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LAUNDRY DRIER WITH SPRINKLING DEVICE

Filed April 25, 1958

3 Sheets-Sheet 1

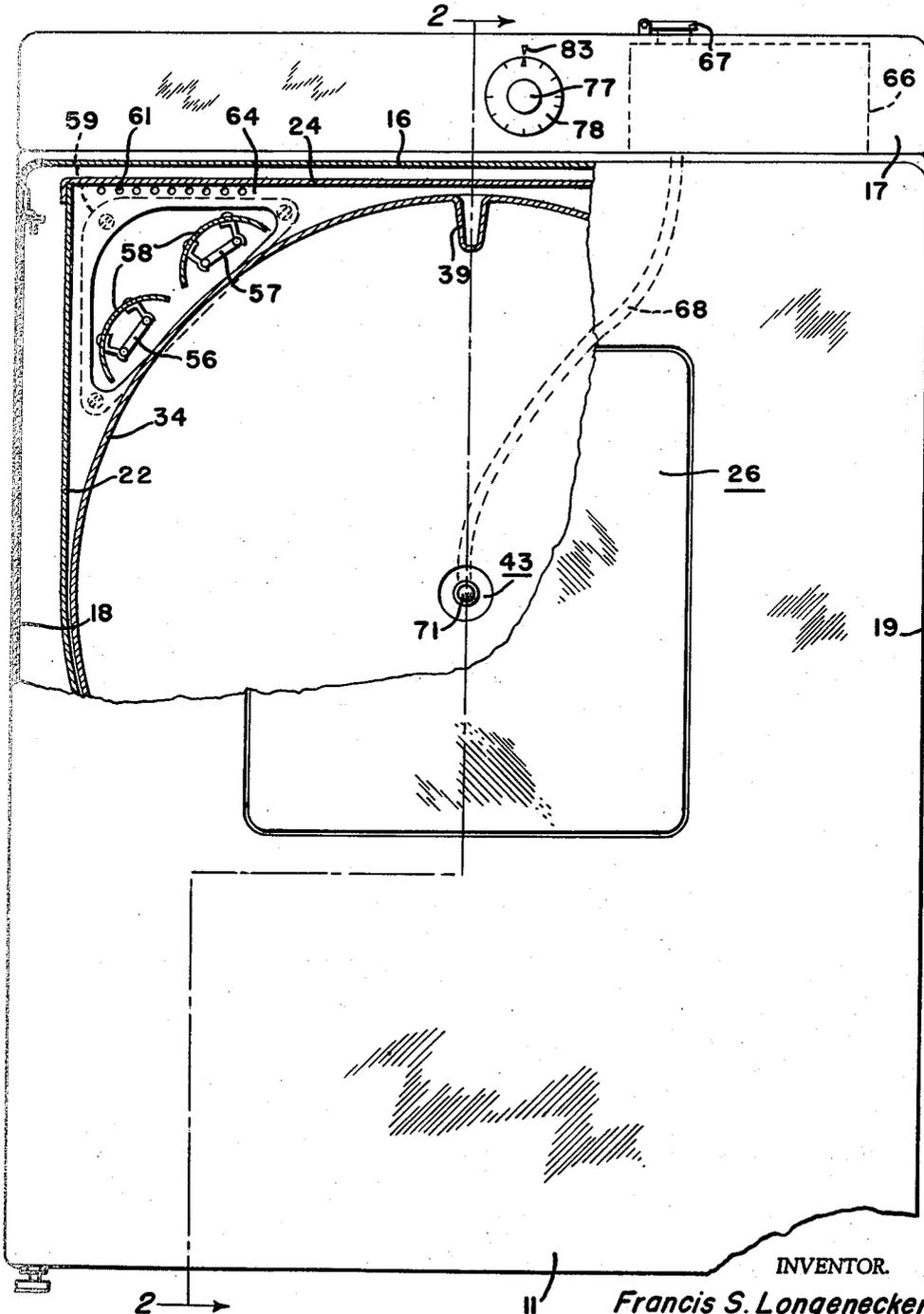


Fig. 1

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3 Sheets-Sheet 3

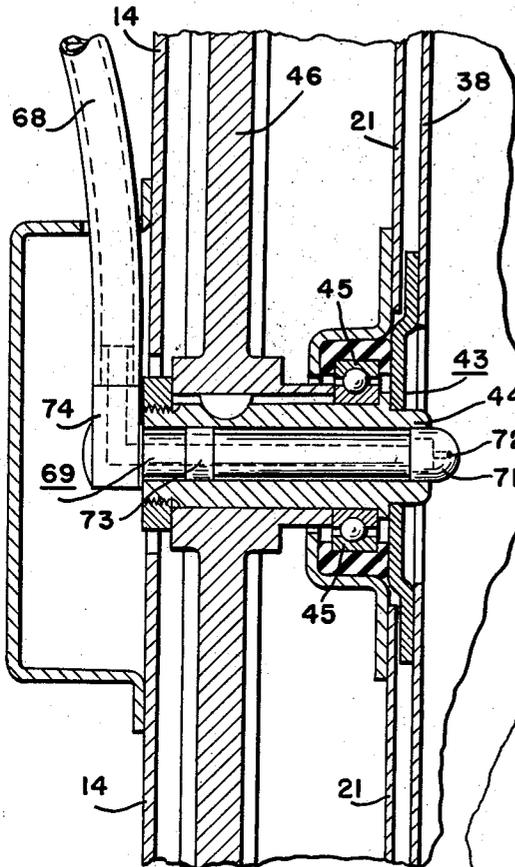


Fig. 3

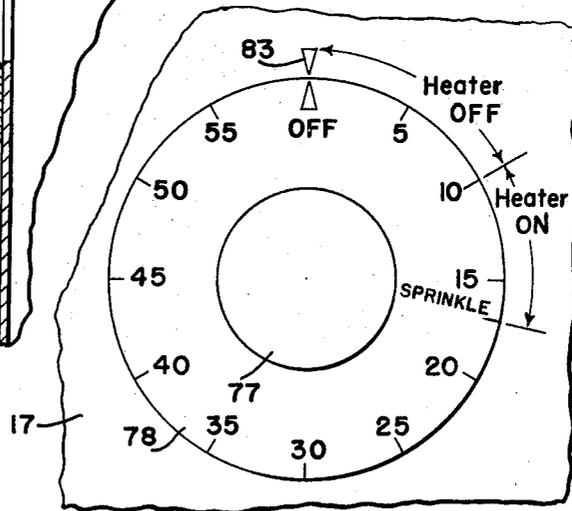


Fig. 4

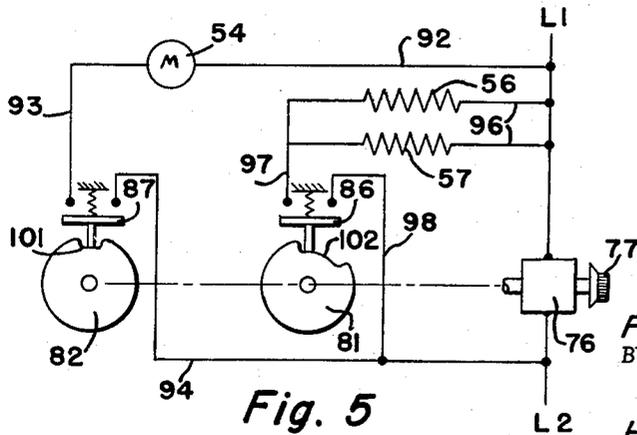


Fig. 5

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2,958,954

**LAUNDRY DRIER WITH SPRINKLING DEVICE**

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6 Claims. (Cl. 34—45)

This invention relates to clothes drying machines and particularly to such machines having means incorporated therein for spraying a clothes conditioning liquid onto clothes dried therein.

An object of this invention is to provide a clothes drying machine with an improved liquid sprinkler or spray arrangement to prepare clothes dried in the machine for ironing.

Another object of this invention is to provide a novel and improved liquid spray means in a clothes drying machine the operation of which is independent of a clothes drying cycle of the machine, at the option of the operator thereof and is effective only upon placing a predetermined amount of water in a water reservoir associated with the machine.

A further object of this invention is to provide a clothes conditioning spray means in a clothes drying machine which is controlled by resetting a settable drying cycle timer control of the machine to heat and simultaneously tumble the clothes in the machine for a given period of time while spraying water thereon and to continue to tumble the clothes after they have been sprayed for a predetermined interval of time without application of heat to the moistened clothes.

