Nov. 1, 1955 A. R. CONSTANTINE 2,722,119

DOOR CONSTRUCTION FOR TUMBLER TYPE WASHING MACHINES

Filed Feb. 17, 1954

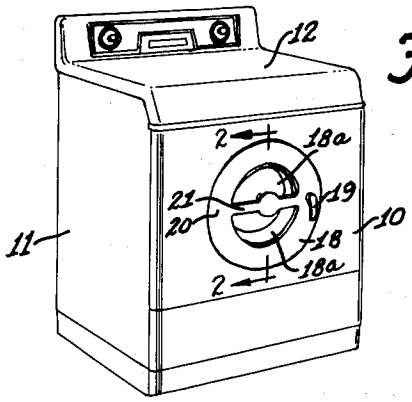


Fig. 1.

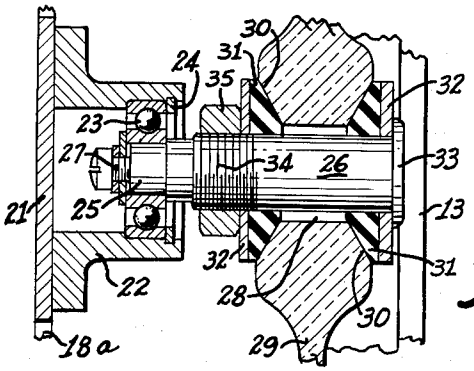


Fig. 3.

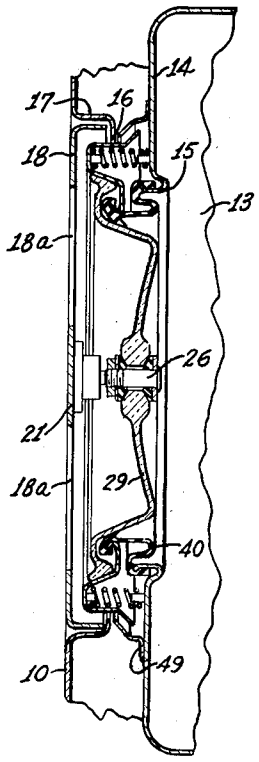


Fig. 2.

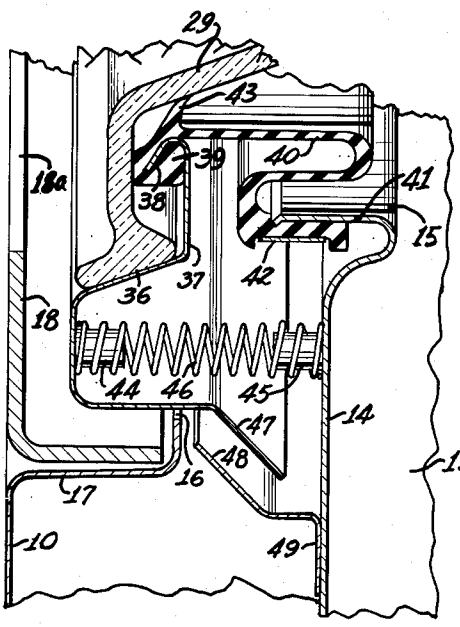


Fig. 4.

INVENTOR.
ARTHUR R. CONSTANTINE.
BY

ATTORNEY.

United States Patent Office

2,722,119

Patented Nov. 1, 1955

2,722,119

DOOR CONSTRUCTION FOR TUMBLER TYPE WASHING MACHINES

Arthur R. Constantine, Longmeadow, Mass.

Application February 17, 1954, Serial No. 410,762

4 Claims. (Cl. 68—139)

This invention relates to washing machines, and more particularly to a door sealing construction adapted for the horizontal axis tumble-action type of machine.

This application is a continuation-in-part of my copending application Serial No. 367,861 filed July 14, 1953, for "Washing Machine."

