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(54) **Laundry dryer with a safety device for preventing overheating of the laundry.**

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Description

The invention refers to a laundry dryer according to the precharacterising part of claim 1. A laundry dryer of this kind is known from US—A—3 890 719 and US—A—3 890 720.

In the known laundry dryers, the spring acts on the lever so as to tension the belt. Upon a possible rupture of the belt, the lever actuates the breaker switch means due to the load of the spring so that the electrical circuit of the heater element and the motors is interrupted.

GB—A—839 471 discloses a similar arrangement in a washing machine in which a lever bearing a tensioning roll acting upon a driving belt also acts on a switch so that upon possible rupture of the belt the switch is opened in order to interrupt the power supply to the electrical equipment of the washing machine.

All of the aforementioned structures fail to interrupt the electrical circuits upon breakage of the lever tensioning means so that the electrical equipment of the respective machine may further be supplied with electric current although the motor is unable to rotate the drum due to the slackening of the belt.

It is, therefore, the object of the present invention to provide a laundry dryer of the aforementioned kind which is secured against an overheating whenever the drum is stopped due to rupture of the belt or breakage of the spring loading the lever carrying the tensioning roll.

This object is attained by the characterising features of claim 1. Preferred embodiments of the invention are the subject matter of the subclaims.

For better understanding of the invention, preferred embodiments thereof shall now be described by way of example with reference to the accompanying drawings, wherein:

figs. 1 and 2 show diagrammatic elevational views of two embodiments of a safety device disposed in the rear portion of a laundry dryer, and

figs. 3 and 4 show portions of electric circuit diagrams associated with the embodiments of figs. 1 and 2, respectively.

With reference to fig. 1, a laundry dryer according to the invention comprises a frame 5 and a drum 6 mounted therein for rotation about an horizontal axis and adapted to contain the laundry to be dried. The machine further comprises a blower and at least one electric heater element (not shown) for generating a flow of heated air through drum 6. Drum 6 is adapted to be rotated by an electric motor 8 provided with a belt pulley 9 and mounted on a support 10 at the lower rear portion of the frame of the machine.

In particular, drum 6 is rotated with the aid of a conventional transmission belt 11 extending around pulley 9 of motor 8 and around drum 6 and kept under tension by means of a tension roll 12. Tension roll 12 is carried by a lever 13 pivotally mounted at one end thereof on the frame of the machine adjacent motor 8. Tension roll 12 is continually biased into engagement with belt 11

by a return spring 14 having its respective end anchored to lever 13 and support 10.

By properly selecting the characteristics of return spring 14, it is thus possible to keep belt 11 under sufficient tension for effectively transmitting the rotation of motor 8 to drum 6 with a minimum of wear of the belt itself.

The described laundry dryer is further provided with a safety device for preventing possible overheating and burning of the laundry in case of rupture or excessive elongation of belt 11.

The safety device in the embodiment shown essentially comprises an electric breaker switch 15 and an associated slider element 16, both mounted on a support 17 adjacent motor 8 and lever 13.

Switch 15 is provided with a spring-loaded button 18 cooperating with a normally open contact 19 connected to the electric circuitry of the machine in a manner to be described.

Slider element 16 is adapted to slide back and forth along a horizontal guide 20 of support 17. Slider element 16 is connected to lever 13 by a compression spring 21 and provided with a plane surface portion 22 for actuating button 18.

Plane surface portion 22 is dimensioned such as to retain button 18 in its depressed state, and thus contact 19 in its closed position, also in case of small displacements of slider element 16 due to the action of the resilient transmission belt 11 on tension roll 12 and lever 13 during rotation of drum 6.

As evident from fig. 3, contact 19 is connected in series with the program unit 23 of the machine, said unit being adapted to control the connection and disconnection, respectively, of the two motors 8 and 26 driving the blower and drum, respectively, and of the heater element 27, itself connected in series with a conventional protective thermostat 28.