In carrying out the foregoing objects it is a still further and more specific object of this invention to extend a water sprinkler conduit through a hollow driving shaft upon which a rotatable clothes tumbling drum of a clothes drying machine is mounted so that a nozzle end of the conduit is exposed to the interior of the drum at a location therein to effectively spray water onto the clothes while they are being rotated and tumbled for homogeneously moistening the clothes.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a front view of a clothes drying machine partly in section having the present invention incorporated therein;

Figure 2 is a vertical sectional view of the machine taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary sectional view showing the mounting of a water conduit within a hollow driving shaft for the clothes tumbling drum of the machine;

Figure 4 is a fragmentary view showing a manually settable knob of a timer control which initiates a drying cycle of the machine and which is also resettable to initiate a clothes moistening cycle of the machine; and

Figure 5 is a diagrammatic illustration of the timer control and electric circuit for elements of the clothes drying machine.

Referring to the drawings there is shown in Figure 1 thereof a clothes drying machine including a cabinet comprising an outer stationary rectangular shaped casing

provided with a front sheet metal panel or wall 11, a sheet metal base 12, a sheet metal rear wall 14, a sheet metal top wall 16 having the raised back splasher housing 17 and side walls 18 and 19 (see Figures 1 and 2). The front wall 11 and side walls 18 and 19 are integral and are of the wrap-around type wherein the ends of the sheet metal are flanged inwardly at the rear of the cabinet to provide a mounting for removably securing back plate 14 to the cabinet. Base plate 12 is welded to the front wall 11 and to side walls 18 and 19. The top wall 16 of the cabinet is secured to the front and side walls 11, 18 and 19 respectively in any desired or well-known manner to complete the outer box-like casing. The cabinet of the drying machine also comprises a stationary inner casing including a sheet metal back wall 21, a U-shaped metal wall 22, a front sheet metal wall 23 and a top wall 24 placed over and suitably secured to the upper edge of walls 21, 22 and 23. This inner casing may be substantially surrounded with any suitable or desirable insulating material as is conventional in the art. Front wall 11 of the outer casing is provided with an opening normally closed by door 26. This door 26 also normally closes a flanged opening 27 provided in front panel 28 and is hingedly mounted on the cabinet front. An opening in the bottom of the U-shaped wall 22 of the inner casing provides communication between the interior of the inner casing and the interior of the outer casing for circulation of air from the inner casing through a heat exchanger of any suitable or conventional construction which condenses moisture out of heated moisture-laden drying air induced into the inner casing.

A damp clothes receiving container or tumbling drum is rotatably located within walls of the stationary inner casing of the cabinet. The container or drum includes a cylindrical sheet metal wall 34 having a plurality of holes or perforations 36 therethrough and front and rear walls 37 and 38 respectively. Cylindrical wall 34 of the clothes drum is provided with integrally formed and inwardly directed vanes or drag members 39. Front wall 37 of the drum is provided with a round opening bounded by flange 41 which registers with the opening 27 and surrounds the flanged wall thereof. A plurality of spaced apart rollers or the like bear against the flange 41 and rotatably support the clothes tumbling drum at the front of the cabinet. The axis of rotation of the clothes container or drum is formed by a hub 43 in the back thereof. Flanged hub 43 is welded or riveted to the back wall 38 of the drum and includes a hollow shaft 44 extending through a bearing 45 carried by or upon wall 21 of the inner cabinet casing (see Figure 3). Shaft 44 of hub 43 on the clothes drum has a large pulley wheel 46 keyed thereto and a belt 47 surrounding this pulley extends around a smaller pulley wheel 48 mounted on a shaft carried by the cabinet back wall 21 of the inner stationary casing. Another large pulley 49 has a belt 51 thereon which extends over another small pulley 52. The pulley 52 is keyed to a drive shaft extension 53 which passes through the rear wall 21 of the inner casing and is connected to the shaft of an electric driving motor 54 located in the dryer cabinet in the space between the inner and outer stationary casings thereof. This speed reducing belt and pulley means rotates the hollow shaft 44 and consequently the clothes tumbling drum within the inner stationary casing of the cabinet. Means including electric heaters 56 and 57 are provided in the cabinet for extracting moisture from damp clothes placed in the clothes tumbling drum. These heaters 56 and 57 are mounted on arcuate-shaped reflectors or the like 58 which are carried by a plate 59 removably attached at one side of the upper portion of back wall 21 of the inner casing. Heaters 56 and 57 extend inwardly of

