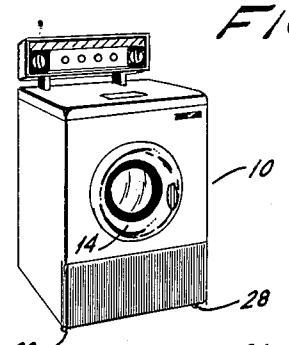
June 19, 1962 J. R. HUBBARD 3,039,613

LAUNDRY APPARATUS

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FIG. 1.



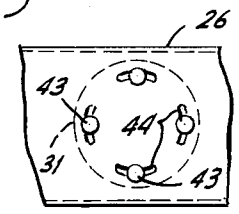


FIG. 4.

FIG. 2.

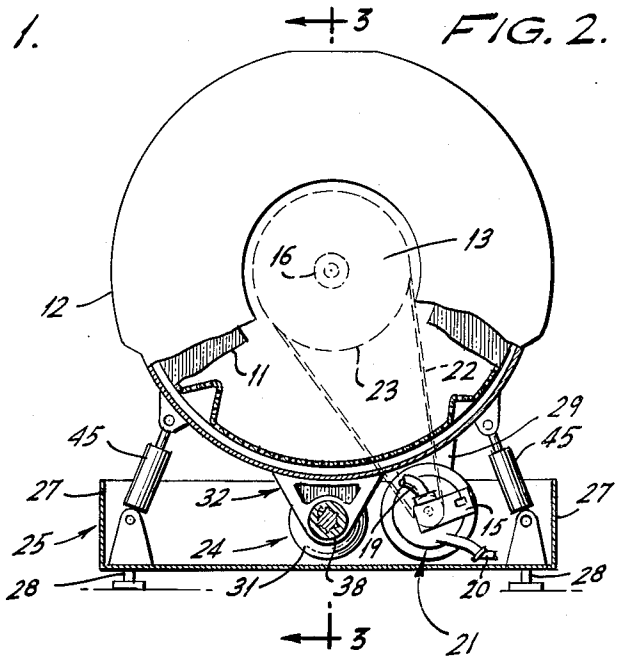


FIG. 3.

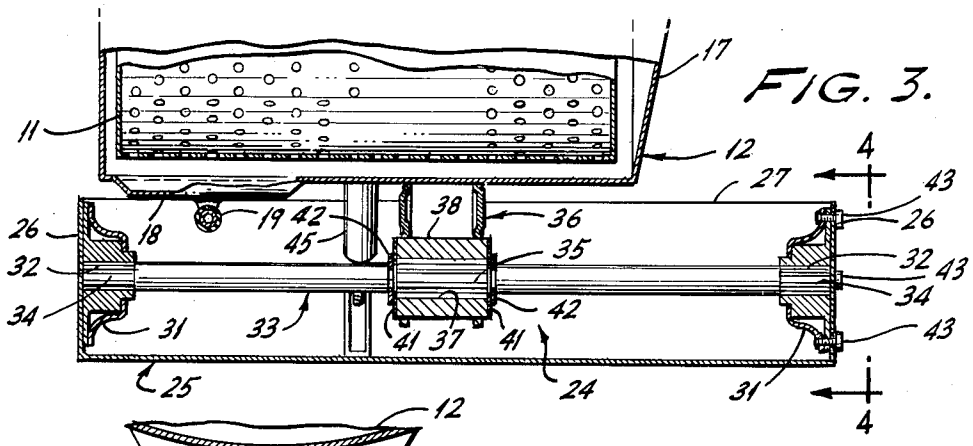
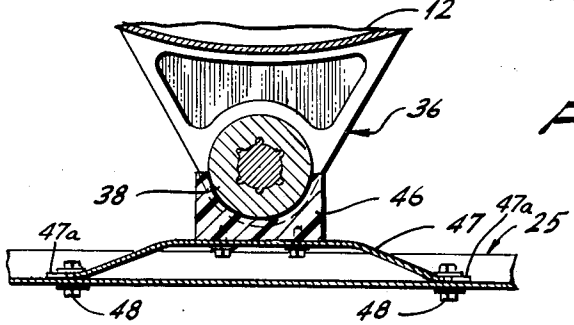


FIG. 5.



