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W. F. SIMPSON
CLOTHES DRYING MACHINE

3,009,259

Filed Jan. 29, 1959

2 Sheets-Sheet 1

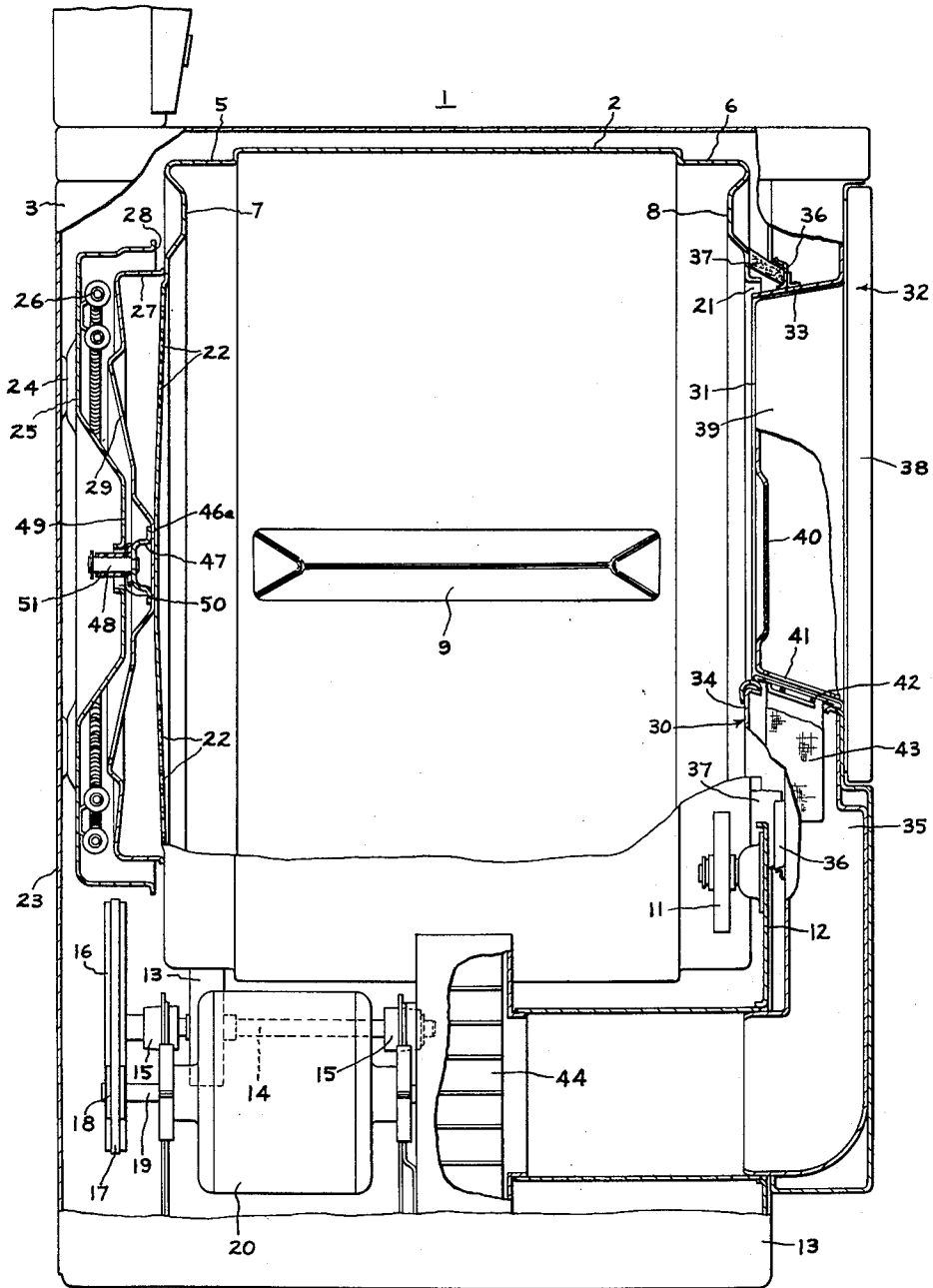


FIG. 1

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FIG. 2

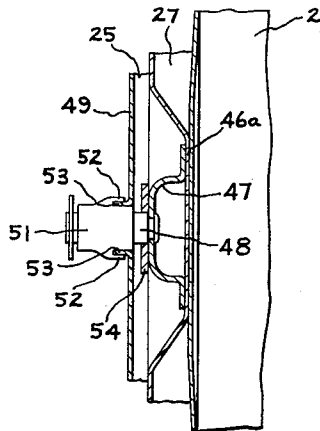
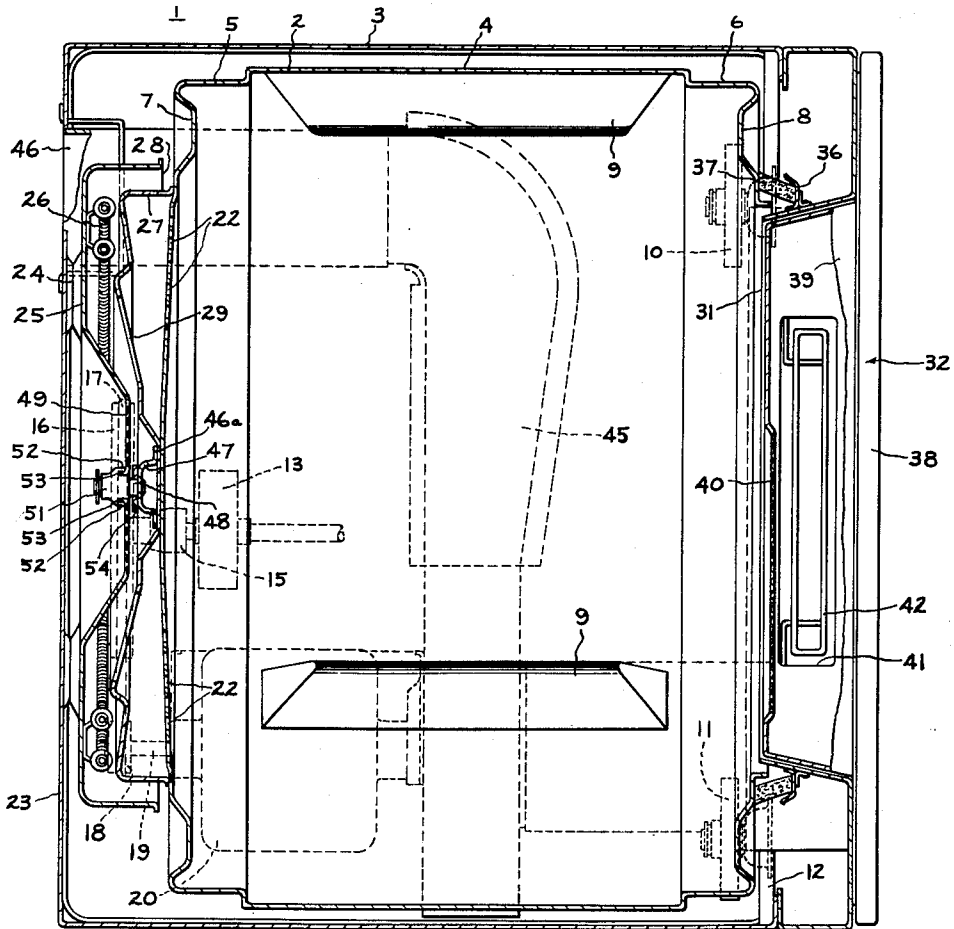


FIG. 3

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CLOTHES DRYING MACHINE

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 5 Claims. (Cl. 34-133)

My invention relates to clothes drying machines, and more particularly to arrangements for supporting and driving the clothes receptacle or drum which is provided in such machines for containing the clothes during the drying thereof.

An object of my invention is to provide an improved clothes dryer wherein means including a single driving roller supports the rotatable clothes drum, and separate means are provided to restrain sidewise and endwise motion without affecting the freedom of vertical motion of the drum.