This invention has particular novelty when applied to a tumble-action type of machine utilizing a single rotatable fluid and laundry receiving cylinder of the type more particularly shown and described in my aforementioned copending application.

Prior art machines of the tumble-action type have usually been provided with a so-called "double tub" construction wherein a perforate clothes receiving cylinder or basket is rotated within a stationary imperforate liquid receiving tub. In such type of machine it has been a relatively simple matter to provide an effective sealing arrangement for the door and the opening through the stationary tub.

The machine disclosed in my aforementioned copending application differs from the prior art machines in that it utilizes a single imperforate liquid and clothes receiving cylinder which is rotated at low and high speeds for washing and centrifugal extraction. Such a construction poses a different problem from the standpoint of sealing the central door opening into the cylinder since it is desired to have a door which is hinged and latched to a stationary cabinet, yet must provide a satisfactory sealing of the opening in a rotating cylinder.

In a construction of the present type, the door does not seat on the door opening in the same angular relation each time, and difficulty is at times encountered in providing a good seal to prevent water leakage due to constructional tolerances, out-of-roundness and misalignment.

It is, therefore, a primary object of the present invention to provide a door and sealing means therefor which may be hinged and latched to a stationary cabinet and also sealingly engage a rotating cylinder within the cabinet.

It is a further object to provide such a door seal construction with means adapted to automatically compensate for variations due to constructional tolerances and for misalignment merely upon closing the door.

Other objects and advantages of the present invention will become readily apparent from the following more detailed description and by reference to the accompanying drawing wherein:

Fig. 1 is a perspective view of a washing machine of the type to which the present invention is particularly adapted for use;

Fig. 2 is a fragmentary sectional view through the front portion of the washing machine showing the general arrangement of the essential features of my new door construction in its closed position, the view being taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view of a central bearing support for the door, the view corresponding to an enlarged central portion of Fig. 2; and

Fig. 4 is an enlarged fragmentary sectional view of the door construction in the vicinity of its annular marginal edge, the view corresponding to an enlarged lower portion of Fig. 2.

In Fig. 1 there is shown a washing machine of the horizontal axis tumble-action type adapted to employ the construction of the present invention. The working parts of the machine are housed within a suitable cabinet comprised of a front panel 10, two side panels 11, a top panel 12, and a back panel (not shown). The panels forming the cabinet may be joined by any conventional method to form a rigid stationary housing for the working parts of the machine.

In Fig. 2, it may be seen that a generally cylindrical tub 13 is mounted within the cabinet for rotation on a substantially horizontal axis. Suitable means is, of course, provided for supporting the tub 13 for rotation about its axis and also for driving the tub in its rotation. The tub 13 is provided with a front wall 14 spaced slightly from the front panel 10 of the cabinet. Located centrally of the front wall 14 of the tub 13 is an enlarged aperture 15 arranged substantially in concentric alignment with a circular aperture 16 in a recessed portion 17 of the front panel 10.

The recessed portion 17 of the front panel 10 is arranged to receive a generally circular flanged door supporting frame member 18. Suitable latching means operable by a handle 19 is provided at one side of the frame member 18, and suitable hinge means is provided at a point 20 radially opposite therefrom in order that the door may swing open to insert materials into the tub 13.

The frame member 18 is provided with a rigid horizontally extending bar 21 centrally thereof upon which is mounted, by any suitable means, a support housing 22.