wall 21 over a substantial portion of the rotatable clothes drum and are connected to a source of electric current supply through a manually settable timer or chronometrically operated control of conventional construction to be hereinafter more specifically referred to. Holes 61 in plate 64 or in the upper portion of rear wall 21 of the inner casing serve to permit air from exteriorly of the outer casing to enter the inner casing above the heaters 56 and 57. Air passing through the holes 61 may enter the space between the inner and outer casings by way of an opening or openings 62 provided at the top of rear wall 14. A fan or blower 63 mounted on the shaft of electric driving motor 54, on the side thereof opposite shaft 53, induces both a heat exchanger cooling circulation of air into and out of the dryer cabinet and a circulation of air through holes 61 over heaters 56 and 57 and over damp clothes placed in the tumbling drum. The moisture-laden air passing through the drum leaves the lower portion of the inner casing and is circulated through a heat exchanger and lint trap device before being expelled by fan or blower 63 out of the dryer cabinet by way of a suitable opening 64 in the cabinet front wall adjacent the blower. The construction of the dryer cabinet and circulation of air therethrough, to effect drying of damp clothes placed in the clothes tumbling drum, is more or less conventional and for a full or detailed description of the present drying machine reference is hereby made to the F. H. McCormick Patent #2,752,694, dated July 3, 1956.

In accordance with the present invention there is provided in the dryer cabinet an arrangement for conditioning or preparing clothes dried therein for ironing. This arrangement includes a water tank or reservoir 66 mounted within the confines of back splasher housing 17 (see Figure 2). Tank or reservoir 66 has a water filling neck portion or inlet port projecting through the top of housing 17 and provided with a hinged closure or lid 67 for loosely covering the inlet port of the tank. The arrangement also includes a hose 68 attached to a bottom water outlet port of reservoir or tank 66 which hose has its lower end connected to a stationary non-metallic conduit 69 extending through the hollow of shaft 44 of the clothes tumbling drum (see Figure 3). This non-metallic or molded plastic conduit 69 is in the form of a hollow shaft on which an end cap or nozzle 71 is secured. Cap or nozzle 71 is provided with an angularly disposed outlet opening or orifice 72 through which water is adapted to be sprinkled or sprayed. Conduit 69 has a raised portion 73 thereon and this raised portion together with the cap 71 form bearings for stationarily supporting the conduit within the hole of the rotatable hollow shaft 44. The stationary conduit 69 is provided at its rear end with a nipple or fitting 74 to which the lower end of hose 68 is attached.

The back splasher housing 17 on the dryer cabinet is adapted to contain a suitable timer motor or control 76 which is adjustable or settable by a knob 77 thereon for controlling energization of motor 54 and heaters 56 and 57 throughout a predetermined timed duration or drying cycle of the drying machine. Such a motor or timer control is conventional and well known to those skilled in the art. Knob 77 has dial part 78 thereon (see Figure 4) which is suitably calibrated to indicate to the operator of the dryer machine different lengths of time of a clothes drying cycle. For example the dial 78 is calibrated throughout 360° therearound at spaced apart five minute points as shown in Figure 4 of the drawings. This dial is also marked at substantially a seventeen minute point thereon for a water sprinkling cycle of the machine which cycle is ineffective during a clothes drying cycle and rendered effective only upon pouring water into tank or reservoir 66 and substantially simultaneously therewith resetting knob 77 for a sprinkle or spray cycle. The timer motor or control 76 includes a timed rotatable shaft carrying cams 81 and 82 rotating therewith which

cams control energization and deenergization of motor 54 and heaters 56 and 57.

To initiate a drying cycle of the machine, for extracting moisture from damp clothes placed in the tumbling drum thereof, knob 77 and the dial 78 integral therewith is manually rotated to any desired or predetermined point in the "Dry" range, indicated on dial 78, with respect to a stationary indicator 83 on housing 17. This turns cam 81 together with cam 82 on the timer motor shaft and simultaneously closes the switches 86 and 87 (see Figure 5). With switches 86 and 87 closed, current flows to the timer motor 76 through a circuit including conductor L1, wire 92, motor 54, wire 93, switch 87 and wire 94 back to the conductor L2 and through a circuit including the conductor L1, wires 96, heaters 56 and 57, wire 97, switch 86 and wires 98 and 94 back to the conductor L2. Timer 76 thus rotates continuously advancing the cams 81 and 82, from the timed setting thereof by knob 77, until such time as a recessed portion 101 in the periphery of cam 82 is reached whereupon switch 87 is opened to break the timer circuit. Drive motor 54 rotates blower 63 and the clothes tumbling drum and the heaters 56 and 57 are energized as long as the cams 81 and 82 hold switches 86 and 87 closed.

