Jan. 13, 1948. J. H. LEEF 2,434,570

CLOTHES WASHING MACHINE

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Fig. 1

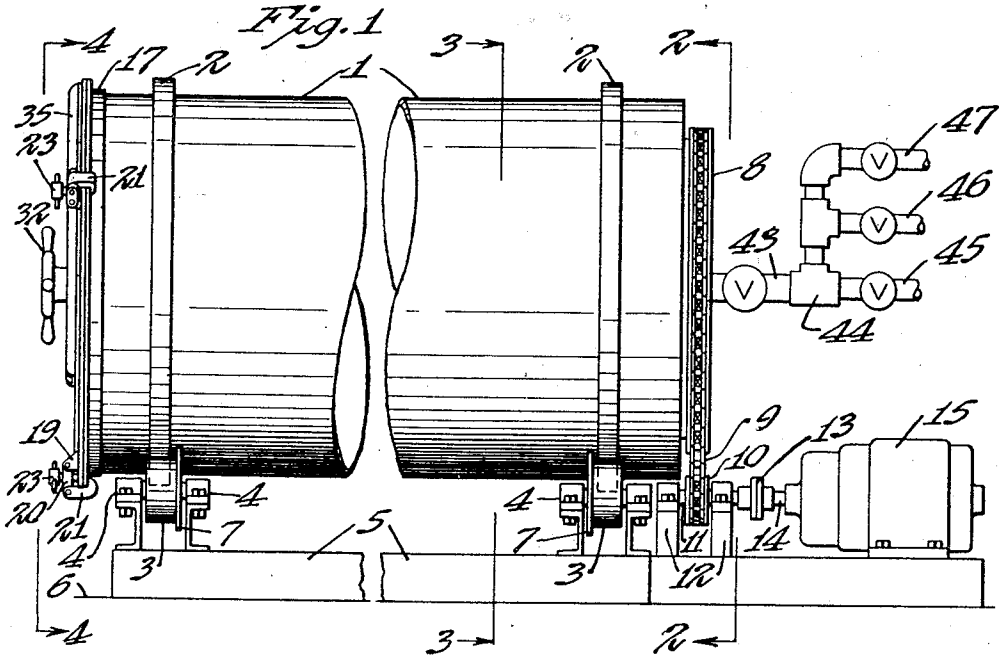


Fig. 2

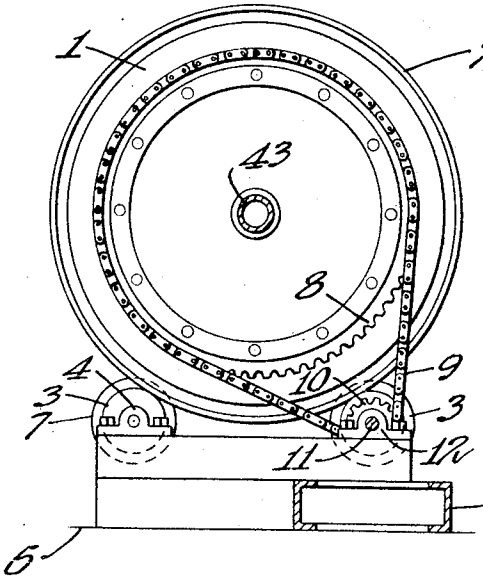
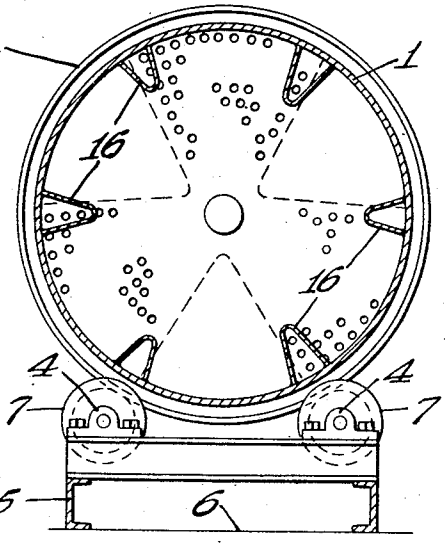