During a normal drying cycle contact 19 is kept closed in the manner described, permitting electric power to be simultaneously supplied to motors 8 and 26 and heater element 27 in series with thermostat 28.

In the case of rupture of belt 11, drum 6 stops and lever 13 is displaced in the direction of arrow A by the action of return spring 14, resulting in a corresponding displacement of slider element 16 by the action of spring 21 (fig. 1).

This results in plane surface portion 22 of slider element 16 releasing button 18, causing it to snap back to its rest position, whereby contact 19 is permitted to open.

The open position of contact 19 is shown in dotted lines in fig. 3. In this position, motors 8 and 26 as well as heater element 27 and thermostat 28 are disconnected from the electric power supply.

As a result, the flow of heated air through the drum is discontinued, and overheating or even burning of the laundry is effectively prevented.

In a similar manner, failure of return spring 14 results in displacement of lever 13 in the direction of arrow B under the action of transmission belt 11. The resulting slack in transmission belt 11

around drum 6 results in rotation of the drum at a reduced speed or even in stoppage of the drum.

In this case, slider element 16 is also displaced in the direction of arrow B by the action of spring 21, whereby plane surface portion 22 is again cause to release button 18. This results in button 18 and contact 19 assuming their rest positions as above described, so that motors 8 and 26 and heater element 27 with thermostat 28 are again disconnected from the electric power supply.

Shown in fig. 2 is a laundry dryer equipped with a safety device in a second embodiment of the invention. In this figure, the above described elements of the dryer are designated by the same reference numerals as in fig. 1.

In the second embodiment, the safety device essentially comprises two breaker switches 29 and 30 facing each other over a short spacing and fixedly mounted in the machine adjacent motor 8 and lever 13, and a slider element 31 carried by a support 32 secured to the machine in a position adjacent switches 29 and 30.

Each breaker switch 29 and 30 is provided with a spring-loaded button 33 and 34, respectively, cooperating with a normally closed electric contact 35 and 36, respectively, said contacts being connected to the electric circuitry of the machine in a manner to be described.

Slider element 31 is adapted to slide back and forth between a pair of parallel horizontal guides 37 and 38 of support 32, and is connected to lever 13 by a compression spring 39.

Slider element 31 is further provided with a projection 40 located at a position between the buttons of the two breaker switches so as to be able to selectively actuate one or the other thereof.

The dimensions of projection 40 are selected so as to permit limited displacement of slider element 31 under the resilient action of transmission belt 11 on tension roll 12 and lever 13 during rotation of drum 6 without projection 40 coming into contact with one of the two buttons.

As shown in fig. 4, contacts 35 and 36 are connected in series with each other and with program unit 23 of the machine, the program unit being in turn connected to the electric components of the machine in the above described manner.

During normal operation of the dryer, slider element 31 does not act on contacts 35 and 36, so that they remain closed during the operating cycle of dryer, permitting the electric components of the machine to be supplied with electric power by program unit 23.

In the case of rupture of transmission belt 11 or failure of return spring 14, slider element 31 is displaced in the direction of arrow A or B, respectively, under the action of lever 13 as described above.

As a result, projection 40 actuates the respective button 33 or 34, respectively, causing the respective contact 35 or 36 to open, as shown in dotted lines, so as to disconnect the electric

components of the machine from the power supply.

Displacement of slider element 31 in one or the other direction thus results in the flow of heated air through the drum being interrupted, so as to prevent overheating and burning of the laundry from occurring.

The safety device according to the invention is of a simple and reliable type and may be employed in combination with conventional safety devices protecting the machine against electric failure, resulting in a laundry dryer thus being effectively protected against any failure of its electric and mechanical components.

