Jan. 15, 1957 T. R. SMITH ET AL 2,777,314

WASHING MACHINE VAPOR SEAL

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Fig. 1.

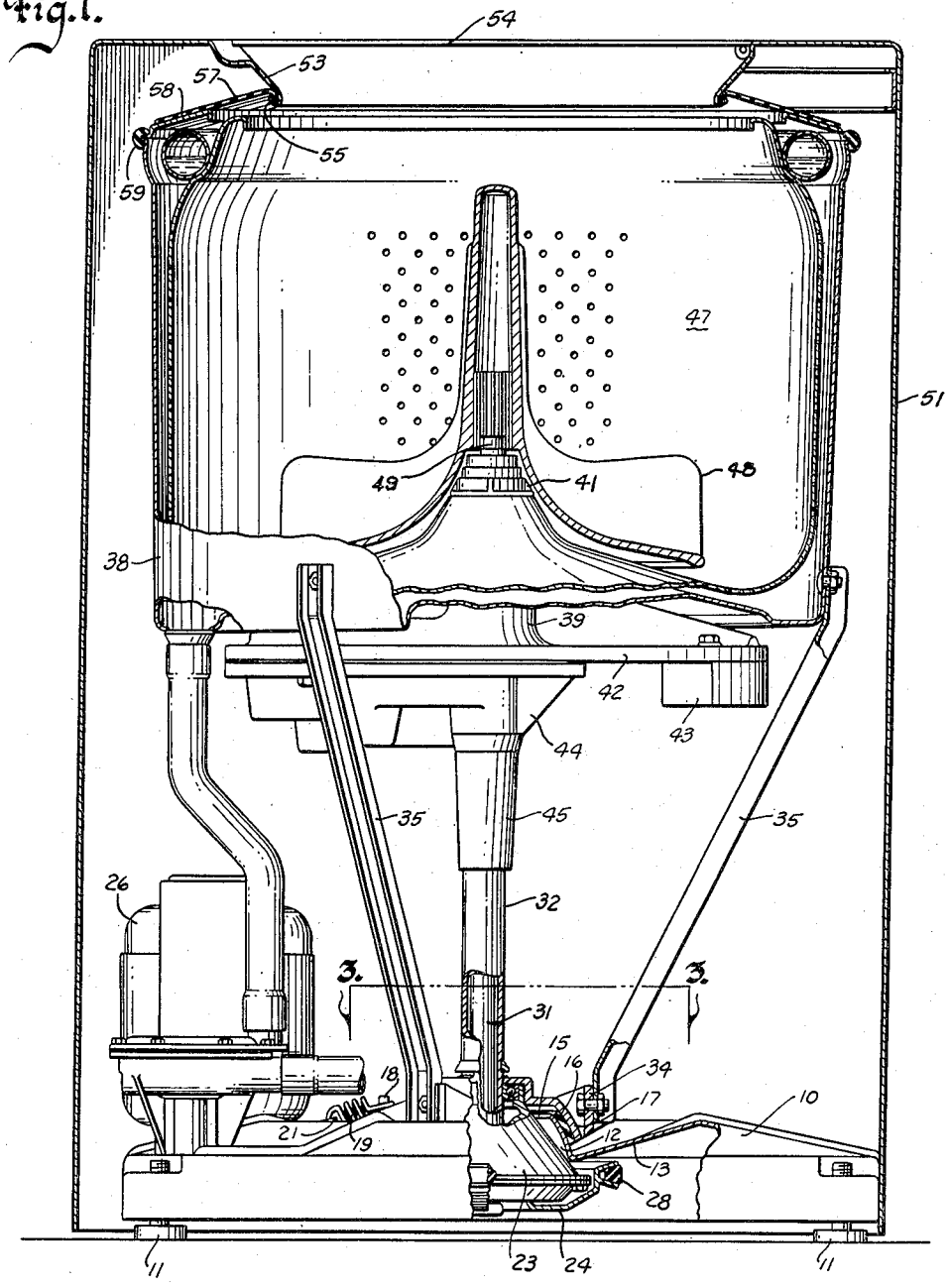

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Fig.2.