Fig. 3



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Fig. 4

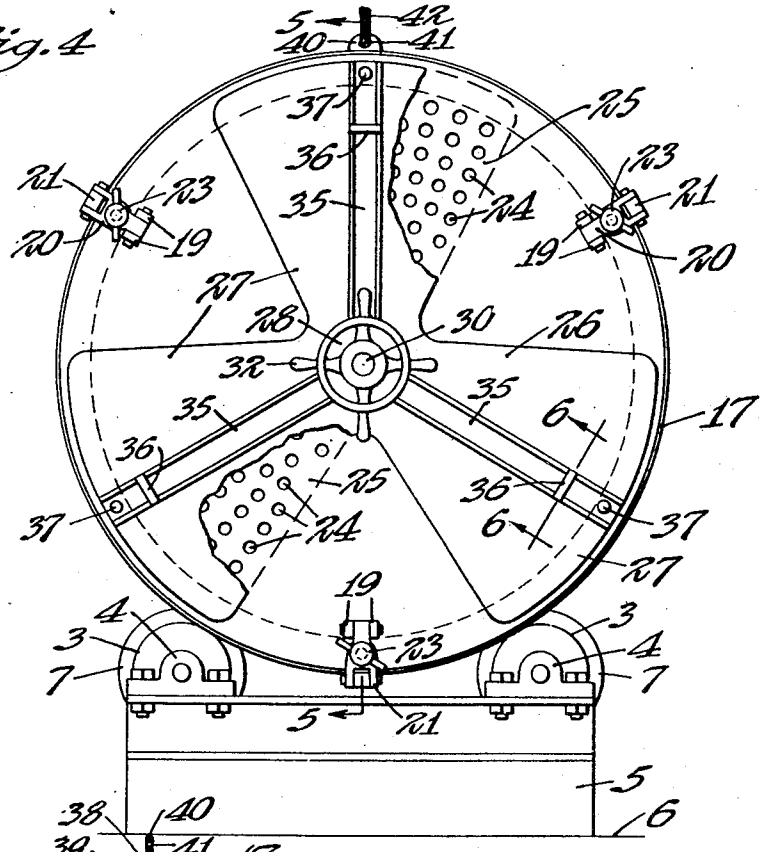


Fig. 5

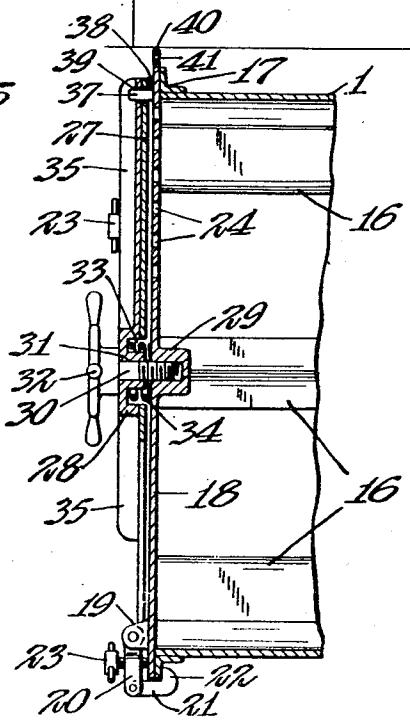
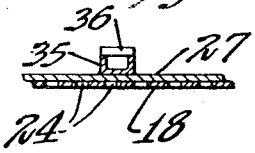


Fig. 6



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UNITED STATES PATENT OFFICE

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CLOTHES-WASHING MACHINE

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4 Claims. (Cl. 68—144)

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My invention relates to washing machines of the type incorporating a horizontally disposed rotary drum in which the clothes or other items to be washed are agitated, and has for its object the provision of means for facilitating the removal of the wash and rinse fluids therefrom, prior to the removal of the clothes or the like.

Another object of my invention is the provision of means whereby the rotating drum may be drained of wash and rinse fluids while the same is still in motion.

The above and still further objects of my invention will become apparent from the following detailed specification and attached drawings.

Referring to the drawings wherein like characters indicate like parts throughout the several views:

Fig. 1 is a side elevational view;

Fig. 2 is an end elevation taken on the line 2—2 of Fig. 1, some parts being shown in section;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged end elevation taken substantially on the line 4—4 of Fig. 1, some parts being broken away;

Fig. 5 is a vertical axial section taken on the line 5—5 of Fig. 4; and

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 4.