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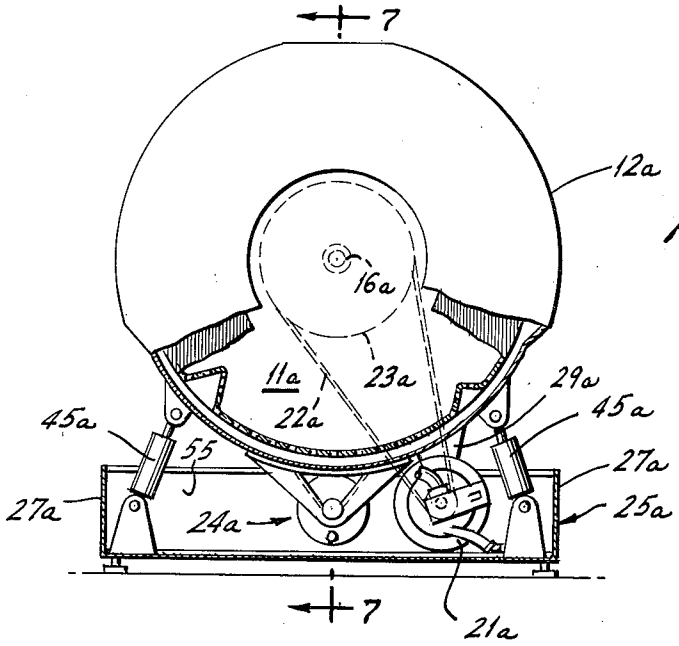


FIG. 6.

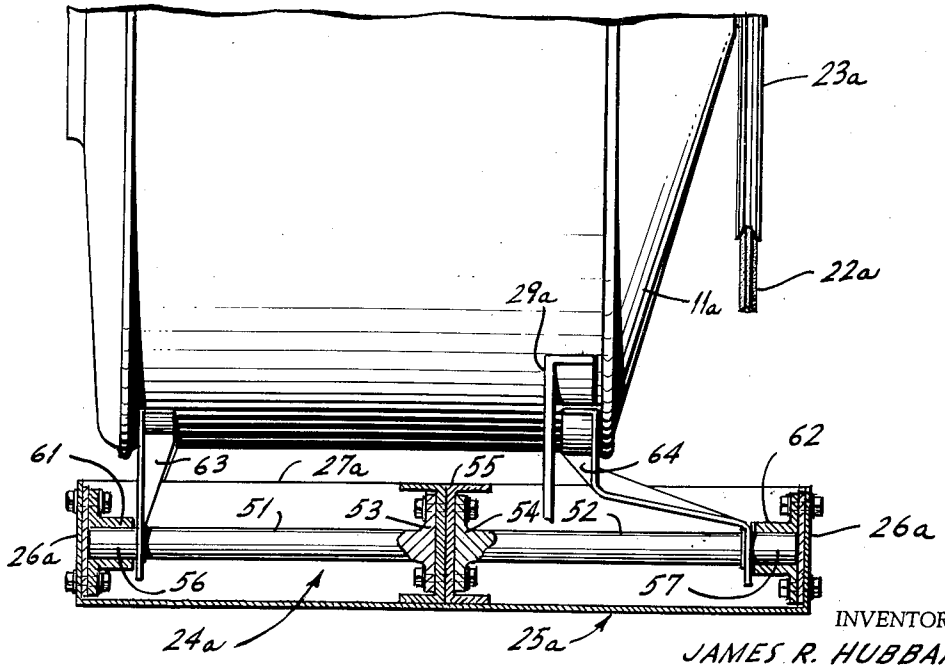


FIG. 7.

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LAUNDRY APPARATUS

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Filed Apr. 30, 1959, Ser. No. 810,115
4 Claims. (Cl. 210—364)

The present invention relates to centrifugally operable apparatus, and more particularly to support structure for the operating mechanism of laundry apparatus.

While of broader applicability, the invention has particular utility in the field of combined clothes washing and drying machines of the type having a rotatable cylinder or basket mounted on a horizontal axis and adapted for washing clothes and for centrifuging washing fluid therefrom.