As best seen in Fig. 3, the support housing 22 is axially bored and counter-bored so as to provide a suitable receptacle for a bearing 23. The bearing 23 may be secured within the housing 22 by means of a retaining ring 24 or any other suitable means. Supported rotatably within the bearing 23 is a shouldered portion 25 of a shaft 26. The shaft 26 is tapped to receive a screw 27 so as to rigidly secure the shoulder portion 25 within the inner rotatable portion of the bearing 23. The shaft 26 is arranged so as to pass freely through an aperture 28 located centrally of a generally circular dish-shaped door 29. The door 29 is preferably, but not necessarily, made of glass, plastic or other transparent material so that the operation of the machine may be observed visually through openings 18A in the frame member 18. Each side of the door 29 centrally thereof, is provided with a counter-sunk recess 30 arranged to receive a sealing and cushioning washer 31 made of rubber or other suitable resilient material. The washers 31 are held in place about the shaft 26 and against the door 29 by means of metallic washers 32. To that end, the shaft 26 is provided with a headed portion 33, a threaded portion 34, and a nut 35, so that the washers 32 and 31 may be securely drawn into place to prevent leakage of liquid centrally of the door 29.

At its marginal edge, as best seen in Fig. 4, the door 29 is provided with a tapered surface 36 adapted to engage a correspondingly tapered surface of an annular ring 37. The ring 37 is provided, at a point adjacent its inner diameter, with an upset edge 38 which is adapetd to receive one end 39 of an annular bellows-like gasket 40. The other end of the gasket 40 is attached to an outwardly flared portion 41 of the tub 13, which portion 41 defines the aperture 15. The attachment of the gasket 40 to the portion 41 may be effected by means of a ring 42 which might have, at some point about its periphery, a means for reducing the diameter thereof so as to draw the surface of the gasket 40 into a tightly sealed relation with the portion 41 to effect a water tight seal to prevent leakage of water from the tub 13 about the aperture 15.

The gasket 40 is further provided, adjacent its end 39, with a continuous annular, flexible, radially inwardly extending sealing lip 43, which is adapted to engage the door 29 under tension in its closed position as shown so

as to provide a further seal to prevent leakage of water from the tub **13** at a point between the door **29** and the ring **37**. The construction of this sealing point is such as to provide sufficient yielding of the sealing lip **43** to permit the lip to normally seat perfectly around the entire periphery of the tapered portion of the door **29** engaged thereby upon application of a small degree of axial thrust as is exerted by the horizontal bar **21** through the bearing **23** when the door **29** is latched.

It may be seen (Fig. 4) that the ring **37** is mounted on a yiedling suspension from the front wall **14** of the tub **13** by means of a plurality of radially spaced lugs **44** attached to the ring **37** and corresponding lugs **45** attached to the front wall **14** of the tub **13** with a plurality of compression springs **46** extending therebetween. With the door **29** in open position, the free position of the ring **37** is limited by the engagement of a tapered face **47** thereon which engages a correspondingly tapered face **48** of another annular ring **49** attached to the front wall **14** of the tub **13**. It should be noted that the springs **46** are assembled under a predetermined amount of compression so as to normally urge the faces **47** and **48** into engagement.

The construction of the yielding suspension for the ring **37** as above described is such as to provide compensation for misalignment of the axis of the tub **13** and the axis of the door **29**. Also for reasonable tolerance accepted in most manufacturing procedures such as out-of-roundness, non-parallelism, etc.

Let it be assumed for instance that the door **29** is in its open position away from the aperture **15** prior to loading the tub **13** with clothes for a washing operation. The tapered surfaces **47** and **48** of the rings **37** and **49** will be engaged in their normal free position. After the tub **13** has been charged with clothes it is then desired to close and latch the door **29** over the aperture **15** in a fluid tight condition. In the event there is a misalignment of axes, the engagement of the tapered surface **36** on the door **29** with the complementary surface of the ring **37** will cause the ring **37** to shift its position to line up with the door **29**, such movement assuring that the flexible lip **43** of the gasket **40** will always be in a position to be engaged and sealed by the door **29**. It may be seen that the yielding or floating construction of the ring **37** as provided by the springs **46** will allow the ring **37** to shift a substantial distance to line up the sealing lip **43** with the portion of the door **29** engaged thereby.

