

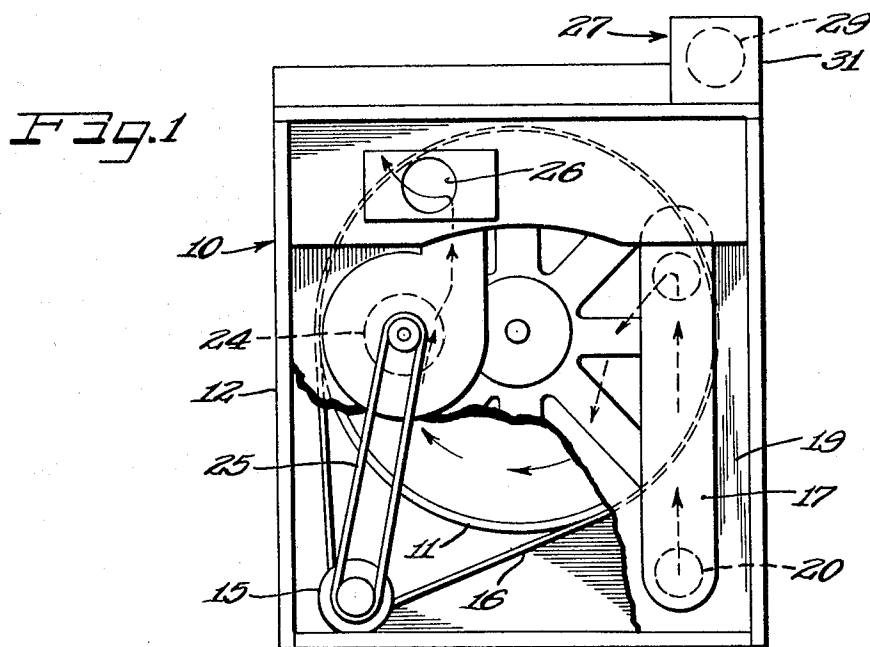
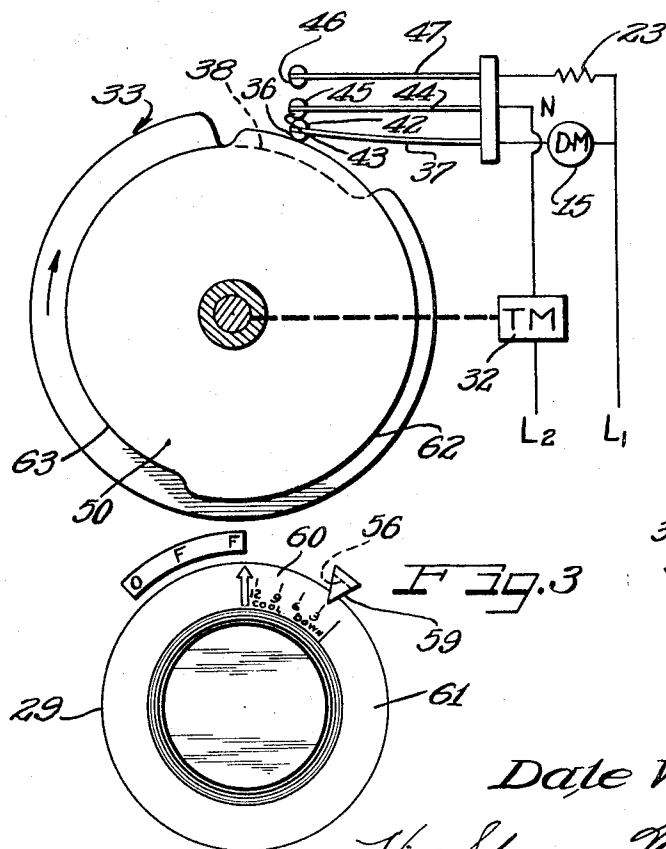
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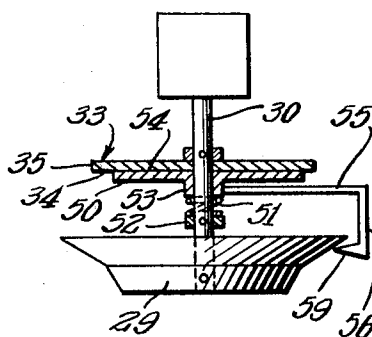
ADJUSTABLE COOL-DOWN CONTROL FOR DRYER CYCLE

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F 39.4

Fig. 2



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ADJUSTABLE COOL-DOWN CONTROL FOR DRYER CYCLE

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3 Claims. (Cl. 34-45)

This invention relates to improvements in clothes dryers and more particularly relates to a control system for a clothes dryer wherein a cool down period compatible with the size and type of load being dried may be pre-selected.