A further object of my invention is to provide an improved clothes dryer wherein, by virtue of the vertical freedom of the drum and the driving of the drum by a single roller at one end thereof, the force of engagement of the drum with the roller is dependent purely upon the weight of the clothes in the drum; thus, the engaging force is commensurate with the need dictated by the weight of the clothes rather than being substantially constant for each type of clothes load.

In carrying out my invention in one form thereof, I provide a clothes drying machine with a rotatable clothes receptacle or drum. The drum has a generally circular cross section over at least a part of its length and means are provided for rotatably supporting the drum including a single drive roller which is positioned under the drum in driving engagement with the circular part thereof; the support means are arranged to cause the drum to rotate on a generally horizontal axis. Shaft means extend from at least one end of the drum coaxially therewith; by virtue of suitable bearing means, the shaft means, and consequently the drum, are restrained from endwise and sidewise movement. As an important feature of the invention, the bearing means is further formed to leave the shaft means entirely free to move in a vertical direction, so that the force of engagement of the drum with the drive roller is directly a function of the weight of the clothes in the drum.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention, however, both as to organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevational view of a clothes dryer incorporating my improved drive and support arrangement, the view being partly broken away and partly sectionalized to illustrate details;

FIGURE 2 is a horizontal sectional view of the dryer with the drum removed, and with certain surfaces broken away and partly sectionalized to illustrate further details; and

FIGURE 3 is an enlarged fragmentary view of a portion of FIGURE 2.

Referring now to the drawings, I have shown therein a domestic clothes dryer 1 which includes a clothes tumbling receptacle or drum 2 provided within a suitable outer casing or cabinet 3 which completely encloses it on all sides. The drum is mounted for rotation within cabinet 3 on a substantially horizontal axis, and is generally

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cylindrical in shape, having a first central outer wall portion 4, second and third outer wall portions 5 and 6 located respectively adjacent the ends of the drum, a back wall 7, and a front wall 8. Outer wall sections 4, 5 and 6 are imperforate over their entire length, so that the entire outer shell of the basket is imperforate; on the interior surface of central portion 4 there is provided a plurality of clothes tumbling ribs 9.

The front of drum 2 is rotatably supported within the the outer casing 3 by means of a pair of idler roller wheels 10 and 11 which are rotatably secured to the top of an upward extending member 12 secured at its bottom to the base 13 of the machine (FIGURE 1). It will be observed that rollers 10 and 11 are disposed beneath the drum in contact with portions 6 thereof so that the drum is free to rotate and is also free to move up away from rollers 10 and 11, that is, to bear against them more or less firmly depending on the gravitational force provided by the weight of the clothes in the drum. The rear end of drum 2 receives its support exclusively from a roller wheel 13 which is positioned beneath portion 5 of the drum in supporting and frictionally driving engagement therewith. While there is obviously a wide choice of suitable materials, one proven effective combination includes steel plate for the drum and relatively hard rubber on the order of sixty durometer units of hardness for the roller.

Roller 13 is mounted on a shaft 14 supported in bearings 15; shaft 14 is secured to a pulley 16 which is driven from a belt 17 in turn powered by a pulley 18 mounted on the end of shaft 19 of an electric motor 20. The motor pulleys and roller are so proportioned to drum 2 and to each other that drum 2 is rotated by roller 13 at an appropriate speed to provide tumbling action for articles of clothing placed therein. It will be observed that with the driving arrangement described, the driving roller 13 provides the support for the rear end of drum 2 so that the force with which the drum presses down on it is a direct reflection of the weight of the clothes in the basket.

