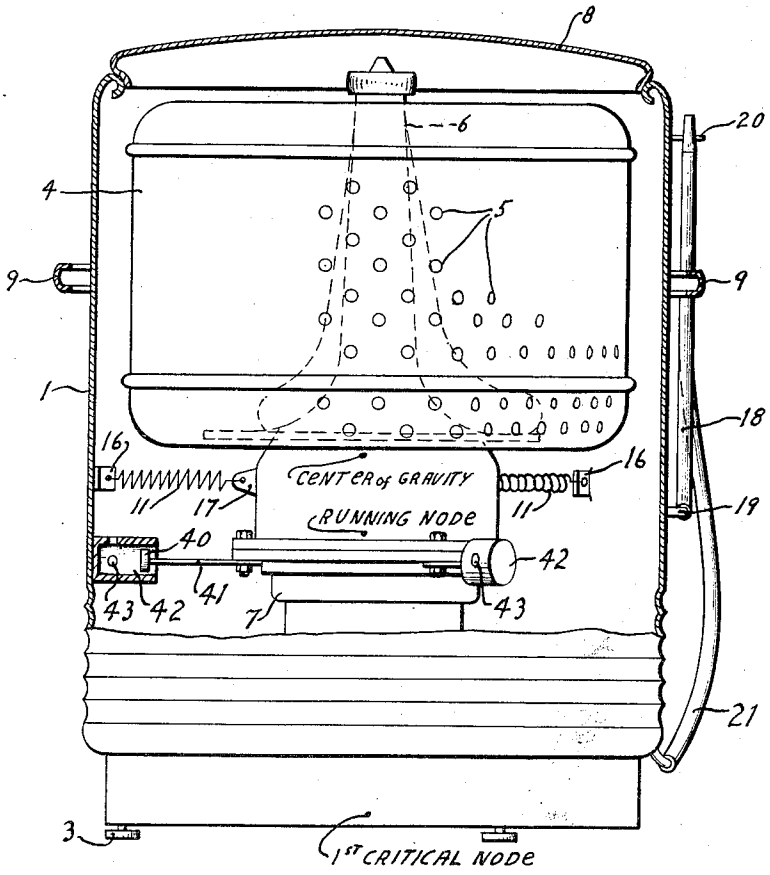
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WASHING MACHINE AND VIBRATION DAMPING MEANS THEREFOR

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WASHING MACHINE AND VIBRATION DAMPING MEANS THEREFOR

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3 Claims. (Cl. 68—23)

The present invention relates to clothes washing machines of the type wherein washing is performed in a basket, the basket afterwards being rotated to centrifugally extract the water from the clothes. The invention is especially well adapted for small portable light-weight machines adapted to be readily lifted manually and placed on a drainboard, for example, when the machine is to be used. However, the invention is not limited thereto necessarily.

This application is a division of my co-pending application Serial No. 787,089, filed November 20, 1947, now Patent No. 2,661,620 for a "Washing Machine and Vibration Damping Means Therefor," and assigned to the General Electric Company, assignee of this application.

More particularly the invention relates to a machine of the above type wherein the basket, the washing means, and the mechanism for actuating the washing means and spinning the basket are built as a unitary structure which is mounted in a tub or casing as a unit.

The object of my invention is to provide an improved construction and arrangement in a machine of this character, and for a consideration of what I believe to be novel and my invention, attention is directed to the following specification and to the claims appended thereto.

In the drawing Fig. 1 is an elevation, partially in section, of a clothes washing machine embodying my invention.

Referring to the drawing, **1** indicates the tub of the washing machine which may be supported on a base **2** provided with feet or casters **3**. In the tube is a unitary structure comprising a basket **4** having perforations **5**, an agitator **6** for performing the washing operation, and a sealed casing **7** in which is an electric motor and mechanism including suitable gearing operated by the motor for oscillating the agitator to perform the washing operation, the basket being then stationary, and for spinning the basket and the agitator to extract the water from the clothes; also in casing **7** is a suitable supply of lubricant and means for circulating it to the parts requiring lubrication. The structure of the mechanism in casing **7** is not illustrated as its specific construction forms no part of the present invention. It may be a structure such as that disclosed and claimed in the application of myself and Carl S. Dayton, Serial No. 787,090, filed of even date herewith, now Patent No. 2,511,681, and assigned to the same assignee as the instant application. The tub is provided with a cover **8** and with handles **9** for use in lifting the machine.

My invention has to do primarily with the arrangement of the unitary structure in the tub and the arrangement for damping vibration caused by nonsymmetrical location of the clothes in the basket **4**.

Referring to the drawing, the unitary structure comprising basket **4**, agitator **6** and mechanism within sealed casing **7** is resiliently supported in the tub by suitable resilient means in the base and three side springs **11**. Side springs **11** are tension springs and are positioned between lugs **16** fixed to casing **1** and lugs **17** fixed to casing **7**. With this arrangement the unitary structure is yieldingly mounted in tub **1**.