Claims

1. A laundry dryer comprising a blower driven by an electric motor and at least one heater element (27) for circulating heated air within a drum (6) containing the laundry to be dried, said drum (6) being rotatively driven by a second electric motor (8) via at least one transmission belt (11) extending around said drum (6) and a belt pulley (9) of said second motor (8) and kept under tension by means of at least one tensioning roll (12) carried by a lever (13) loaded by a spring (14) and pivotally mounted in the lower rearward portion of the machine, and further comprising actuator and breaker switch means (16, 31; 15, 29, 30) cooperating with said lever (13), said heater element (27) and said motors (8, 26) so as to control the connection and disconnection, respectively, of said heater element (27) and said motors (8, 26) to the electric power supply of the machine in response to the position assumed by said lever (13), characterized in that said breaker switch means (15, 29, 30) has three possible switching positions provided by its actuator (16), namely, a first end position being attained upon possible rupture of the belt (11), an intermediate position being accorded to the normal running of the machine, and a second end position being attained upon possible breakage of said spring (14), the switch means (15, 29, 30) being opened in both end positions and being closed in its intermediate position.

2. A laundry dryer according to claim 1, characterised in that said actuator means comprises a slider element (16) associated to a breaker switch (15) having a contact (19) controlling said heater element (27) and said motors (8, 26), said slider element (16) being connected to said lever (13) by a second spring (21) and comprising a plane surface portion (22) adapted to actuate said contact (19) to its closed position in the intermediate position of said slider element (16) or its open position in both of the end positions of said slider element (16).

3. A laundry dryer according to claim 1 characterised in that said actuator and breaker switch means comprise a slider element (31) and two breaker switches (29, 30) having their contacts (35, 36) connected in series with one another for controlling said heater element (27) and said

motors (8, 26), said slider element (31) being connected to said lever (13) by a spring (39) and having a projection (40) disposed between said breaker switches (29, 30) for actuating one or the other thereof to its open or closed position.

Patentansprüche

1. Wäschetrockner, enthaltend ein Gebläse, das von einem Elektromotor angetrieben wird, und wenigstens ein Heizelement 27 zur Zirkulierung erwärmter Luft innerhalb einer Trommel (6), die die zu trocknende Wäsche enthält, wobei die Trommel (6) von einem zweiten Elektromotor (8) über wenigstens einen Transmissionsriemen (11) in Drehung versetzt wird, der sich um die Trommel (6) und eine Riemenscheibe (9) des zweiten Elektromotors (8) erstreckt und mittels wenigstens einer Spannrolle (12) unter Spannung gehalten wird, die von einem Hebel (13) getragen wird, der von einer Feder (14) belastet und schwenkbar im unteren rückwärtigen Teil der Maschine montiert ist, und weiterhin enthaltend eine Betätigungs- und Unterbrecherschalteinrichtung (16, 31; 15, 29, 30), die mit dem Hebel (13), dem Heizelement (27) und den Motoren (8, 26) so zusammenwirkt, daß die Verbindung bzw. Abtrennung des Heizelements (27) und der Motoren (8, 26) mit bzw. von der elektrischen Stromversorgung der Maschine in Abhängigkeit der von dem Hebel (13) eingenommenen Stellung gesteuert wird, dadurch gekennzeichnet, daß die Unterbrecherschalteinrichtung (15, 29, 30) drei mögliche Schaltstellungen hat, die von ihrem Betätigungsglied (16) bestimmt sind, nämlich eine erste Endstellung, die bei einem möglichen Bruch des Riemens (11) eingenommen wird, eine Zwischenstellung, die dem normalen Lauf der Maschine zugehörig ist, und eine zweite Endstellung, die bei einem möglichen Bruch der Feder (14) eingenommen wird, wobei die Schalteinrichtung (15, 29, 30) in beiden Endstellungen geöffnet und in ihrer Zwischenstellung geschlossen ist.

2. Wäschetrockner nach Anspruch 1, dadurch gekennzeichnet, daß die Betätigungseinrichtung ein Schieberelement (16) enthält, das einem Unterbrecherschalter (15) zugeordnet ist, der einen Kontakt (19) hat, der das Heizelement (27) und die Motoren (8, 26) steuert, wobei das Schieberelement (16) mit dem Hebel (13) durch eine zweite Feder (21) verbunden ist und einen ebenen Oberflächenabschnitt (22) aufweist, der dazu eingerichtet ist, den Kontakt (19) in seine geschlossene Stellung in der mittleren Stellung des Schieberelements (16) oder in seine geöffnete Stellung in den beiden Endstellungen des Schieberelements (16) zu bewegen.