In order that a stream of drying air may be introduced and passed through the clothes drum, the drum is provided with a central aperture 21 in its front wall 8 and with a plurality of perforations 22 extending in an annulus around its back wall 7. Rigidly secured to the rear wall 23 of casing 3 by any desired means such as, for instance, welding at suitable points 24, is a baffle member 25 which has secured thereto heating elements 26 appropriately insulated from the baffle member. Heating elements 26 may be annular in shape so as to be generally coextensive with the perforations 22 in drum 2. A baffle member 27 is rigidly secured to the back wall 7 of the drum outside the ring of perforations 22 and within the stationary baffle 25 so that an annular air inlet 28 is in effect formed by the two baffles 25 and 27. Baffle 27 is further provided with an annular series of openings 29; in this manner a passage is provided for air to enter annular opening 28 between the baffles, pass over the heating elements 26, through openings 29, and then through perforations 22 into the interior of drum member 2.

The front opening 21 of the drum is substantially closed by means of a stationary bulkhead generally indicated at 30. Bulkhead 30 is made up of a number of adjacent members including the inner surface 31 of an access door 32 mounted on the dryer cabinet, a stationary seat 33 for the door, the inner surface 34 of an exhaust duct 35 leading from the drum, and an annular flange 36 mounted on the seat 33 and on the duct wall. It will be noted that a suitable clearance is provided between the inner

edge of the drum opening 21 and the edge of bulkhead 30 so that there is no rubbing between the drum and the bulkhead during rotation of the drum. In order to prevent any substantial air leakage through opening 21 between the interior and the exterior of the drum a suitable ring seal 37, preferably formed of felt-like material, is secured to flange 36 in sealing relationship with the exterior surface of drum wall 8.

Front opening 21 in addition to serving as part of the air flow path through the drum, also serves as a means whereby clothes may be loaded into and unloaded from the drum. The door 32, whose inner surface forms part of the bulkhead closing the opening, is mounted on cabinet 3 and when the door is opened the clothes may be inserted into or removed from the drum through the door seat 33. It will be noted that the door includes an outer imperforate section 38 and an inwardly extending hollow section 39 mounted on the flat section. Hollow section 39 extends into the door seat 33 when the door is closed, and the door surface 31 which comprises part of the combination bulkhead 30 is actually the inner wall of this hollow section.

The air outlet from the basket is provided by a perforated opening 40 formed in the inner wall 31 of hollow door section 39. The bottom wall of door section 39 and the adjacent wall of door seat 33 are provided with aligned openings 41 and 42, opening 42 providing the entrance to duct 35. As shown, a lint trap 43, which may comprise a fine mesh bag, is preferably positioned in exhaust duct 35 at opening 42, the bag being supported by the door seat 33.

Duct 35 leads to suitable air moving means which may, as shown, comprise a centrifugal blower 44 mounted on the motor shaft and thus driven by motor 20. The outlet of blower 44 communicates with an outlet duct 45 which extends to an opening 46 in the back 23 of cabinet 3. During operation of motor 20, the rotation of blower 44 causes air to be drawn into cabinet 3 through suitable openings (not shown), through annular opening 28 over heaters 26, through openings 29 and perforations 22 into drum 2, across the drum; through screened opening 40 and aligned openings 41 and 42 into duct 35, and then through the blower, the outlet duct 45, and opening 46 to atmosphere.

Secured to the center portion 46a of baffle 27 is a bracket 47, and, in turn, secured to the bracket is a stub shaft member 48 which is substantially coaxial with drum 2. The central portion 49 of baffle 25, which is aligned with the central portion 46a of baffle 27, has an opening 50 formed therein in the form of a slot with a relatively large vertical dimension (FIGURE 1) and a relatively small horizontal dimension (FIGURES 2 and 3). A member 51 secured on shaft 48 at the point where it extends through opening 50; member 51 is formed with small flanges 52 on each side thereof which lap over vertical flanges 53 formed on each side of opening 50 so that shaft 48 and member 51 are guided for movement in a vertical direction by the engagement of the flanges 52 and 53. It will be seen that the engagement of the flanges prevents sidewise movement.