During centrifuging operations excessive unbalance of the load in the rotatable basket, due to lack of even distribution therein, may constitute a substantial problem. Unbalance becomes excessive when upwardly-directed vertical components of the centrifugal force induced by the unbalance are sufficient to reduce the frictional forces between the machine and the floor to such degree as to permit horizontal components of the centrifugal force to effect lateral shifting or "walking" movement of the machine upon the floor.

While a number of known support means include damping apparatus for substantially cancelling the forces tending to shift the machine, many such means are characterized by relatively complex linkages requiring massive cabinet framing structure to provide suitable restraining forces.

It is an object of the invention to provide simple and effective damping means for forces arising from unbalance in the rotating parts of a laundry machine.

It is another object of the invention to provide rotatable basket mounting and damping means in a substantially unitary base structure independent of the decorative cabinet structure.

In achievement of the foregoing, the invention contemplates supporting the tub or housing within which the rotatable washing and spinning basket is mounted, upon a horizontally extending torsion member disposed substantially parallel to and vertically spaced from the axis of the rotatable basket, and while providing such support of the housing as to permit limited pivotal movements of the latter about the axis of the torsion member, in response to laterally directed centrifugal force components arising from an unevenly distributed load.

The manner in which the foregoing as well as other objectives may best be achieved will be clearly understood from a consideration of the following description in view of the accompanying drawings, in which:

FIGURE 1 is a perspective showing of laundry apparatus embodying the invention;

FIGURE 2 is a somewhat enlarged elevational showing, partly in section, of apparatus housed within the cabinet shown in FIGURE 1, and illustrating one form of the invention;

FIGURE 3 is an enlarged sectional showing, with parts broken away, taken along the line 3—3 as applied to FIGURE 2;

FIGURE 4 is an elevational showing, with parts broken away, and looking in the direction of arrows 4—4 as applied to FIGURE 3;

FIGURE 5 is an enlarged fragmentary showing, partly in section, similar to FIGURE 2, and illustrating an alternate constructional feature;

FIGURE 6 is a showing similar to FIGURE 2, but illustrating another form of the invention; and

FIGURE 7 is a sectional showing, with parts broken away, taken along the line 7—7 as applied to FIGURE 6.

Now making more particular reference to the drawings, and first to FIGURES 1, 2 and 3, a cabinet **10** houses a horizontal axis laundry machine wherein a clothes washing and centrifuging perforate basket **11** is disposed for rotatable movements within a housing **12**. The cabinet **10**, basket **11**, and housing **12** each has an opening, said openings being axially aligned and together forming a basket access opening designated generally at **13** (FIGURE 2). A door **14** (FIGURE 1) is disposed over the opening **13** and is hingedly mounted for opening and closing movements relative thereto. A flexible sleeve (not shown) may extend between the housing **12** and cabinet **10**, in the region of access opening **13**, to accommodate relative movements between said housing and said cabinet.

The basket **11** is mounted for rotatable movements upon hub **16** journalled within rear wall **17** (FIGURE 3) of housing **12**. Drive means for rotating the basket includes combined motor-transmission means **21** mounted upon a bracket **29** affixed to housing **12** and arranged to drive a belt **22**, the latter engaging a pulley **23** carried by basket **11** in the region of said hub **16**.

As is well known in the art, in the washing operation basket **11** is rotated at a relatively low speed, as provided through selective operation of motor-transmission means **21**, to tumble the clothes in the presence of suitable washing fluid disposed in housing **12**. In the fluid or water extracting operation, the basket is rotated at a relatively high speed sufficient to centrifuge major portions of the cleaning fluid from the clothes. Centrifuging is both preceded and accompanied by operation of fluid-drain pump means **15** of known design and disposed in fluid flow communication with sump **18** (FIGURE 3), drain hose **19**, and discharge hose **20** thereby to remove substantially all the washing fluid from housing **12**. Supply of water, as well as control thereof, is provided by known means. Programming of the various operations is of course provided by suitable control means associated with the operating mechanisms. Inasmuch as operational features of such apparatus are well known in the art, no further description thereof will be made.