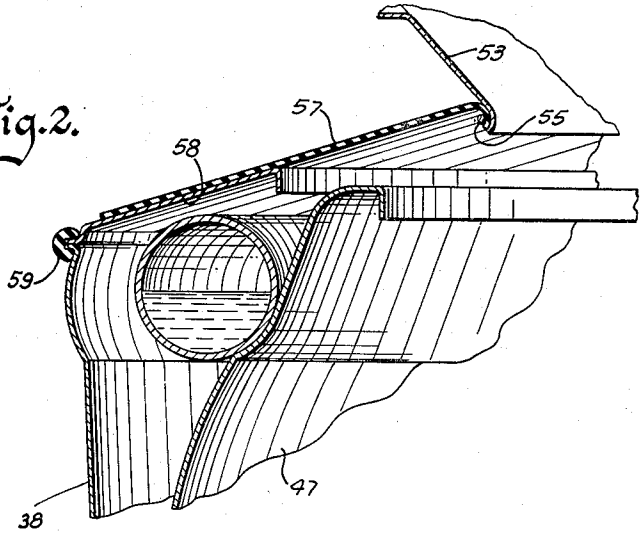
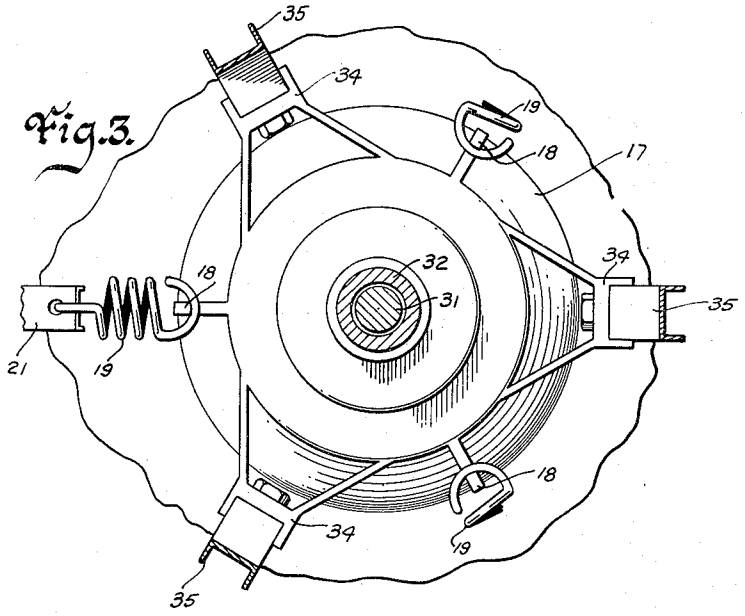


Fig.3.



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WASHING MACHINE VAPOR SEAL

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Application June 27, 1955, Serial No. 518,286

6 Claims. (Cl. 68—23)

This invention relates to a vapor seal for washing machines. It relates specifically to a sealing construction between the cabinet enclosing the washing apparatus and the tub assembly containing the fabrics. Its principal object is to prevent the escape of water or water vapor from the tub assembly during the cleaning and extracting operations even though the tub assembly proper may nutate at all times about a point lying on the rotational axis of the rotatable basket forming part of the tub assembly.

In the disclosed construction illustrating a machine of the vertical axis type, the upper portion of the tub assembly is fitted with a spherical segmental member having a radius of curvature substantially equal to the distance between the top of the tub assembly carrying the spherical segmental member and a point on the vertical axis constituting the point of nutation of the tub assembly during its deviations from this vertical axis. The desired sealing action is provided by the cooperation between this segmental member and a flexible seal mating with this segmental member and fastened to a depending cabinet flange defining the access opening into the tub assembly.

In the accompanying drawings:

Figure 1 is a vertical elevation, partially broken away, showing a washing machine embodying my invention;

Figure 2 is an enlarged fragmentary cross-sectional view taken through one side of the tub assembly of Figure 1 to show the coaction between the resilient vapor sealing flap and the non-rotating imperforate tub, and

Figure 3 is a view taken on line 3—3 of Figure 1.