It is to be noted that cam 81 is provided with an elongated recessed portion 102 in its periphery which corresponds in length of time of operation of timer 76 to that indicated by the "Heat Off" marks in Figure 4 of the drawings which in the present disclosure amounts to approximately ten minutes. Thus when the cam follower on switch 86 drops into the recessed portion 102 of cam 81 switch 86 opens prior to lapse of a predetermined timed duration of energization of driving motor 54 and timer motor 76 by cam 82 and switch 87. This provides, before rotation of the clothes tumbling drum is stopped, a "Cool Down" period for the tumbling clothes near the end of a drying cycle after which the dried clothes may be removed from the drying machine or they may be permitted to remain therein in a dry condition. The blower 63 operates throughout the predetermined timed duration or drying cycle of operation of the clothes drum since a steady flow of air over heaters 56 and 57 into the drum and out of the machine is desired.

In sprinkling dried clothes in a clothes drying machine of the type herein disclosed it has been discovered that the dried clothes tumbling in the drum while being sprayed with water are more advantageously or homogeneously moistened if heat is applied to the clothes during the spraying operation. Thus in the present invention the clothes are heated during part of a tumbling and moistening period thereof in the clothes tumbling drum after which they are continued to be tumbled without application of heat thereto to cool the moistened clothes. This is accomplished by the elongated recess 102 in cam 81 and the "Heater On" marks indicated in Figure 4 of the drawings. Suppose that it is now desired to remoisten dried clothes left in the drum of the drying machine to condition or prepare them for ironing. To sprinkle the dry clothes, lid or cover 67 on tank or reservoir 66 is opened and fresh water is poured into the reservoir or tank. Immediately after or simultaneously with this water pouring act knob 77 of timer motor 76 is rotated and reset with the "Sprinkler" mark on dial 78 registering with the indicator 83 on housing 17. Resetting of timer 76 in this manner completes an electric circuit to the timer motor for operating same and causes the cam follower on each of the switches 86 and 87 to close these switches for energizing motor 54 and heaters 56 and 57 for a period of time less than a predetermined timed duration of a normal clothes drying cycle of the machine. Water poured into tank or reservoir 66 flows by gravity therefrom, by way of hose 68, into stationary conduit 69 and is discharged from this conduit in a spray onto clothes being heated and tumbled in the tumbling drum by the

outlet hole or orifice 72. The application of heat to warm the clothes while they are being gravitationally sprayed with water causes the clothes to be moistened in a homogeneous fashion to better condition them for ironing. As timer motor 76 continues to operate, the cam follower on switch 86 drops into the recessed portion 102 of cam 81 after lapse of approximately seven minutes of the lesser timed sprinkling period of operation of the machine to open switch 86 and deenergize the heaters 56 and 57. At this time cam 82 holds switch 87 closed for approximately ten more minutes of operation of the machine whereby the moistened clothes are continued to be tumbled, without application of heat thereto, whereby the remoistened warm clothes are cooled in the tumbling drum. When the cam follower on switch 87 drops into the recess 101 of cam 82 this switch opens to deenergize blower and drum tumbling motor 54 and also the timer motor 76 whereupon operation of the machine is stopped thus terminating a short or approximately seventeen minute tumbling, heating and clothes moistening cycle thereof. The homogeneously remoistened clothes may then be removed from the drying machine and transported to a point where they are to be ironed.

