown eight radial fins, with alternate fins 23*a* including integrally therewith leg members 24, while the intermediate fins 23 do not include such legs. Fig. 2, having a portion of an intermediate fin broken away, clearly illustrates a fin 23*a* with an integral depending leg 24. As a further aid in attaching the strainer to make it secure in spite of the rather vigorous action of the water being drained, I have recessed the fins at the base of each leg to form an indentation 25 into which the upper extension of the sleeve 21 fits. It will be understood, of course, that these indentations are unnecessary for successful utilization of my invention in most instances; further, it is generally not necessary that more than three leg members be provided for suitable securement. I prefer, however, to use 6 or 8 fins with 3 or 4 legs and to provide the indentations as described, when applying my strainer to a clothes washer drain. Obviously however, one leg may be used with each fin. It should be understood, of course, that my invention is not limited to the particular attachment means shown, as other similar means of securement may be used.

As is clear from the inspection of Fig. 3, the several fins are joined together at the center of the strainer, each adjacent pair of fins making an acute angle. While it is not essential that 8 fins or any other particular odd or even number be used, it is necessary that a sufficient number of

fins be employed to form series of acute angles to provide narrow channels or openings leading from the top of the strainer, where the strainer is open to the tub, down to the drain outlet. Thus the strainer will prevent small items of clothing from entering it and jamming the pump. Moreover, the fins must be extended a considerable distance relative to the diameter of the outlet; as a minimum, the distance from the center of the strainer to the outer ends of the fins **23** must be greater than the radius of the outlet which the device protects. This is to form a large protective circle, defined by the outer extremity of the fins, to keep small items of clothing at such a distance from the drain opening as to leave the openings to the drain conduit substantially unimpaired for the free passage of washing liquid and lint. Furthermore, making each of these fins of sufficient width relative to the drain opening provides large surfaces over which articles of clothing can drape. Thus, the articles which should not be permitted to pass into the drain outlet will usually do no more than fold over and temporarily wrap about one fin, or, at most, become lodged in the space between two adjacent fins. Even the latter occurrence leaves the other passages to the drain opening unimpaired and, since discharge over the clothes basket of more than two or three such items during a wash is unusual, the possibility of clogging the strainer is remote.

It can be readily seen from an inspection of Figs. 2 and 3 that uniformly smooth flat surfaces are presented. Consequently, lint strands, having nothing about which to wrap, will not accumulate on the strainer as in the case of wire or perforated metal strainers. Also because of the smooth surface presented, the water entering the drain outlet will sweep lint particles into the drain where they are readily passed by the pump and discharged into a suitable disposal conduit. To further facilitate this action and to eliminate the possibility of lint catching on and hanging over the upper edges of the strainer fins, I have provided these members with rounded upper edges **26**, as best seen in Fig. 2. This makes the accumulation of lint very unlikely, as lint will be readily washed off the rounded edges into the space between fins and into the drain by the normal flow of washing liquid. Small clothing articles likewise will be washed off the top of the device to the bottom of the tub **2** and either wrapped around the outer circle defined by the outer edges of the fins or draped over a single fin or pair of fins.

As explained previously, the size of the strainer must necessarily depend, to some extent, on the size of the drain to be protected, since it is essential that the radius of the circle outlined by the edges of the fins must exceed the radius of the drain opening. Otherwise, the protective outer circle will be too small to effectively prevent clogging of the strainer by clothing articles if the drain is small, or if the drain is large the passage between adjacent fins would be too large to prevent clothing items from reaching the pump. In the application shown in Fig. 1, however, the fins form a protective circle that is large relative to the drain opening, and together form narrow passageways leading to the drain since only the narrow portions of the acute angles formed between fins communicate with the drain opening.

Although the height of the fins is not as critical as their width, it is important that, in the particular application illustrated, the fins be sufficiently high that the expected foreign material, such as a child's sock, would not be able to completely cover the strainer. In the illustrated application, for example, the fins are made 1¼ inches high, which size has been very satisfactory in use.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made; and I, therefore contemplate, by the appended claims, to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A strainer for the drain conduit of a clothes washer tub in which said conduit forms the intake passageway for a liquid pump, comprising an assembly formed of a plurality of flat imperforate fins extending radially outwardly from a central axis and connected together at their inward edges to form a hub extending outwardly and coaxially from said conduit, the radial width of each of said fins being greater than the radius of the opening of said drain conduit, said fins forming a plurality of acute angles to provide passages between the fins parallel to said axis, said passages opening laterally from one end of the fin assembly, the ends of said passages at the hub end of said assembly being adapted to discharge into said drain conduit opening, said assembly being proportioned to said conduit opening so that said hub ends of said passages are of insufficient size to permit the passage of articles capable of rendering said pump inoperative, and means for securing said strainer to said drain conduit with said last-named ends in registry therewith.

2. A strainer for the drain conduit of a clothes washer tub, which conduit forms the intake passageway for a liquid pump, comprising a central hub portion extending from the strainer outer end to the conduit inlet with a diameter less than the conduit diameter and coaxial with the entrance to the conduit, a plurality of imperforate plates forming fins integral with and extending radially from said hub a distance exceeding the conduit radius, adjacent ones of said fins forming an acute angle, thereby defining a plurality of converging passages into said hub and conduit, and a plurality of legs integral with certain of said fins adapted to extend into said conduit for removably securing the strainer within the conduit.

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