In particular accordance with the invention, and keeping in mind that the clothes-load is often unevenly distributed during the spinning or centrifuging operation to such an extent as to induce forces tending to move the entire machine, resilient mounting of housing **12** for disposition within cabinet **10** is accomplished through the agency of torsion bar apparatus **24**.

Cabinet **10** and apparatus **24** are each mounted independently of the other upon a pan-like base **25** having peripheral wall portions **26** and **27**. Base **25** is supported by known caster means, such as adjustable feet **28**. As best seen in FIGURE 3, oppositely disposed walls **26** each have rigidly affixed to central portions thereof a torsion bar support **31** having a splined bore **32**. The bores **32** are aligned axially with one another and are disposed and arranged to receive splined end portions **34** of torsion bar **33**, the splines preventing rotating movements of end portions of bar **33**.

Additional splines **35** extend along a portion of the bar **33** disposed intermediate supports **31**. Splines **35** are disposed and adapted for engagement by splines **37** formed in cylindrical portion **38** of support bracket **36** affixed to the bottom of housing **12**. Proper axial disposition of bracket **36**, and the supported housing **12**, relative to torsion bar **33** is ensured by means of thrust washers **41** disposed adjacent ends of bracket **36** and held in place by snap rings **42** affixed to bar **33**. Positioning of the torsion bar is such that its axis is substantially parallel to and spaced vertically beneath the axis of the rotatable basket.

As best seen in FIGURE 4, the right hand torsion bar

support 31, as viewed in FIGURE 3, is affixed to wall 26 by screws 43 extending through slots 44 provided in the wall. By this arrangement angular adjustments of the torsion bar 33 can be made in order properly to align the housing 12 with base 25.

Lateral oscillatory movements of housing 12, occurring during centrifuging of an unbalanced clothes load in basket 11, take the form of relatively small arcuate movements thereof about the axis of torsion bar 33. Also, such limited vertical oscillatory movements of the housing as may occur are afforded by bending of the torsion bar. Damping of both lateral and vertical movements is provided by suitable hydraulic or friction dampers 45 extending between housing 12 and base 25, as best seen in FIGURE 2. As will be appreciated, reactive torsional forces are applied by displaced torsion bar 33 and tend to return the displaced assembly to its initial rest position. As a result of this construction, it will be further appreciated that resilient support of housing 12, as well as components mounted thereon, is derived, in large part, through the agency of unitary structure comprising base 25 and torsion bar apparatus 24 mounted thereon. The dampers 45, of course, also contribute to the support of the housing.

An alternate structure for damping oscillatory movements of housing 12 is illustrated in FIGURE 5, and in connection with the embodiment shown in FIGURES 2 and 4, wherein a suitably proportioned block 46 of friction material is supported upon the central portion of an upwardly arched leaf spring 47. The spring is slidably mounted at its end portions to the base 25 by bolts or pins 48 anchored to the latter and extending with clearance through slots or bifurcations 47*a* provided in the spring. The slots accommodate flexing of the spring due to forces imparted transversely thereto by bracket means 36. Block 46 is resiliently urged against cylindrical portion 38 of the bracket 36 as shown, and the damper thereby both frictionally and resiliently tends to oppose movements of housing 12 during rotation of basket 11.

In the modified embodiment illustrated in FIGURES 6 and 7, housing 12*a* supports rotatable basket 11*a*. A pulley 23*a* is mounted to the hub 16*a*, and a drive belt 22*a* links the pulley to motor-transmission 21*a* mounted upon bracket 29*a* affixed to the housing.

A base 25*a* supports housing 12*a* through the agency of torsion bar support apparatus 24*a*, comprising a pair of torsion bar elements 51 and 52, each having flanged end portions 53 and 54, respectively, affixed to I-beam 55 extending transverse the axes of the torsion bar elements. Note that in this embodiment, as in the embodiment shown in FIGURES 2 and 3, the torsion bar elements extend substantially parallel to the axis of the basket and are disposed substantially vertically thereunder. Said I-beam 55 is rigidly affixed to the base 25*a* and extends between side walls 27*a* thereof. Opposite free end portions 56 and 57 of torsion bars 51 and 52 are each freely journalled in bearing elements 61 and 62 respectively, each such element being affixed to a wall 26*a* of the base. Mounting of the housing 12*a* to torsion bars 51 and 52 is effected by means of brackets 63 and 64 rigidly affixed to the housing and to the torsion bars as shown. Attachment of the brackets to the bars may be by any suitable means, for example either by keying or by welding.