3. Wäschetrockner nach Anspruch 1, dadurch gekennzeichnet, daß die Betätigungs- und Unterbrecherschalteinrichtung ein Schieberelement (31) und zwei Unterbrecherschalter (29, 30) aufweist, deren Kontakte (35, 36) in Serie miteinander geschaltet sind, um das Heizelement (27) und die Motoren (8, 26) zu steuern, wobei das Schie-

berement (31) mit dem Hebel (13) durch eine Feder verbunden ist und einen Vorsprung (40) aufweist, der zwischen den Unterbrecherschaltern (29, 30) angeordnet ist, um den einen oder den anderen derselben in seine geöffnete oder geschlossene Stellung zu bewegen.

Revendications

1. Séchoir à linge, comprenant une soufflante entraînée par un moteur électrique et au moins un élément chauffant (27) pour faire circuler de l'air chaud dans un tambour (6) contenant du linge à sécher, le tambour (6) étant entraîné en rotation par un second moteur électrique (8), par l'intermédiaire d'au moins une courroie de transmission (11) passant autour du tambour (6) et d'une poulie à courroie (9) du second moteur (8), la courroie étant maintenue sous tension par au moins un rouleau tendeur (12) porté par un levier (13) chargé par un ressort (14) et monté pivotant dans la partie inférieure à l'arrière de la machine, et comprenant, en outre, des dispositifs d'actionnement et d'interruption (16, 31; 15, 29, 30) coopérant avec le levier (13), l'élément chauffant (27) et les moteurs (8, 26) pour commander la connexion et la déconnexion de l'élément chauffant (27) et des moteurs (8, 26) de l'alimentation électrique de la machine suivant la position occupée par le levier (13), caractérisé en ce que le dispositif d'interruption (15, 29, 30) a trois positions possibles, définies par son dispositif d'actionnement (16), à savoir, une première position de fin de course atteinte en cas de rupture de la courroie (11), une position intermédiaire affectée à la marche normale de la machine et une deuxième position de fin de course atteinte en cas de rupture dudit ressort (14), le dispositif d'interruption (15, 29, 30) étant ouvert aux deux positions en fin de course et étant fermé à sa position intermédiaire.

2. Séchoir à linge selon la revendication 1, caractérisé en ce que le dispositif d'actionnement comprend un coulisseau (16) coordonné à un interrupteur (15) possédant un contact (19) commandant l'élément chauffant (27) et les moteurs (8, 26), le coulisseau (16) étant relié audit levier (13) par un second ressort (21) et comprenant une partie à surface plane (22) agencée pour amener le contact (19) à sa position fermée à la position intermédiaire de coulisseau (16) et pour l'amener à sa position ouverte à l'une et l'autre des deux positions de fin de course du coulisseau (16).

3. Séchoir à linge selon la revendication 1, caractérisé en ce que les dispositifs d'actionnement et d'interruption comprennent un coulisseau (31) et deux interrupteurs (29, 30) dont les contacts (35, 36) sont connectés en série l'un avec l'autre pour la commande de l'élément chauffant (27) et des moteurs (8, 26), le coulisseau (31) étant relié audit levier (13) par un ressort (39) et possédant une saillie (40) placée entre les interrupteurs (29, 30) en vue de l'actionnement de l'un ou l'autre interrupteur pour l'amener à sa position ouverte ou sa position fermée.