Now with reference to the drawings in detail, Figure 1 shows a base frame member 10 mounted on adjustable feet 11 and provided with a centrally located depression 13 out of which rises the dome member 12. Dome member 12 is provided with an opening 15 in the center of base frame 10 and carries about its periphery a plurality of friction pads 16 which serve as support surfaces for the umbrella-like support member 17. Support member 17 carries on its outer periphery three equally spaced ears 18 to which are fastened the three centering springs 19 which in turn are anchored to the bracket members 21 fastened to base frame 10. This centering arrangement which centers the umbrella member 17 on dome 12 for nutational movement on that dome member while restraining member 17 from rotation relative to base frame 10 is disclosed and claimed in the co-pending application of William F. Scott and Arthur W. Vonderbaar, filed May 2, 1955, under the Serial No. 505,251.

Support member 17 is fastened to a housing 23 of substantially frusto-conical configuration which encloses a drive assembly driven by pulley 24 which in turn is powered by the reversible motor 26 through belt 28. Through the use of a drive assembly within housing 23 such as that described in the co-pending application of John D. Goodlaxson, Serial No. 505,231, filed May 2, 1955, and assigned to the same assignee as that of this application, the rotation of pulley 24 in a counterclockwise direction, as viewed from the bottom of Figure 1, will impart a like rotation to the power shaft 31 extending upwardly from the drive assembly 14 while the spin tube 32, also powered by the drive assembly within power housing 23, is restrained against rotation by a braking device within housing 23. When pulley 24 is reversed by a reversal of motor 26, both of shafts 31 and 32 will rotate in unison in a colckwise direction.

In addition to carrying the three equally spaced ears 18, support member 17 carries the three equally spaced support lugs 34 each of which is mounted midway between two adjacent ears 18. Support lugs 34 are fastened to the lower ends of the three respective brace members 35 which extend upwardly and outwardly to form an inverted tripod support for an imperforate tub 38. Although not shown in the accompanying drawings, a radial bearing is provided in the bottom wall of imperforate tub 38 to journal the shaft extension 39 formed integrally with the upper power housing cover 42. Power housing cover 42 which carries the counterweight 43 is fastened to the lower power housing cover 44 which is provided with a lower extension 45 fastened rigidly to the spin tube 32.

Through the use of fastener nut 41 which is threaded on the upper end of shaft extension 39, the power housing formed by covers 42 and 44 is rotatable with the perforate basket 47 which is nested within imperforate tub 38. This allows basket 47 to rotate within the non-rotatable tub 38 upon rotation of spin tube 32.

The agitator 48 within basket 47 is connected to a rock shaft 49 which is driven by the power shaft 31 and the conventional motion converting mechanism enclosed by the power housing covers 42 and 44.

Now with reference to the vapor seal forming the invention of this application, it will be noted that cabinet 51 enclosing the washing apparatus is provided with a depending flange 53 which defines an access opening into the tub assembly. The access opening thus formed by the annular flange 53 of this disclosed embodiment is normally covered by means of the conventional door 54 in the top of cabinet 51.

Sealed and fastened to the outer periphery of the depending flange 53 by means of a spring tensioned wire member 55 is a resilient sealing flap 57 which rests in frictional contact against the upper surface of a spherical segmental member 58 provided with an inner rolled edge and a peripheral flange portion juxtapositioned with the flanged portion formed by the terminal edge of the sidewall of imperforate tub 38. It should be noted here that even though member 58 is provided with a flanged periphery and an inner rolled edge, it is termed a spherical segmental member because its intermediate portion contacting flap 57 is a segment of a sphere which would be formed with a radius equal to the distance between member 58 and the point of nutation of the tub assembly as described in the following paragraph. Member 58 is sealed to tub 38 by means of the resilient band 59 encompassing the flanged portions of these abutting members. This seal between tub 38 and member 58 prevents water from rising over the upper side wall of tub 38 during the initial stages of the spin periods.

In order to provide a suitable seal between members 57 and 58, member 58 is provided with the radius of curvature equal to the distance between the top surface of member 58 and the point of nutation of the tub assembly as determined by the intersection of the axis of rotation of shafts 31 and 32 with the horizontal plane bisecting the groove of pulley 24. This point of intersection is also the point defined by the intersection of the radii of curvature for the mounting dome 12.

While resilient member 57 may be molded flat if made of resilient and pliable material, a more efficient sealing arrangement is achieved if this member is provided with the radius of curvature equal to that of the spherical segmental member 58. With this described sealing construction, sporadic water droplets are prevented from being splashed or thrown from the tub assembly while water vapor is prevented from escaping into the ambient atmosphere or condensing on the interior surfaces of cabinet 51.