The drum of this machine is marked with the numeral 1 and is shown as provided with circumferentially extended external rail flanges 2 arranged to run on supporting rollers 3 journalled in bearings 4 of a heavy metallic frame 5 which, as shown, rests on a floor or the like 6. Rollers 4 are shown as having opposed circumferential ribs 7 which prevent axial movements of the drum during rotation.

The drum, of course, can be supported and driven in various different ways but, as shown, is provided at one end with a large ring gear 8. A chain 9 runs over ring gear 8 and over a much smaller gear 10 on a shaft 11 journalled in suitable bearings 12 on the frame 5. Shaft 11 is shown as coupled at 13 to the rotor shaft 14 of an electric motor 15, also mounted on the frame 5 so that the complete machine is mounted as a self-contained structure on a common base frame.

Shown as secured to the inside peripheral surface of drum 1 and projecting radially inwardly therefrom are a plurality of spaced clothes-lifting vanes 16 which extend substantially the length of the drum 1.

The peripheral surface of drum 1 and the end to which the driving mechanism is secured, are imperforate. However, the opposite end of the drum is open and is equipped at its edge with a circumferentially extended radially projecting reinforcing and clamping flange 17. A removable header or end plate 18, of sufficient diameter

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to close the open end of drum 1 is shown as having a plurality of circumferentially spaced bifurcated bearing lugs 19 in which stud links 20 are pivoted. Links 20 are bifurcated at their outer ends to receive for pivotal movements clamping links 21 having hooked ends 22 which are adapted to overlap radially projecting flange 17 for holding the removable end plate 18 in place. Thumb screws 23 work through links 20 and against end plate 18.

As shown, end plate 18 is provided with a plurality of drainage ports or perforations 24, arranged in spaced segmental areas 25. Shown as overlying and normally covering a different segmental perforated area 25 of end plate 18, is a valve plate, identified in its entirety by the numeral 26, and having a plurality of radially projecting segmental valve plates 27, connected near the axis of removable end plate 18 and there provided with a hub 28, which is concentric with a similar hub 29 on end plate 18.

A stud shaft 30 is adapted to rotate freely in an opening 31 in hub 28 and its inner end has screw-threaded engagement (right handed thread) with hub 29. At the outer end of stud shaft 30 is rigidly secured a hand wheel 32. Into an annular slot 33 surrounding hub 28 fits a compressed coil spring 34, which bears against hub 29, thereby tending to keep end plate 18 and valve plate 26 spaced apart upon loosening of hand wheel 32. Radially projecting from hub 28 of valve plate 26 are a plurality of reinforcing arms 35, one for each segmental valve plate 27. As shown, particularly in Fig. 6, reinforcing arms 35 are channel-shape in cross section and each is provided with a transverse reinforcing strut 36. A plurality of circumferentially spaced guide pins 37 extend outwardly from perforate plate 18 adjacent the peripheral edge thereof, in planes parallel to the axis of stud shaft 30. Guide pins 37 are shown as projecting through openings 38 adjacent the peripheral edges of valve plates 27 and have their outer ends projecting through aligned openings 39 in the reinforcing arms 35.

Projecting radially outwardly from removable end plate 18 is an ear 40 having an eye 41 through which a cable or the like 42 is adapted to pass. A plurality of similar ears 40 may be circumferentially spaced, if desired.

For the introduction of water or washing fluids into the drum 1, a valve equipped supply line 43 is extended axially through the closed end thereof. Supply pipe 43 is provided with a packed bearing which rotates on the discharge end of said pipe 43. In the preferred arrangement, pipe 43 will be connected to a pipe coupling 44 to which latter will also be connected valve equipped pipes 45, 46 and 47. Pipe 45 can be assumed to supply cold water, pipe 46 to supply hot water, and pipe 47 to supply steam.

Clothes or other articles to be washed are in-

serted into the drum 1 through the open end thereof when the removable end plate 18 has been removed. The removal of end plate 18 is accomplished by relieving the tension on thumb nuts 23 so as to permit the hooked ends 22 of clamping links 21 to be disengaged from the radially projecting clamping flange 17 in the open end of drum 1. A cable or the like 42 is then inserted into the eye 41 in ear 40 and end plate 18 is then swung off to one side by means of a boom and winch arrangement, not shown.

After the clothes have been inserted into the drum, the end plate 18 is secured thereto in a reverse manner to that just above described. Care is then taken to see that the hand wheel 32 is then turned in a clockwise position to press valve plate 26 tightly against the removable end plate 18, thus closing the drainage ports 24 therein.