In performing a washing operation the clothes to be washed are placed in basket **4** and the tub is filled with washing solution to a point slightly above the top row of openings **5**. With this arrangement the basket **4** and the casing **7** are completely surrounded by washing solution. The agitator is now operated to perform the washing operation. After the washing operation is completed, the level of the washing solution in the tub is lowered to a point somewhat below the bottom of basket **4**, it being lowered sufficiently to leave space between the bottom of basket **4** and such level to hold the washing solution to be extracted from the clothes. For conveniently lowering the water level to the desired point, I provide preferably a hose **18** connected to the tub at **19**, the level desired in the tub at the beginning of the spinning operation. Normally hose **18** may be supported in a vertical position on the tub by means of a clip **20**. After the washing operation is completed hose **18** may be lowered and its end placed in a suitable receptacle permitting the washing solution to flow from the tub down to the level **19**. The hose **18** may be then again fastened vertically by the clip **20**. After the washing solution level has been thus lowered, the basket is spun to extract centrifugally the water from the clothes.

With the foregoing arrangement it will be seen that casing **7** and the mechanism therein is completely surrounded by washing solution during the washing operation and is partially surrounded during the spinning operation. By such arrangement the washing solution serves to extract heat from the mechanism and the lubricant in casing **7**. This serves the double purpose of cooling the mechanism and lubricant and imparting heat to the washing solution.

If additional clothes are not to be washed, then after the spinning operation is completed the washing solution still in the tub may be drained from the tub by means of a hose **21** similar to hose **18** and connected to the tub at its bottom. On the other hand, if additional clothes are to be washed then the washing solution previously drained out through hose **18** may be returned to the tub, or fresh washing solution added to bring the level in the tub up to the desired point.

During the spin cycle, small dissymmetry in the distribution of the clothes in the basket causes vibration of the unitary structure, especially at the critical frequencies, and in this connection I utilize the washing solution in the bottom of the tub to perform two functions, one to add weight to machine and the other as a liquid for a hydraulic vibration dampening system.

As to the first-mentioned function, I provide sufficient capacity in the portion of the tub below the basket that when the washing solution stands at the level **19**, weight is added to the machine sufficient to give good stability during the spin cycle, so as to prevent excessive tub motion. In a small machine, a volume of water may be used having a weight about equal to the weight of the machine. The volume needed is controlled by the machine structure. It should be an amout which represents a good economy between effectiveness and cost of construction.

As to the second-mentioned function, I provide dampening means connected to and carried by casing **7** positioned in the washing solution and cooperating with the washing solution to effect the absorption of vibrations.

In a structure as disclosed and with maximum extraction speeds of the order of one thousand R. P. M., for example, there are encountered two critical speeds due to unbalanced clothes in the basket, a first critical speed which may occur at a speed of the order of one hundred R. P. M., for example, and a second critical speed which may occur at a speed of the order of five hundred R. P. M., for example. At first critical speed the node or imaginary point of pivoting of the unitary structure axis occurs at some distance below the center of gravity of the structure which center of gravity in the present structure is about at the bottom edge of the basket as indicated in Fig. 1. For example such node may be the point indicated in Fig. 1. At second critical speed, the node shifts up to slightly above the center of gravity and then drops to slightly below it indicated "running node" in Fig. 1. Use is made of this shift in positioning the damping means in that it is so located and arranged that its motion will be large with

respect to the water and pushes the water as the basket goes through its first critical speed and slight during the second critical speed and up to running speed.

The specific damping means disclosed and claimed in this application comprises pistons **40** carried at the ends of arms **41** fixed to the casing and fitting loosely in cylinders **42** attached to the tub wall. The cylinders may be provided with openings **43** for inward and outward flow of washing solution effected by movement of the pistons. This forms in substance a series of dampening dash pots. In the present instance three are indicated but this is only by way of example. Any suitable number may be used.

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

1. For use in a clothes washing machine having an outer tub for containing washing solution, a unitary structure comprising a sealed casing, a rotatable shaft journaled therein and extending upwardly therefrom, a receptacle for an unbalanced load carried by said shaft for rotation therewith, motor drive means for said shaft disposed within said casing, means for resiliently supporting said casing within said tub, dampening means including a piston carried by the casing positioned to cooperate with a cylinder carried by said tub and having openings permitting flow of washing solution in the tub for dampening vibration of the unitary structure.

2. For use in a clothes washing machine having an outer tub for containing washing solution, a unitary structure comprising a sealed casing, a rotatable shaft journaled therein and extending upwardly therefrom, a receptacle for an unbalanced load carried by said shaft for rotation therewith, motor drive means for said shaft disposed within said casing, means for resiliently supporting said casing within said tub, damping means including a piston and cylinder, one of which is carried by said casing and the other by said outer tub, said piston and cylinder being submersed in the washing solution in the tub for damping vibration of the unitary structure.

3. In a clothes washing machine of the type having a clothes basket rotatable within an enclosing tub with drive means for rotating said basket and an unbalanced clothes load therein at a centrifuging speed, said drive means being enclosed within a casing within said tub, support and vibration damping means for the basket, drive means, and drive means casing comprising a plurality of cooperating and relatively movable pistons and cylinders, means permitting washing liquid to be drawn into and pushed out of each cylinder by the relative movement of the cooperating piston, and resilient means supporting said drive casing and associated structure within said tub, one of each of said cooperating pistons and cylinders being secured to said casing while the other is secured to said outer tub below the normal level of washing liquid therein during operation of the machine.

No references cited.