The sprinkling arrangement herein disclosed provides for conditioning or remoistening dried clothes at the option of the operator of the drying machine and the effectiveness of the sprinkler may be varied to meet different loads of clothes in the machine. For example if a smaller or larger than ordinary load of clothes are dried in the machine the operator can properly condition or remoisten clothes of such variable loads by pouring a lesser or a greater amount of water into the tank or reservoir 66. Thus an over and/or under moistening of different loads of clothes in the tumbling drum of the drying machine is prevented by instinct of the operator after actual practice of a few sprinkling cycles. For example the operator soon becomes adept to the desired amount of water to be poured into the water tank 66 for a given load of clothes contained in the tumbling drum. In the arrangement disclosed dried clothes may be removed from the drying machine without being remoistened or the dry clothes may be left in the machine until such time as they are desired to be remoistened and ironed. The clothes may be removed from the machine and later replaced therein for a sprinkling operation thereof without necessity of operating the machine through a clothes drying cycle. While a gravitational flow of water to the sprinkler nozzle in the clothes drum is herein disclosed it is within the realm of the invention to connect the spray or sprinkler nozzle of the drying machine to a source of water under pressure if desired. In such case an electrically actuated solenoid or the like valve would be installed in suitable plumbing connections, intermediate the supply of water and the conduit of the sprinkler nozzle, with this valve interposed in an electric circuit including a control switch for the valve operable by the operator at the time the machine is energized to carry out a clothes sprinkling or remoistening cycle as should be well known by those skilled in the art.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A dryer comprising, an outer casing, a clothes tumbling drum within said casing, said drum being supported on and rotatable by a hollow shaft mounted on said casing, a conduit extended through said hollow shaft and having a nozzle end exposed to the interior of said drum, said conduit being connected to a source of liquid supply and adapted to spray the liquid through said nozzle onto dried clothes contained in said drum, a motor for driving said shaft to rotate said drum, an electric heater for warming the interior of said drum, a timer control, an electric circuit for said motor, said heater and said timer control,

a first switch in the electric circuit of said timer control and said motor, a second switch in the electric circuit of said timer control and said heater, means operated by said timer control for actuating said switches, said timer control being settable when liquid is to be sprayed onto dried clothes within said drum, the setting of said control causing said means to simultaneously close both of said switches for energizing said motor and said heater to tumble the clothes and warm them while spraying liquid thereon whereby the clothes better absorb the liquid, said means actuating said second switch to open same independently of said first switch for deenergizing said heater prior to deenergizing said motor to thereby continue tumbling of the moistened clothes in said drum without application of heat thereto, and said means actuating said first switch to open same and deenergize said motor after a predetermined timed rotation of said drum.

2. A dryer comprising, an outer casing, a clothes tumbling drum within said casing, said drum being supported on and rotatable by a hollow shaft mounted on said casing, a conduit extended through said hollow shaft and having a nozzle end exposed to the interior of said drum, said conduit being connected to a reservoir located at the upper portion of said dryer above said shaft and adapted to gravitationally spray liquid poured therein through said nozzle onto dried clothes contained in said drum, a motor for driving said shaft to rotate said drum, an electric heater for warming the interior of said drum, a timer control, an electric circuit for said motor, said heater and said timer control, a first switch in the electric circuit of said timer control and said motor, a second switch in the electric circuit of said timer control and said heater, means operated by said timer control for actuating said switches, said timer control being settable when liquid is to be sprayed onto dried clothes within said drum, the setting of said control causing said means to simultaneously close both of said switches for energizing said motor and said heater to tumble the clothes and warm them while spraying liquid thereon for moistening the clothes in a homogeneous fashion, said means actuating said second switch to open same independently of said first switch for deenergizing said heater prior to deenergizing said motor to thereby continue tumbling of the moistened clothes in said drum without application of heat thereto, and said means actuating said first switch to open same and deenergize said motor after a predetermined timed rotation of said drum.

3. A clothes drying machine comprising, a generally rectangular shaped casing, a perforated drum rotatably supported within said casing, the central portion of one end of said drum being mounted by a hollow shaft on a stationary part of said casing, the other end of said drum having a central access opening therein aligned with a closure member therefor movably mounted on a wall of said casing, means for driving said hollow shaft to rotate said drum, a heater for warming the interior of said drum, a blower for circulating air into said casing through said drum over clothes contained therein and out of the casing, said means including a single motor for rotating said drum and for operating said blower, said motor, said blower and said heater all being mounted within said casing and transportable therewith as a unit, a conduit extended through said hollow shaft and having a nozzle end exposed to the interior of said drum, said conduit being connected to a source of liquid supply adapted to be sprayed by said nozzle onto clothes in said drum, a timer control, an electric circuit for said motor, said heater and said timer control, switch means in said electric circuit actuated by said timer control, and said timer control be manually settable when liquid is to be sprayed onto clothes within said drum for closing said switch means and energizing said motor, said heater and said blower throughout a predetermined timed duration for moistening the clothes while warming and tumbling them in the drum, said

timer control opening said switch means automatically in response to elapse of said predetermined timed duration of rotation of said drum for deenergizing said motor, said heater and said blower.

4. A clothes drying machine comprising, a generally rectilinear shaped casing, a perforated drum rotatably supported within said casing, the central portion of one end of said drum being mounted by a hollow shaft on a stationary part of said casing, the other end of said drum having a central access opening therein aligned with a closure member therefor movably mounted on a wall of said casing, means for driving said hollow shaft to rotate said drum, a heater for warming the interior of said drum, a blower for circulating air into said casing through said drum over clothes contained therein and out of the casing, said means including a single motor for rotating said drum and for operating said blower, said motor, said blower and said heater all being mounted within said casing and transportable therewith as a unit, a conduit extended through said hollow shaft and having a nozzle end exposed to the interior of said drum, said conduit being connected to a source of liquid supply adapted to be sprayed by said nozzle onto clothes in said drum, a timer control, an electric circuit for said motor, said heater and said timer control, switch means having a part thereof connected to said timer control and operated thereby, said switch means including first contacts in the electric circuit of said timer control and said motor and second contacts in the electric circuit of said timer control and said heater, said control being settable when liquid is to be sprayed onto clothes within said drum and operating said switch means to close both said first and said second contacts in the electric circuit for simultaneously energizing said heater, said motor and said blower to tumble clothes in said drum while liquid is being sprayed on them throughout a predetermined timed duration for warming and moistening the clothes, and said control operating said switch means to open said second contacts prior to opening said first contacts for deenergizing said heater during the latter part of said predetermined timed duration of rotation of said drum whereby the moistened clothes are fluffed and cooled by air circulating thereover before expiration of said predetermined timed drum rotation.

5. In a dryer, a generally rectilinear shaped outer casing, a fabric receiving and tumbling drum within said casing, said drum being supported on and rotatable by a hollow stub shaft mounted on an upright wall portion of said dryer, said stub shaft having an inner end terminated inwardly of said drum adjacent one side thereof so as not to form an obstruction within the drum to fabrics to be tumbled therein, a motor for driving said stub shaft to rotate said drum, a heater for heating the interior of said drum, an electric circuit for energizing and deenergizing said motor and rendering said heater effective and

ineffective, a settable timer control for initiating a first cycle of operation of the dryer with said motor energized and rotating said drum and said heater effective to tumble, heat and dry damp fabrics inserted in the drum, said timer control also being resettable to initiate a predetermined second cycle of operation of the dryer in which said drum is rotated throughout a period of time shorter than the rotation thereof in said first cycle of operation of the dryer, means for moistening dried fabrics contained in said drum during at least a portion of said second cycle of rotation thereof, said means comprising a conduit separate from and independent of said stub shaft and disposed in the hollow thereof connected at its outer end by a conduit to a reservoir located on a stationary upper part of said casing above the shaft and a nozzle on said conduit at said inner end of said stub shaft whereby liquid placed in said reservoir is gravitationally sprayed through said nozzle from the axis of said shaft into said drum at said one side thereof onto the fabrics therein to be moistened.

6. In a dryer, a generally rectilinear shaped outer casing, a fabric receiving and tumbling drum within said casing, said drum being supported on and rotatable about the axis of a stub shaft mounted on an upright portion of said dryer, said stub shaft having an inner end in engagement with said drum adjacent one side thereof so as not to form an obstruction within the drum to fabrics to be tumbled therein, a motor for rotating said drum, a heater disposed within said casing for heating the interior of said drum, an electric circuit for energizing and deenergizing said motor and for rendering said heater effective and ineffective, a settable timer control for initiating a cycle of operation of the dryer with said motor energized and said heater effective to tumble, heat and dry damp fabrics inserted into said drum, said timer control also being settable to initiate another cycle of operation of said dryer, means for moistening dried fabrics contained in said drum during at least a portion of one of said cycles of operation of the dryer, said means comprising a passageway enclosed in said stub shaft connected at its outer end by a conduit to a reservoir located on a stationary upper part of said dryer above the shaft and a nozzle on said inner end of said stub shaft whereby liquid placed in said reservoir is gravitationally sprayed through said nozzle from the axis of said shaft into said drum at said one side thereof onto the fabrics therein to be moistened.

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