While the structure necessary to fill the tub assembly with washing fluid is not shown on the accompanying drawings and forms no part of this invention, a water fill spout may be arranged to pass through either the upper side wall of tub 38 or the spherical segmental member 58. In the latter case the periphery of the flexible flap 57 may be notched or slotted to accommodate the fill spout during relative movement of members 57 and 58 without interference of the vapor sealing arrangement.

While this vapor sealing arrangement is effective at all times, it should be apparent that during the tub filling operations when motor 26 is deenergized as well as during the agitation periods when motor 26 produces an oscillation of agitator 48 that there will be little relative movement between the tub assembly and the vapor sealing member 57. It is during the spin period when motor 26 is reversed so as to allow agitator 48 and basket 47 to spin in unison at a higher rate of speed that the unbalanced loads produced by the fabrics within tub 38 will tend to cause the tub assembly to nutate on base frame 10 and produce a sliding movement between sealing flap 57 and segmental member 58.

Though only one embodiment of my invention has been shown in the accompanying drawings, it is to be understood that modifications of this embodiment may be made without departing from the scope of my invention as set forth in the following claims.

We claim:

1. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about a point lying on a vertical axis passing through the center of said tub, a vapor seal sealing the interior of said tub from the interior of said cabinet comprising, a depending flange on said cabinet defining an access opening into said tub through said cabinet, a spherical segmental member connected to said tube adjacent said depending flange, a resilient sealing element fastened to said depending flange and contacting said segmental member in frictional engagement to provide a seal between said element and said segmental member during nutational movements of said tub, said segmental member having a radius of curvature equal to the distance between said segmental member and the point of nutation of said tub.

2. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about a point lying on a vertical axis passing through the center of said tub, a vapor seal sealing the interior of said tub from the interior of said cabinet comprising, a depending flange on said cabinet defining an access opening into said tub through said cabinet, a spherical segmental member connected to said tub adjacent to said depending flange, a resilient sealing element fastened to said depending flange and contacting said segmental member in frictional engagement to provide a seal between said element and said segmental member during nutational movements of said tub, said segmental member and said resilient sealing element each having a radius of curvature equal to the distance between said segmental member and the point of nutation of said tub.

3. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about an axis passing through the center of said tub, a vapor seal sealing the interior of said tub from interior of said cabinet comprising, a flange on said cabinet defining an access opening into said tub through said cabinet, a spherical segmental portion sealed to and carried by said tub, a sealing element fastened to said flange and contacting said segmental portion in frictional engagement to provide a seal between said element and said segmental portion during nutational movements of said tub, said segmental portion having a radius of curvature equal to the distance between said segmental portion and the point of nutation of said tub.

4. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about an axis passing through the center of said tub, a vapor seal sealing the interior of said tub from the interior of said cabinet comprising, a flange on said cabinet defining an access opening into said tub through said cabinet, a spherical segmental portion sealed to and carried by said tub, a sealing element fastened to said flange and contacting said segmental portion in frictional engagement to provide a seal between said element and said segmental portion during nutational movements of said tub, said segmental portion and said sealing element each having a radius of curvature equal to the distance between said segmental portion and the point of nutation of said tub.

5. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about a point lying on a vertical axis passing through the center of said tub, a vapor seal sealing the interior of said tub from the interior of said cabinet comprising, a depending flange on said cabinet defining an access opening into said tub through said cabinet, a flanged member connected to said tub, and a sealing element fastened to said depending flange and frictionally engaging said flanged member for relative movement thereto during nutational movements of said tub, said sealing element having a radius of curvature equal to the distance between said element and the point of nutation of said tub.

6. In a washing machine having a cabinet enclosing a tub mounted for nutational movements about a point lying on a vertical axis passing through the center of said tub, a vapor seal sealing the interior of said tub from the interior of said cabinet comprising, a depending flange on said cabinet defining an access opening into said tub through said cabinet, a peripheral flange on said tub, said peripheral flange including a spherical segmental portion, and a sealing element connected to said depending flange and frictionally engaging said segmental portion for relative movement thereto during nutational movements of said tub, said sealing element and said segmental portion each having a radius of curvature equal to the distance between said sealing element and the point of nutation of said tub.

No references cited.