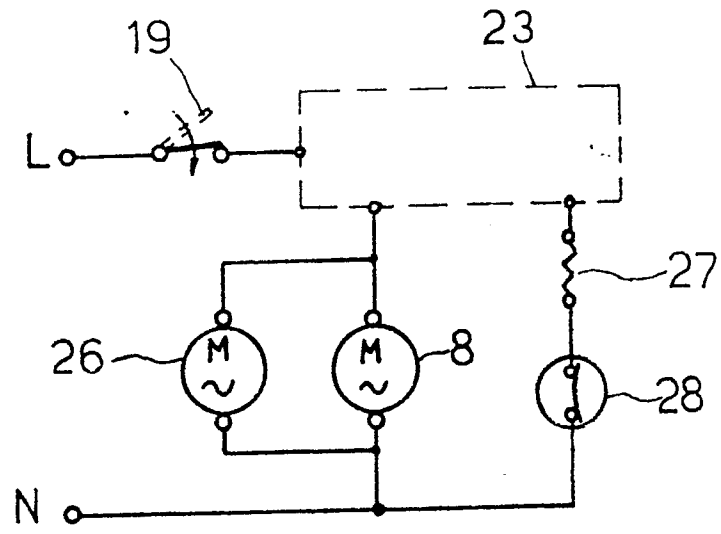


FIG. 3

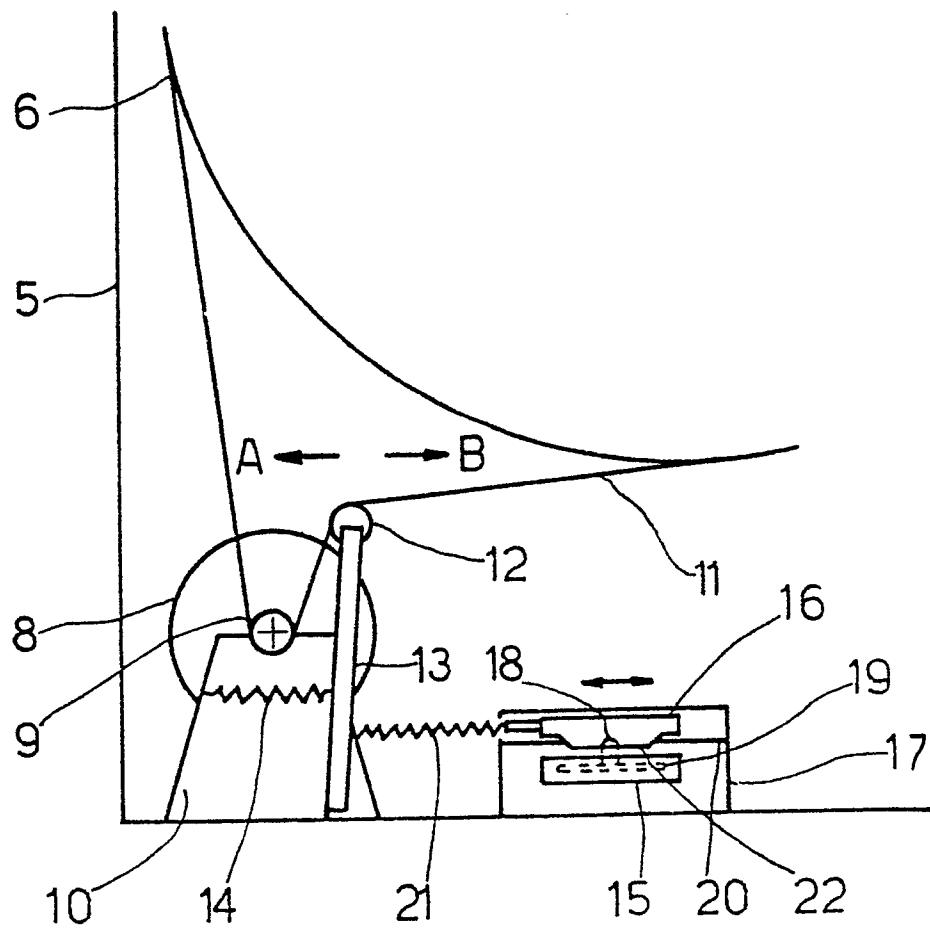


FIG. 1