Endwise movement of shaft 48 to the right, as viewed in FIGURE 2, is also prevented by engagement to the flanges. Movement of the shaft to the left is precluded by provision of a suitable washer member 54 secured to the stub shaft which engages baffle portion 49 whenever there is any movement of the stub shaft to the left. Thus, in effect, the stub shaft 48 is held from endwise movement and from sidewise movement by its engagement with the bearing means formed by the opening 50 in baffle portion 49. However, as can be seen by particular reference to FIGURE 1, there is ample space above and below shaft 48 and member 51 in opening 50 for the degree of vertical movement which drum 2 undergoes as a result of the driving motion and the tumbling clothes. Thus, the restraint of the bearing means is only against sidewise

and endwise movement and does not interfere at all with any vertical movement of the drum as it is rotated.

By thus making the drum entirely free in the vertical direction insofar as the bearing support is concerned, the force of engagement of the drum 2 with roller 13 is a function of the weight of clothes in the drum, i.e., the greater the weight of clothes the harder the drum will press down on roller 13. This is most desirable in that as the weight of clothes increases a greater amount of force pressing the drum and roller together is needed for the frictional drive to be effective. The construction provided automatically effects this desired result, so that with light loads there is only a light force causing engagement of the drum and the roller; therefore when such light loads are dried, there will be substantially less wear on the roller than for heavy loads which require a greater force providing the frictional engagement. Inasmuch as suitable frictional materials have some tendency to wear through the life of the machine, it will readily be seen that this wearing tendency is held to a minimum by providing the minimum engaging force necessary for each load rather than a constant engaging force which, of course, must be adequate for driving the heavy loads as well as the lighter loads. It will also be seen that the entire weight of the drum support is put on the rollers, the bearing means has only the function of steadying or balancing the drum on the rollers. Therefore, the bearing means may be most economically manufactured; the illustrated construction, wherein the bearing means are formed within relatively light metal baffles, is illustrative of the economies which may be effected.

While in accordance with the patent statutes I have shown what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the invention, and I therefore aim to cover in the appended claims all such equivalent variations as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A clothes dryer comprising a drum having a generally circular cross-section over at least a part of its length adjacent one end thereof, means rotatably supporting said drum adjacent the other end thereof, drive means for rotating said drum consisting of a single drive roller and means for rotating said roller, said roller being positioned under said drum in supporting and in frictional drive relation to said circular drum part, said support means and said roller supporting said drum for rotation on a generally horizontal axis, shaft means extending coaxially from said drum at at least said one end thereof, and thrust bearing means formed to restrain said shaft means from endwise and sidewise movement but to provide for freedom of movement thereof in a vertical direction whereby the force of engagement of said drum with said roller is directly a function of the weight of clothes in said drum.

2. The apparatus defined in claim 1 wherein said drum is substantially cylindrical over the full length thereof.

3. The apparatus defined in claim 1 wherein said bearing means includes a member having a vertical slot formed therein, said shaft means extending through said vertical slot substantially in engagement with the sides thereof thereby to prevent sidewise movement, said vertical slot having a length sufficient to leave said shaft means freedom of vertical movement subject only to support by said drive roller.

4. The apparatus defined in claim 1 wherein said means rotatably supporting the other end of said drum comprise a pair of idler rollers respectively positioned under each side of said other end of said drum in engagement therewith.

5. A clothes dryer comprising a generally cylindrical drum having an imperforate cylindrical outer wall and

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having end walls formed with openings therein for admission of air to and emission of air from the drum, means rotatably supporting said drum adjacent the front end thereof, a single drive roller positioned under said drum in supporting relation and in frictional drive relation thereto adjacent the rear end thereof, said support means and said roller supporting said drum for rotation on a generally horizontal axis, means for rotating said roller to drive said drum, stationary baffle means positioned coaxially with said drum behind the rear wall thereof, air heating means secured between said baffle and said drum rear wall, said baffle means having a substantially vertical slot formed coaxially with said drum, shaft means extending coaxially from said drum through said slot, said slot restraining said shaft means from sidewise move-

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ment and leaving said shaft means free to move in a vertical direction, means adjacent said slot for preventing endwise movement of said shaft means, and air circulating means for causing air to pass between said baffle and the rear wall of said drum, over said heating means, through said rear wall opening into said drum, and through said front wall opening out of said drum.

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