As the tub **13** is rotated, either for a low speed washing operation or a high speed extracting operation, it may be seen that the tub **13**, the ring **37**, the gasket **40**, the door **29** and the other related parts will all rotate together at the same speed in a fluid tight condition irrespective of misalignment of their axes.

From the foregoing it may be seen that a seal is provided having excellent sealing characteristics under a minimum thrust requirement, such sealing being effective whether the door and the tub are stationary or in rotation, and that efficient means is provided to assure perfect sealing under conditions of substantial misalignment.

Although a single embodiment of the invention has been herein illustrated and described, it is to be understood that modifications are obvious with respect to various constructional details without departing from the spirit of the invention; therefore, it is not intended that the invention be limited to the specific embodiment shown nor otherwise than by the terms of the appended claims.

I claim:

1. In an apparatus of the character described comprising a stationary support, a tub having an end wall, means for mounting said tub on said support for rotation about an axis normal to said end wall, a circular door-receiving aperture in said end wall arranged substantially coaxial with the axis of rotation of said tub, a circular door arranged to be positioned adjacent said door-receiving aperture, a stationary hinged support for said door positioned adjacent said end wall, bearing means on said hinged support for rotatably supporting said door for rotation coaxial with said tub when said door is in closed position, an annular member resiliently supported on said end wall between said end wall and said door, a resilient continuous annular gasket having one edge thereof attached to said end wall and another edge thereof attached to said annular member, said gasket having a radially inwardly extending annular sealing lip arranged to be engaged by a portion of said door to seal said aperture, and said annular member having a surface adapted to be engaged by a portion of said door whereby to axially align said door with respect to said sealing lip.

2. In an apparatus of the character described comprising a stationary support, a tub having an end wall, means for mounting said tub on said support for rotation about an axis normal to said end wall, a door-receiving aperture in said end wall arranged substantially coaxial with the axis of rotation of said tub, a resilient continuous annular gasket attached to said end wall about said aperture, said gasket having a radially inwardly extending annular sealing lip, a door rotatably mounted and positioned adjacent said end wall upon a stationary hinged support, said door having a surface arranged to engage said sealing lip, and means between said end wall and said door resiliently mounted upon said end wall and attached to said gasket, said last named means arranged to axially align said surface of said door with said sealing lip, whereby said tub and said door will rotate together in sealed relationship.

3. In an apparatus of the character described comprising a stationary support, a tub having an end wall, means for mounting said tub on said support for rotation about an axis normal to said end wall, a door-receiving aperture substantially centrally of said end wall, a door positioned adjacent said end wall, a stationary hinged support upon which said door is rotatably mounted, a resiliently mounted annular member on said end wall between said door and said end wall, a continuous annular resilient gasket attached to said end wall and said resiliently mounted annular member, said gasket having a radially inwardly extending annular sealing lip, said resiliently mounted annular member having means thereon adapted to engage a portion of said door on closing thereof so as to urge said gasket and said sealing lip into axial alignment with a portion of said door whereby said tub and said door may rotate together in sealed relationship.

4. In an apparatus of the character described comprising a stationary support, a tub having an end wall, means for mounting said tub on said support for rotation about an axis normal to said end wall, said tub having a substantially circular aperture arranged substantially coaxial with the axis of rotation thereof, a stationary hinged support adjacent said end wall, a substantially circular door, bearing means on said hinged support for rotatably mounting said substantially circular door, a resilient continuous annular gasket attached to said end wall about said aperture and positioned to extend between said door and said end wall when said door is closed, said gasket having an annular flexible sealing lip extending radially inwardly therefrom and adapted to engage a portion of said door to seal said aperture when said door is in closed position, and a resiliently mounted annular member attached to said end wall and to said gasket, said resiliently mounted annular member being engageable by a portion of said door to axially align said door with respect to said sealing lip when said door is moved to its closed position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,105,248	Johnson	Jan. 11, 1938
2,586,794	Douglas	Feb. 26, 1952
2,650,490	Glassey	Sept. 1, 1953