It will be noted in the modified embodiment, as illustrated in FIGURES 6 and 7, that the weight of the housing 12*a*, and apparatus affixed thereto, is supported by portions of torsion bars disposed adjacent bearing elements 61 and 62. Any movements of the housing 12*a* will therefore be substantially lateral, in limited arcs about the axes of the aligned torsion bar elements. Centrifugal force components tending to move the housing are damped by damper means 45*a* extending between the housing and base 25*a* as shown.

It is seen, therefore, that in all illustrated embodiments the invention, movements of the housing subject the torsion bar elements to torsional forces whereby to introduce restoring forces tending to return the displaced assembly to its predetermined rest position. Accordingly, horizontal excursion of the basket housing advantageously is in the nature of very small, well defined arcuate movements about the axis of the torsion bar element. Due to the above described well defined, minimal movements of the housing afforded by the apparatus of the present invention, clearances between the outer cabinet and basket housing can be held to a minimum, an advantage which, heretofore, has been difficult to attain.

It will further be understood that a distinct advantage of the torsion bar apparatus of the present invention resides in elimination of the need for incorporating in the decorative cabinet structure, per se, costly and space consuming framing structure for supporting the operating mechanism.

Also, inasmuch as sole support of the tub housing is derived from a single base member, there is afforded a minimum of resilient support elements requiring alignment. The only support function that need be performed by the decorative cabinet is support of the non-force producing elements such, for example, as control apparatus for programming the operating cycles.

Modified embodiments of the present invention have been illustrated in laundry apparatus of a particular type, and it will be understood that such other modifications may be made as fall within the scope of the appended claims.

I claim:

1. In centrifuging apparatus of the kind including a movably mounted, generally cylindrical assembly comprising a tub having a perforate basket rotatable mounted therein, a pan-like base structure having a bottom wall and confronting side wall portions extending vertically therefrom, torsion bar means having end portions carried by said confronting wall portions and adapted to brace the latter, said torsion bar means being spaced substantially vertically beneath and extending substantially parallel to the axis of the cylindrical assembly, means fixedly mounting said cylindrical assembly upon said torsion bar means whereby the latter supports substantially the entire weight of the assembly and, responsive to unbalance in the rotating tub, accommodates limited pivotal movements of said assembly about said torsion bar means, such pivotal movement introducing restoring forces in said torsion bar means tending to return the displaced assembly to a predetermined position, and cabinet means enclosing said cylindrical assembly and said torsion bar means and mounted upon said pan-like base structure.

2. Apparatus in accordance with claim 1, and further characterized in that said torsion bar means includes a torsion element end portions of which are rigidly supported by said side wall portions of said base structure, and said means for fixedly mounting said cylindrical assembly upon said torsion bar means comprises a sleeve-like element secured to said cylindrical assembly and fixedly engaging the torsion bar element intermediate the supported portions thereof while being in coaxial alignment with the latter.

3. Apparatus in accordance with claim 1, and further characterized in that said torsion bar means includes a pair of axially aligned torsion elements each having a first rigidly supported portion disposed adjacent the like portion of the other element and a second portion spaced axially from said first portions and rotatably supported by said side wall portions of said base structure, said means fixedly mounting said assembly upon said bar means including a bracket portion mounted upon said tub and disposed in fixed engagement with each said torsion ele-

ments adjacent the rotatably supported portions of the latter.

4. Apparatus in accordance with claim 1 and further including damping means for said assembly disposed and adapted forcibly to oppose pivotal movements of the latter about the torsion bar means, said damping means comprising an upwardly arched leaf spring having pin and slot connection with the bottom wall portions of said pan-like structure, said leaf spring extending transverse the axis of said torsion bar means, and a body of friction material mounted upon the upwardly arched portion of said leaf spring and including a portion disposed and adapted rotatably to restrain said torsion bar means in the region thereof that is free to turn, said leaf spring resiliently urging said body of frictional material into frictional engagement with elements of said torsion bar means and movable therewith.

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