The invention specifically relates to a clothes dryer and sequential controlling mechanism therefor, in which the programming of one or more of the sequential operations of a fabric treatment cycle, such as the cool-down period or "heat-off" period, may be adjusted or modified with respect to the duration of another operation of the treatment cycle or "heat-on" period.

The control mechanism includes a timer mechanism incorporating a motor driven shaft having at least one cam thereon regulating the heating of the air stream supplied to the dryer drum and the termination of the fabric treatment cycle and having modifying cam means associated therewith which may be so arranged as to vary the length of an operation in the cycle of fabric treatment by manual positioning of the modifying cam.

In the disclosed embodiment of the invention, the modifying cam is adapted to provide a cool-down time of a clothes drying apparatus in which the heat is turned off and the blower and tumbling drum continue to operate, although it should be understood that the principles of the present invention may also be applied toward modifying the "heat-on" time as well as the "cool-down" time.

A principal object of the present invention is to provide a clothes dryer and control therefor operable to selectively provide an operation in the fabric treatment cycle of a clothes dryer in addition to the heating operation, the length of time of which may readily be varied.

Another object of the invention is to provide an improved form of control means for controlling the cycle of operation of a clothes dryer in which a cool-down time of the treatment cycle may be provided and selected in accordance with the size of load and material to be dried.

Another object of the invention is to provide a sequential controller particularly adapted to control the treatment cycle of a domestic clothes dryer including a cam driven by a timer motor and positionable to control the "heat-on" time of drying and a second cam rotatable therewith and adjustable relative thereto to modify the contour of the control cam and thereby provide cool-down time of the clothes dryer which may readily be adjusted.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawing wherein:

FIGURE 1 is a diagrammatic view of a domestic clothes dryer looking at the dryer from the back thereof with certain parts of the back cover broken away;

FIGURE 2 is a top plan view of the timer shaft and cams of a timer for domestic clothes dryer showing the control cams in horizontal section;

FIGURE 3 is an end view of the dial knob shown in FIGURE 2 and showing the control means for varying the cool-down time of the dryer; and

FIGURE 4 is a diagrammatic view illustrating the

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timer and modifying cams and the control circuit to the heater and dryer drum motor.

In the embodiment of the invention illustrated in the drawings, I have shown in FIGURE 1, in general diagrammatic form, a clothes dryer 10 having a control therefor of a type suitable for carrying out my invention. The clothes dryer 10 generally includes a tumbler drum 11 rotatably journaled in a cabinet 12 for the clothes dryer. The tumbler drum 11 is driven from a motor 15, to tumble clothes therein, through a conventional form of belt drive 16. A heater duct 17 extends vertically along a back plate 19, extending along the back of the dryer drum 11 and communicating with air at atmospheric pressure at the front of the cabinet 12 through a duct 20. The heater duct 17 has communication with the dryer drum through a port 21.

A suitable heater 23 (FIGURE 4), diagrammatically shown as being an electric heater, is mounted within the heater duct 17 to heat the air discharged into the dryer drum and thereby effect the drying of clothes in the drum. While the heater 23 is shown as being an electric heater, it need not be an electric heater, but may be a gas heater controlled by electrically energizable gas valves. Air is drawn into the duct 20, the heater duct 17, through the dryer drum by a blower 24 driven from the motor 15 through a belt drive 25 and having communication with the back of the dryer drum through the plate 19. Spent air drawn through the dryer drum by the blower 24, and tumbling clothes therein, is discharged to the atmosphere through a port opening 26.

A sequential controller or timer generally indicated by reference character 27 is provided at the back of the cabinet 12 and includes a dial knob 29, pinned or otherwise secured to a timer shaft 30, suitably journaled in a casing 31 for the timer and driven from a timer motor 32 in a suitable manner. The timer motor may be a conventional form of electrically energizable timer motor having reduction gearing in the housing for the timer motor for driving the timer shaft 30 for substantially one complete revolution, in the time required to dry a normal heavy load of goods in the tumbling drum 11. The timer motor and the drive to the timer shaft 13, therefore, need not herein be shown or described further.