Drum 1 is then properly loaded with hot water or other washing solution which is introduced through valve equipped supply line 43. Of course, if steam is desired, this may be introduced in the drum 1 in a like manner. Then, under the rotation of drum 1, the clothes, or other articles being washed, will be carried through the wash water or other cleansing fluid and lifted by the inwardly projecting vanes 16 and thereby raised, dropped, and rolled over in the fluid until they have been completely cleaned. The washing compound may be applied in different ways, but preferably will be dissolved in the hot water source, where water is the cleaning fluid.

After the washing has been completed, and without stopping the rotation of the drum, hand wheel 32 is turned in a counter-clockwise direction so as to allow perforated end plate 18 and cover plate 26 to separate under the force of coil spring 34 which is compressed between the two. This separation of end plate 18 and valve plate 26, as best illustrated in Fig. 5, is adequate to permit escape of the fluid in the drum, through discharge ports 24. The rotation of the drum during draining permits a quick and thorough draining thereof without fear of escape from the drum of any of the articles being washed therein. The rinse water will then be turned into the drum through the supply line 43. Because the drum is still rotating with the discharge ports 24 in an open position, the discharge water will drain out of the ports 24 in one end of the tank while it is being introduced in the closed end of the drum. This feature is very important because it not only thoroughly rinses the clothes but does it in a shortest possible period of time.

To remove the clothes from the drum, end plate 18 is first removed in a manner already described.

While in the preferred embodiment of my invention I have shown guide pins 37 to keep the segmental valve plates in constant alignment with the perforated areas 25 of the end plate 18, it should be understood that both the guide pins 37 and the coil spring 34 could be omitted so as to permit rotation of the valve plate 26 to expose the perforations 24.

Furthermore, while I have shown the drainage ports 24 as being arranged in spaced segmental areas, it should be understood that drainage ports 24 could cover the complete surface of end plate 18 in which event a completely circular valve plate 26 would be used.

While I have described a commercial form of my invention it should be obvious that the same is subject to certain modifications without departing from the spirit of the invention, as defined in the appended claims.

What I claim is:

1. In a washing machine, a horizontally disposed rotary washing drum having a circumferentially spaced series of segmental perforated areas in one end thereof, a circumferentially spaced plurality of segmental valve plates connected near the axis of the drum end, each segmental valve plate overlying and normally covering a different segmental perforated area of the drum end, axial bosses on said drum end and on the connecting portion of said valve plates, a stud shaft mounted for rotation in the boss of the connecting portion of said valve plates and having screw-threaded engagement in the boss in the end of the drum, a hand wheel secured fast to the projecting outer end of said stud shaft, and spring means interposed between the perforated end of the drum and the valve plates normally tending to bias said valve plates out of contact with the end of said drum.

2. In a washing machine, a horizontally disposed open ended drum, a circular loading and unloading door adapted to be removably secured in the open end of said drum, said door having a plurality of circumferentially spaced drainage ports therein, a valve plate normally overlying and closing said ports, means mounting said valve plate on said door for axial movements with respect thereto to thereby open and close said ports, and means interposed between said door and said valve plate normally tending to bias said valve plate out of contact with said door.

3. In a washing machine, a horizontally disposed open-ended rotary washing drum, means remote from the open end of the drum for imparting rotary movements thereto, a fluid supply pipe communicating with the interior of said drum axially through the closed end thereof, a loading and unloading door in the nature of a perforate end plate adapted to be removably secured to the open end of said drum, a valve plate carried by said perforate end plate and normally overlying and closing the perforations in said end plate, and means for moving said valve plate axially with respect to said perforate end plate.

4. In a washing machine, a horizontally disposed open-ended rotary washing drum, means remote from the open end of the drum for imparting rotary movements thereto, a fluid supply pipe communicating with the interior of said drum axially through the closed end thereof, a loading and unloading door in the nature of a circular end plate adapted to be removably secured to the open end of said drum, said door being provided with a circumferentially spaced series of perforated areas, a circumferentially spaced plurality of segmental valve plates connected together near the axis of said door, each segmental plate overlying and normally covering a different perforated area in the removable door, and means mounting said valve plates on said door for axial movements with respect thereto, whereby to open and close the perforated areas in the door.

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REFERENCES CITED

The following references are of record in the file of this patent:

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