Sept. 1, 1942. T. R. SMITH 2,294,517

AGITATOR SEALING MEANS

Filed July 29, 1940

Fig. 1

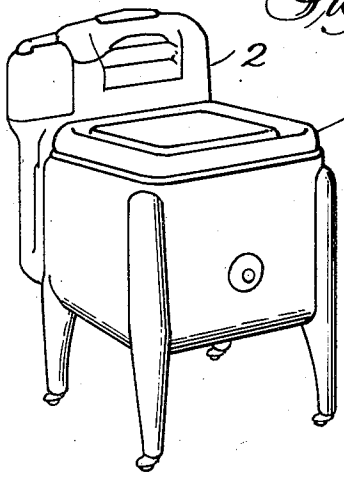
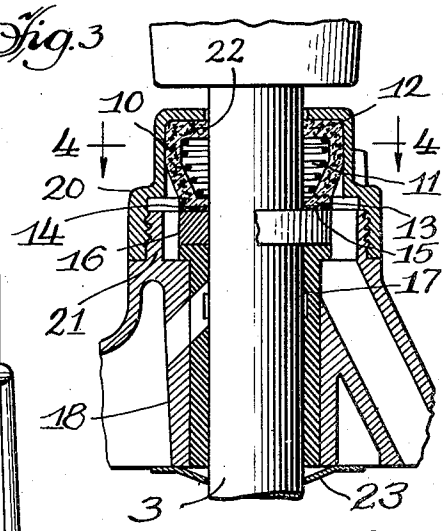


Fig. 3



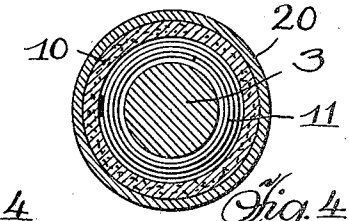


Fig. 4

Fig. 2

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AGITATOR SEALING MEANS

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2 Claims. (Cl. 286—11)

The present invention relates to an agitator sealing means and more particularly to a novel construction of water seal for the agitator shaft of a washing machine.

The novel invention comprehends a most effective water seal for a washing machine having a drive shaft projecting through the bottom of the tub. Difficulty has been experienced in properly sealing the drive mechanism and gear case from the washing fluid, particularly where the drive shaft does not extend above the normal water line or level of the washing fluid in the tub. The present invention makes possible the use of such a low center washing machine drive in that the seal prevents leakage around the alternately rotating or oscillating drive shaft.

The present invention further relates to a novel assembly of water seal and retainer therefor adapted for use on a relatively slow speed oscillating shaft of the type now generally employed in washing machines of the agitator type. The sealing element is of the bellows type in which the body is molded of a synthetic rubber or rubber-like compound such as polymerized chloroprene or the like having the properties of flexibility or elasticity under all conditions of use, and being resistant to a high degree against attack by water, detergents, soap and/or other washing compounds or solutions used in washing clothes.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

The invention further resides in the construction, combination and arrangement of parts illustrated in the accompanying drawing, and while I have shown therein a preferred embodiment, it is to be understood that the same is susceptible of modification and change, and comprehends other details, arrangements of parts, features and constructions without departing from the spirit of the invention.

In the drawing:

Fig. 1 is a view in perspective of a washing machine equipped with the novel agitator sealing means.

Fig. 2 is a fragmentary enlarged view, part in side elevation and part in vertical cross section, of the agitator, its drive shaft and driving mechanism.

Fig. 3 is a fragmentary enlarged view in vertical cross section through the bearing assembly and sealing means for the shaft.

Fig. 4 is a view in horizontal cross section taken in a plane represented by the line 4—4 of Fig. 3.

Referring more particularly to the disclosure in the drawing, Fig. 1 shows an illustrative embodiment of a washing machine upon which is mounted a swinging wringer 2. This washing machine is of the agitator type in which a vertical drive shaft 3 extends through the bottom of the tub and upon which shaft is mounted an agitator 4 adapted to be oscillated or alternately rotated through a predetermined arc by a suitable drive mechanism. In the illustrative disclosure of Fig. 2, this drive mechanism comprises a motor or other power source 5 adapted to be suitably connected to and rotate a worm wheel or gear 6 which in turn reciprocates a rack or cross head 7 slidably mounted upon a bar 8 and in continuous meshing engagement with a pinion 9, the latter being keyed or adapted to be clutched to the drive shaft 3 through any suitable mechanism.

The agitator shaft 3 may be of the low center type in which the upper end of this shaft is disposed below the normal water level in the tub. In such a construction, difficulty is encountered in properly sealing the agitator shaft and its associated drive mechanism to prevent the washing fluid or solution in the tub from working down into the bearings and drive mechanism. In the present construction, this is effectively accomplished by means of a novel agitator seal 10 in which the body of the seal is preferably of a rubber-like material such as one of the synthetic rubbers. Excellent results have been secured in using polymerized chloroprene which is resilient and maintains its elasticity or flexibility under all operating conditions and is also highly resistant to the action of the water and washing compounds or solutions used in the laundering operation. To augment the inherent resiliency of this body member, the invention comprehends the use of an expansible spring 11 preferably of stainless steel having its upper end abutting against the inturned flange 12 of the seal and its lower end abutting the inturned flange 13 of this seal. This operating or sealing surface is reinforced at its sealing end 14 by means of a fabric face 15 which is impregnated or loaded with graphite. This fabric face strengthens the sealing surface and reduces the coefficient of friction, which characteristic or property is further augmented or enhanced by the impregnation or loading of graphite.

The sealing element 10 is retained stationary with the fabric face having a wiping contact with a ring or collar 16 preferably of stainless steel and pressed or otherwise secured onto the agitator shaft 3. The lower end of this ring is shown as abutting a bushing or sleeve 17 pressed into the stationary housing 18 which forms the cover for the gear housing 19 as well as the lowermost portion of the tub bottom. In order to retain the sealing element 10 in its predetermined sealing position, the novel assembly includes a retainer or cap 20 adapted to be threaded upon the upper reduced end 21 of the housing 18. This retaining cap maintains the agitator seal stationary or in fixed position and in sealing contact with the ring 16 by holding this seal tightly against the inside shoulder 22 of the cap. The spring 11 applies pressure against both ends of the seal and thereby prevents leakage between the seal retainer 20 and the seal assembly, as well as between the sealing face 14 and the collar 16. A spring washer 23 of dished contour tightly embraces the agitator shaft 3 and has its outer diameter or periphery seating against the lower end of the bushing 17. This has a tendency to force the shaft downwardly and most effectively maintain sealing engagement between the sealing elements to prevent leakage around the oscillating shaft which enters from the bottom of the washing machine tub.

In operation, the seal is stationary and the ring or collar 16 is fixed on the agitator shaft, the latter oscillating at a speed at which centrifugal force is not a factor and does not aid in the sealing action. The novel unit seal being of a resilient material, and this resiliency augmented by an expansible spring, effectively seals against leakage. However, it is desirable that some of the liquid being sealed be allowed to filter through the ends of the fabric and onto the sealing surface for the purpose of lubricating this sealing surface. This fabric face provides a most satisfactory sealing surface, not only from the standpoint of increasing the abrasion resistance but also by lowering the coefficient of friction and allowing the separate threads in the fabric to act as wicks, drawing the washing solution onto the face of the sealing surface for the purpose of lubrication.

Having thus disclosed the invention, I claim:

1. The combination with an oscillating shaft of a washing machine, a sealing mechanism comprising a sealing element having an inturned flange at each end thereof, an expansible spring within said sealing element and bearing against said flanges, a collar secured upon and rotatable with said shaft, a fabric face on the flange adjacent said collar and having a wiping contact therewith, and an adjustably mounted retainer for enclosing and having contact with the upper and side walls of said sealing element and including a shoulder seating upon one of said flanges and cooperating with the spring for applying pressure to the opposite ends of the sealing element and maintaining the fabric face of the other flange in sealing and wiping contact with the collar on said shaft.

2. The combination with a vertical oscillating shaft of a washing machine, a sealing mechanism comprising a bellows type sealing element having an inturned flange at each end thereof, an expansible spring bearing against said flanges, a collar secured upon said shaft, a housing for said shaft, and a threaded retainer providing a closure for said housing and enclosing said sealing element and having contact with the upper of said flanges and periphery of said sealing element for holding the sealing element stationary in said retainer and cooperating with the spring for forcing and maintaining the lower flange in sealing and wiping contact with the collar secured to said shaft.

THOMAS R. SMITH.