A cycle control or timer cam 33 is pinned or otherwise secured to the timer shaft 30 for rotation therewith. Said cycle control or timer cam 33 has a raised peripheral cam surface 35 which extends for a greater portion of the circumference of the cam and a low portion 38 of the cam which connects opposite ends of the high portion 35 together. The high portion 35 determines the heating period of the heater 23, which may be a resistor type of electrically energizable heater, while the low portion 38 determines a plurality of off positions.

As shown in FIGURE 4, a resilient switch arm 37 has a cam follower 36 and a contact 42 on the end thereof engageable with a contact 43 on a resilient switch arm 44. Engagement of the contact 42 with the contact 43 will complete an energizing circuit to the timing motor 32 and the drive motor 15. The switch arm 44 also has a contact 45 on the opposite side thereof from the contact 43 for engaging a contact 46 on a resilient switch arm 47. Engagement of the contact 45 with the contact 46, effected by the riding of the follower 36 on the raised cam surface 35, will complete an energizing circuit to the heater 23, to supply the heat in the heater duct 17 necessary to dry articles of clothing and the like in the tumbling drum 11, in a predetermined period of time, depending upon the type and weight of the articles to be dried.

A cycle modifying cam 50 is rotatably mounted on the shaft 30 adjacent the cam 33 and has a plane face 54

frictionally engaged with a plane face 34 of the cam 33, biased by a spring 51 encircling the shaft 30. As diagrammatically shown in FIGURE 2, the spring 51 is interposed between a collar 52, pinned or otherwise secured to the shaft 30, and a hub 53 extending from the cycle modifying cam 50. The cycle modifying cam, therefore, normally rotates with the cam 33, but may be moved with respect to the cam 33, when it is desired to change or modify the contour of the cam 33 to give a predetermined effective profile of the combined cams.

As diagrammatically shown in FIGURES 2 and 3, an arm 55 extends radially outwardly of the hub 53 and is suitably secured thereto. An arm portion 56 extends axially of the outer end portion of the arm 55 over the dial knob 29 on the shaft 30. The arm 56 has an inwardly extending indexing end or pointer 59 terminating in a point and cooperating with indicia 60 to an outer inclined face 61 of the dial knob 29. The indicia 60 are in registry with the low portion 38 of the cam 33 and correspond to the time of a cool-down period attained by movement of a raised cam face 62 of the cam 50 to mask said low portion 38. As for example, when the pointer 59 is in registry with the numeral 12, the dryer drum will rotate for a cool-down period of 12 minutes with the heat off.

The cycle modifying cam 50, as shown in FIGURE 4, has a raised cam face 62, extending for a portion of the circumference thereof and terminating into a reduced diameter face 63 of the same diameter as the reduced diameter face 38 of the cycle control cam 33.

The rise of the cam face 62, when engaged by the follower 36, is sufficient to engage the contact 42 with the contact 43 and maintain a circuit to the motor 15 and the timer 32. When the follower 36 rides along a reduced diameter face 63 of the cam 50, and along the face 38 of the cycle control cam 33, the contact 42 will be moved out of engagement with the contact 43 and the drive motor 15 and timer motor 32 will be deenergized and the dryer will stop. Thus cam faces 38 and 63 provide a plurality of off positions, determined by selection of the duration of the cool-down period.

It will be noted from FIGURES 2 and 3 that the cycle modifying cam 50 is positioned by operation of the arm 55. By moving said arm in a counterclockwise direction, the cool-down period is increased. The cams 33 and 50 are rotated together in a clockwise direction by the timer to carry out a sequential treatment cycle.

It may further be seen from FIGURES 3 and 4 that the cycle modifying cam can be adjusted to vary the cool-down period from zero to 12 minutes and that when positioning the cycle modifying cam to select the cool-down period, the cam 33 may be held from rotation by holding the dial knob 29, while the cam 50 is rotated by grasping the pointer 59 and moving said pointer in registry with a desired cool-down period indicated on the dial knob 29, it being understood that the dial knob 29 is turned in a clockwise direction to select the length of a drying cycle in accordance with the type of goods to be dried.

The cycle modifying cam shown in the drawings is of a configuration which varies the cool-down period, leaving the heat-on period constant, and thus varies the total cycle time within the limits of the cool down period. The cycle modifying cam, however, may be of a configuration which varies the heat-on period, leaving the total cycle time constant. In the latter case, the cycle control cam may be provided with the combined cam contour shown in FIGURE 4 and the cycle modifying cam provided with a peripheral raised portion equal to the diameter of raised portion 35 shown in FIGURES 2 and 4. The cycle modifying cam may then be positioned in such a manner as to increase the heat-on portion of the treatment cycle while simultaneously decreasing the cool down portion of the cycle.

While I have herein shown and described exemplary

forms in which the invention may be embodied, it may readily be understood that various variations and modifications in the invention may be attained without departing from the spirit and scope of the novel concepts thereof.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a control for a clothes dryer having a drying chamber,

motor-driven means for tumbling clothes in the drying chamber and for translating air thereover and a heater for heating the air,

the combination of a rotatable sequence timer manually movable from an inactive position to selective active positions and controlling operation of the heater and the motor driven means,

a multiple parts cam rotatable with said timer,

and said multiple parts together with one another forming a single cam profile having a peripheral cam high portion, a peripheral cam raised portion, and a peripheral cam low portion,

and multiple switch means actuatingly operated by said cam profile and engaging a corresponding multiple of cam followers disposed in operative register with high portion, said raised portion, and said low portion to operate the dryer automatically under the control of said rotatable sequence timer through a drying cycle including

- (1) a heat-on period, and
- (2) a cool-down period and an
- (3) off position,

said heat-on period and said cool-down period corresponding to said high and raised portions on said cam profile,

and adjustment means to selectively modify the heat-on period and the cool-down period by selectively adjusting said multiple parts of said cam to modify the profile of the cam by changing the effective circumferential length of said cam high portion and said cam raised portion.

2. In a clothes dryer having a tumbling drum, a main motor for rotatably driving said drum to tumble goods therein for drying, a heater, and means for drawing heated air through said tumbling drum, the improvement comprising:

a timer controlling the sequential operation of said dryer through a fabric treatment cycle and including a timer motor for driving said timer,

circuit means including an energizing circuit for said main motor,

said timer motor and said heater,

a timer cam rotatably driven by said timer motor and switch means operated by said timer cam for controlling said circuit means,

said timer cam having a high operating said switch means to energize said main motor, said heater and said timer motor,

and having a low portion accommodating the opening of said switch means and the deenergization of said main motor,

said timer motor and said heater,

and second cam means having clutching engagement with said timer cam and driven thereby and having a cam surface adjustably modifying the low portion of said timer cam to deenergize said heater and maintain said main motor and said timer motor in operation to provide a cool-down portion of said fabric treatment cycle,

said switch means including at least three switch arms, a follower on one switch arm engaging said timer cam and operated thereby to complete said energizing circuit through said three switch arms during rotation of said timer cam as said follower rides on the high portion thereof and operable to break said

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energizing circuit between said switch arms as said follower rides on the low portion of said timer cam, and wherein said second cam has a rise spaced radially inwardly of the high cam surface of said timer cam and radially outwardly of the low cam surface of said timer cam and engaged by said follower to maintain said energizing circuit between two of said switch arms and to deenergize the third of said switch arms, to effect deenergization of said heater and the continued operation of said main motor and said timer motor for a cool-down portion of said fabric treatment cycle,

and manually operable means for selectively adjusting the position of said second cam with respect to said timer cam and the duration of said cool-down portion.

3. In a dryer as defined in claim 2 and further characterized by said second cam being rotatably adjustable with respect to the cam in a direction opposite to the direction of rotation of said cam to control the sequential operation of the dryer,

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a dial knob connected to said timer cam to select the duration of a drying operation, and a manually operable member connected with said second cam and operable from a position in the region of said dial knob is provided to adjust said second cam with respect to said first cam and adjustably move said second cam in a direction opposite to the direction of rotation of said first cam.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,293,769

December 27, 1966

Dale W. Graham

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 26, before "high" insert -- said --; line 40, for "lenth" read -- length --; same line 40, for "com" read -- cam --; line 56, after "high" insert -- portion --.

Signed and sealed this 24th day of October 1967.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents