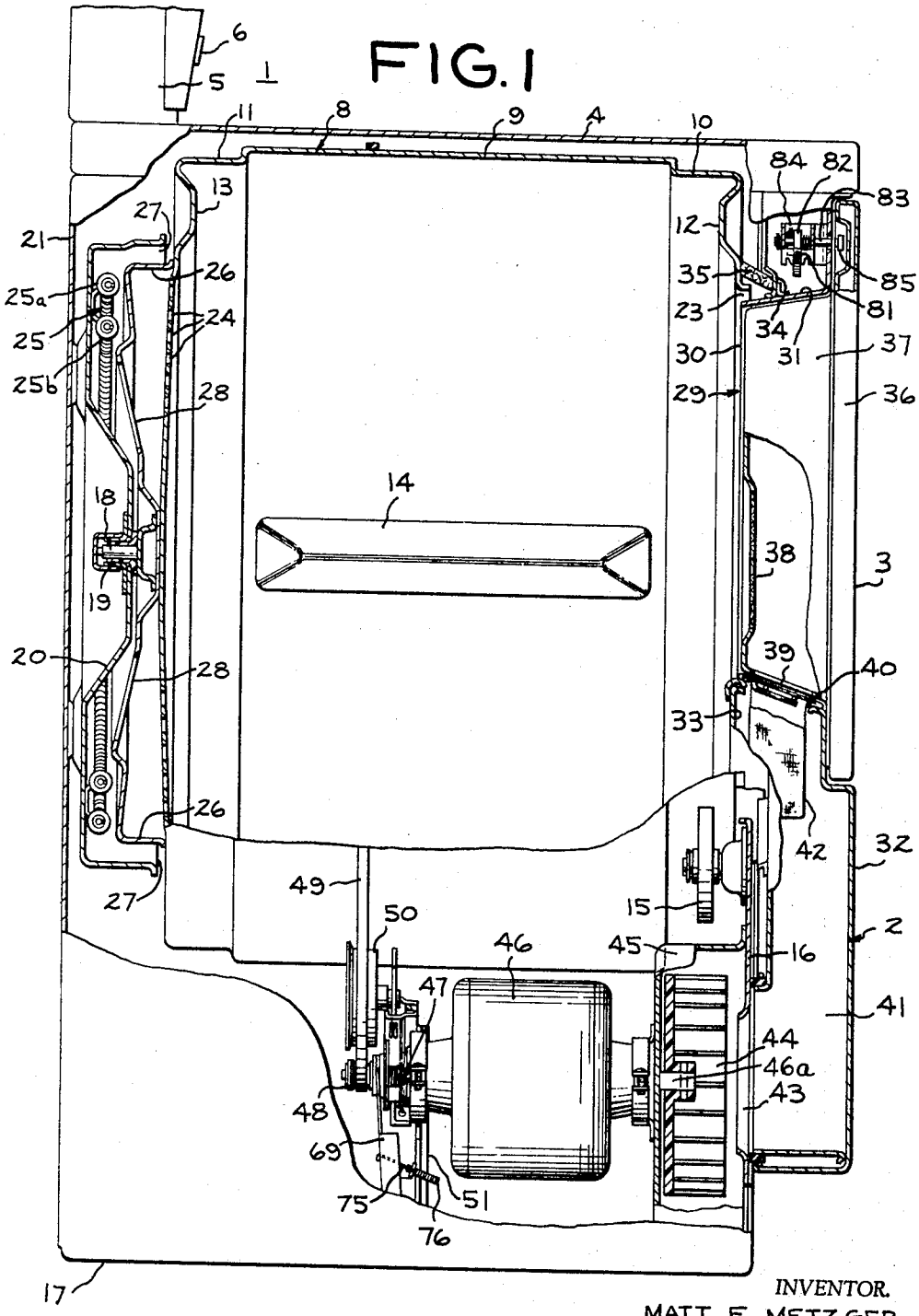
Feb. 25, 1969 M. F. METZGER 3,429,056

CLOTHES DRYER WITH SELECTIVE CLUTCH FOR DRUM ROTATION

Filed Nov. 30, 1967 Sheet 1 of 2

FIG. 1



INVENTOR.
MATT F. METZGER
BY Radford M. Reams
HIS ATTORNEY

Feb. 25, 1969 M. F. METZGER 3,429,056

CLOTHES DRYER WITH SELECTIVE CLUTCH FOR DRUM ROTATION

Filed Nov. 30, 1967 Sheet 2 of 2

FIG. 3

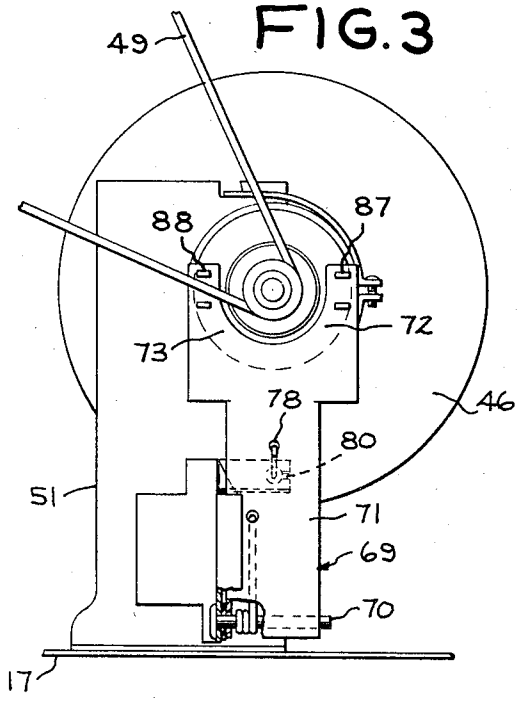


FIG. 2

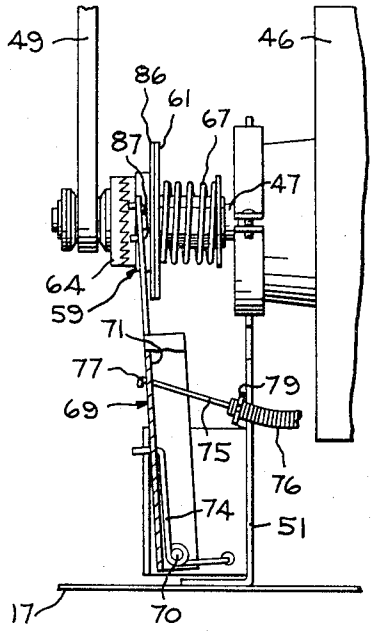
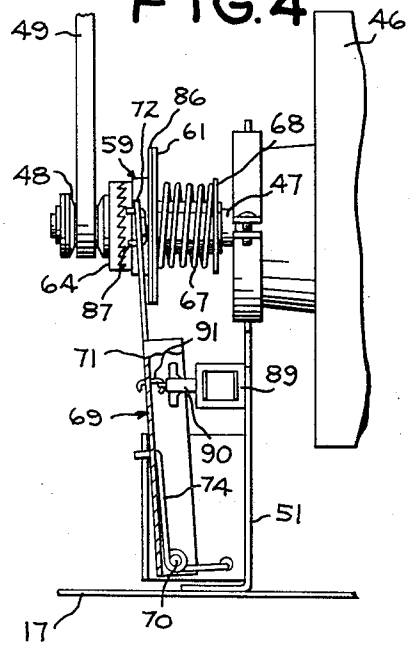


FIG. 4



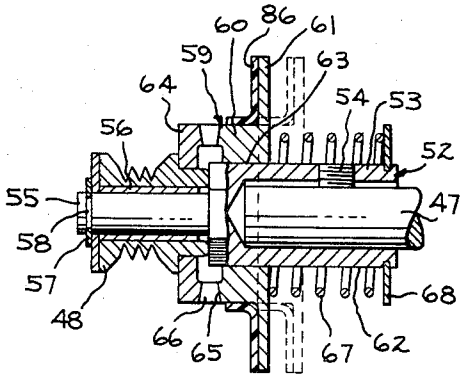


FIG. 5

INVENTOR.
MATT F. METZGER
BY Rudford M. Reams
HIS ATTORNEY

United States Patent Office 3,429,056
Patented Feb. 25, 1969

3,429,056

CLOTHES DRYER WITH SELECTIVE CLUTCH FOR DRUM ROTATION

Matt F. Metzger, Jeffersonville, Ind., assignor to General Electric Company, a corporation of New York

Continuation-in-part of application Ser. No. 474,068, July 22, 1965. This application Nov. 30, 1967, Ser. No. 690,694
U.S. Cl. 34—133 6 Claims
Int. Cl. F26b 11/04; F16d 11/04

ABSTRACT OF THE DISCLOSURE

A clothes dryer with a motor having a first shaft to drive the dryer air circulating means and a second shaft to drive the dryer drum through a pulley when the second shaft is connected to the pulley. A positive engagement clutch normally connects the second shaft and the pulley and manually controllable means are included to disengage the clutch.

This application is a continuation-in-part of my copending application, Ser. No. 474,068, filed July 22, 1965, and now abandoned, and assigned to the same assignee as the present invention.

Background of the invention

There are at the present time a large number of domestic clothes dryers which dry clothes placed in a clothes container by rotating the container and at the same time passing a stream of heated air through the container. Some of these clothes drying machines provide for a stationary drying operation in which the drum or clothes container remains stationary during the drying operation. However, those prior art machines which provide a stationary drying feature have distinct disadvantages. They normally maintain the drum in a stationary position by providing a control mechanism by which the drum may be lifted from the drive rollers which normally rotate the drum and by which the drum may be maintained off of these rollers during the drying operation. Such a mechanism must be constructed of heavy material in order to support the weight of the drum and the load of clothes being dried in a stationary manner and they often involve complicated mechanism to provide the user with a mechanical advantage to make the manual lifting of the drum easier.

Summary of the invention

It is an object of this invention to provide a new and improved clothes dryer in which a stationary dry operation may be selected by the user.

It is a further object of this invention to provide such a clothes dryer in which the clothes receiving container is maintained on its usual supports during the stationary drying operation.

A further object of this invention is to provide such an improved clothes dryer in which the stationary dry selector is easy to operate and reliable in performance.

In carrying out my invention, in one form thereof, I provide a fabric or clothes drying machine including a rotatable container to receive clothes to be dried and air circulating means to force drying air through the container. The dryer also includes a motor adapted both to drive the air circulating means and to rotate the container. Motion transfer means drivingly connect the motor to the container and includes a clutch selectively operable to interrupt rotation of the container independently of the motor.

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.

Brief description of the drawing

In the drawings,

FIGURE 1 is a partial side elevational view of a clothes dryer incorporating one embodiment of my invention, the view being partly broke away and partly sectionalized to illustrate details;

FIGURE 2 is a fragmentary side elevational view, somewhat enlarged, of the lower portion of FIGURE 1 showing in detail the motion transfer means and clutch utilized in the machine of FIGURE 1;

FIGURE 3 is a fragmentary rear elevational view of the mechanism shown in FIGURE 2;

FIGURE 4 is a fragmentary side elevational view similar to FIGURE 2 showing another embodiment of my invention; and

FIGURE 5 is a fragmentary side elevational view of the clutch mechanism utilized in the machine of FIGURE 1, the view being partly broken away and partly in section for purposes of illustration.

Description of the preferred embodiments

Referring now to FIGURE 1, the machine illustrated is a domestic clothes dryer generally indicated by the numeral **1**. Dryer **1** is provided in the usual way with a cabinet **2** having a front door **3** to provide access to the interior of the cabinet for loading and unloading clothes. Provided on the top wall **4** of the cabinet **2** is a control panel **5** which may, in the conventional way, include a suitable manual control **6**. By operation of manual control **6**, the machine may be caused to start and automatically proceed through a cycle of operation.

Within cabinet **2** there is provided a clothes receiving container, or drum, **8** mounted for rotation on a substantially horizontal axis. Drum **8** is substantially cylindrical in shape having a first cylindrical wall portion **9**, second and third outer cylindrical wall portions **10** and **11** located respectively adjacent the front and back of the drum, a front wall **12**, and a back wall **13**. Outer wall portions **9**, **10** and **11** are imperforate over their entire length so that the outer shell of the basket is imperforate. On the interior surface of central portion **9** there may be provided a plurality of clothes tumbling ribs **14** so that clothes are lifted up when the drum rotates, and then tumble down onto the bottom of the drum.

The front of drum **8** may be rotatably supported within outer casing **2** by suitable idler wheels, one of which is shown by numeral **15**. These wheels are rotatably secured to the top of a member **16** which extends up from the base **17** of the machine. The wheels **15** are disposed beneath the drum in contact with portion **10** thereof so as to support portion **10** on each side to provide a stable support.

The rear end of drum **8** receives its support by means of a stub shaft **18** etxending from the center of wall **13**. Shaft **18** is secured within a bearing **19** formed in a baffle **20** which in turn is rigidly secured to the back wall **21** of cabinet **2** by any suitable means such as, for instance, welding at a number of points **22**. With the arrangement shown, the basket may rotate on a horizontal axis, with rollers **15** providing the front support and stub shaft **18** within bearing **19** providing the rear support.

In order to provide for the flow of a stream of drying air through the clothes drum, the drum is provided with a central aperture **23** in its front wall **12** and with an opening in the form of a plurality of perforations **24** in the rear wall **13**, the perforations in the present case being formed to extend around the rear wall in an annulus.

As has been stated, baffle member **20** is rigidly secured to rear wall **21** of cabinet **2**. Baffle member **20** also serves to support heater **25** which includes two electrical resistance heating elements **25***a* and **25***b* appropriately insulated from the baffle member. Elements **25***a* and **25***b* may be annular in shape so as to be generally coextensive with perforations **24** in drum **8**. A baffle member **26** is rigidly secured to the back wall **13** of the drum outside the ring of perforations **24** and within the stationary baffle **20**, so that an annular air inlet **27** is, in effect, formed by baffles **20** and **26**. In this manner a passage is formed for air to enter annular inlet opening **27** between the baffles, pass over the heater **25**, and then pass through openings **28** formed in baffle **26** to the interior of drum **8**.

The front opening **23** of the drum is substantially closed by means of a stationary bulkhead generally indicated by the numeral **29**. Bulkhead **29** is made up of a number of adjacent members including the inner surface **30** of access door **3**, a stationary frame **31** for the door formed as a part of front wall **32** of the cabinet, the inner surface member **33** of an exhaust duct which is formed by the cooperation of member **33** with the front wall **32** of the cabinet, and an annular flange **34** mounted on frame **31** and on the duct wall. It will be noted that a suitable clearance is provided between the inner edge of the drum opening **23** and the edge of bulkhead **29** 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 **23** between the interior and exterior of the drum, a suitable ring seal **35**, preferably in the form of felt-like material, is secured to flange **34** in sealing relationship with the exterior surface of drum wall **12**.

Front opening **23**, 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. Door **3**, whose inner surface forms part of the bulkhead closing the opening, is mounted on cabinet **2** so that when the door is opened clothes may be inserted into or removed from the drum through the door frame **31**. It will be noted that the door includes an outer, flat, imperforate section **36** and an inwardly extending hollow section **37** mounted on the flat outer section. Hollow section **37** extends into the door frame **31** when the door is closed, and the door surface **30** which comprises part of the combination bulkhead **29** is actually the inner wall of the hollow section.

The air outlet from the drum is provided by a perforated opening **38** formed in the inner wall **30** of hollow door section **37**. The bottom wall section of door **3** and the adjacent wall of door frame **31** are provided with aligned openings **39** and **40**, opening **40** providing the entrance to the duct **41** formed by the cooperation of member **33** with front wall **32**. As shown, a lint trap **42** is positioned in the exhaust duct **41** at opening **40**, the trap being supported by the door frame **31**.

Duct **41** leads downwardly to an opening **43** formed in the member **16** which supports wheels **15**. Opening **43** constitutes the inlet to a blower member **44** contained within a housing **45** and directly driven by an electric motor **46** as by mounting the blower **44** on the shaft **46***a*, which constitutes the right hand end of motor shaft **47**. The blower draws ambient air in over the heater **25**, then through the basket, then throuhg the door **3** and the duct **41**, and then into the blower. From the blower the air passes through any appropriate duct (not shown) out of cabinet **2** so as to be exhausted from the machine.

In addition to driving blower **44**, motor **46** constitutes the means for effecting the rotation of drum **8**. In order to effect this motor **46** is provided with a shaft **47** having a small pulley **48** mounted at the end thereof. A motor may be provided having two entirely different shafts, one to drive the blower **44** and one to rotate the drum **8**. The more usual practice is to provide a motor with one shaft extending out of each end of the motor so as to both drive the blower and rotate the drum. Thus, normally the shaft **47** is the opposite end of the shaft which provides the direct drive from motor **46** to blower **44**.

A belt **49** extends around pulley **48** and also entirely around the cylindrical wall section **9** of drum **8**. The relative circumferences of pulley **48** and wall section **9** causes the drum to be driven by the motor at a speed suitable to effect tumbling of the colthes therein when the pulley **48** is drivenly connected to the shaft **47**. In order to effect proper tensioning of belt **49**, there may be provided a suitable idler assembly **50** secured on the same support **51** which secures one end of the motor. Thus, during normal operation, the air is pulled through the drum and, at the same time, the fabrics in the drum are tumbled. When the air is heated by heating elements **25***a* and **25***b*, the heated air passing through the drum causes vaporization of moisture from the clothes. The vapor is carried off with the air as it passes out of the machine.

There are a number of suitable control circuits which may be utilized with the machine of FIGURE 1 to control a sequence of operation for effecting heater temperature, length of dryer operation and so forth. The particular control circuit utilized does not form a part of my invention and has, therefore, been omitted for purposes of increased clarity.

Referring now to FIGURE 5 there is shown therein the motion transfer means by which a driving connection selectively may be provided between motor shaft **47** and pulley **48**. A hub **52** is provided and includes a first, hollow portion **53** insertable around the end of shaft **47** and secured in driven relationship thereto by any suitable means such as set screw **54**. At the outer end of hollow portion **53**, hub **52** includes a reduced diameter cylindrical portion **55** on which pulley **48** is mounted by means of a sleeve bearing **56**. A C clip **57** is mounted in a recess **58** formed in cylindrical portion **55** outwardly of pulley **48** to prevent the pulley from sliding off the end of portion **55**. Thus, the hub **52** is secured to shaft **47** for rotation therewith while the pulley **48** is freely rotatable on cylindrical portion **55** independent of the rotation of shaft **47** and hub **52**.

In order to provide a driving connection between hub **52** and pulley **48** there is provided a positive engagement type clutch mechanism including a first clutch member **59** having a base portion **60** and an annular, radially outwardly extending wall portion **61**. Base portion **60** is mounted around hollow portion **53** of hub **52** for rotation therewith by any suitable means such as, for instance, forming the outer surface **62** of hub portion **53** and the inner surface **63** of base portion **60** with cooperative hexagonal shapes. Thus, first clutch member **59** rotates with hub **52** and, at the same time, is freely movable axially with respect to hollow portion **53**. A second clutch member **64** is securely mounted on pulley **48** for rotation therewith. The first and second clutch members are provided with interfitting teeth **65** and **66** respectively so that, when first clutch member **59** is in engagement with second clutch member **64**, a driving connection is formed from shaft **47** to pulley **48** and the pulley is rotated with the shaft to drive drum **8**.

First pulley member **59** is normally forced into a position so that teeth **65** engage teeth **66** by means of a helical spring **67** which is received between base portion **60** of clutch member **59** and a collar **68** mounted on hollow portion **53**. In order to selectively disengage clutch member **59** from clutch member **64**, so that motor **46** will rotate without rotating drum **8**, a yoke **69** is pivotally mounted on a pin **70** received in motor support **51**. The yoke includes a generally upwardly extending base portion **71** which terminates in a pair of arms **72** and **73** which are spaced apart sufficiently to pass by the sides of the base portion **60** of clutch member **59** and engage the radially extending wall portion **61**. A spring **74** is mounted around pin **70** and is received in

support member **51** and base portion **71** of yoke **69** in order to bias arms **72** and **73** out of contact with radially extending wall portion **61**.

Referring now to FIGURES 1 and 2 there is included manually controllable means for selectively engaging the yoke **69** and moving it into engagement with clutch member **59** to disengage the clutch. In the embodiment of FIGURES 1–3 the manually controllable means includes a choke wire type mechanism having an inner wire **75** and an outer protective sheath **76** which may be in the form of a wound wire. One end **77** of inner wire **75** passes through an opening **78** formed in base portion **71** of the yoke and is bent over to engage the base portion. The sheath terminates between support member **51** and yoke **69** and receives a nut **79** which bears against a slot **80** formed in support member **51** to prevent the sheath **76** from being withdrawn past support member **51**.

Referring now to FIGURE 1, the other end **81** of inner wire **75** is secured to a cam member **82** that is mounted for rotation on a spindle or shaft **83**. The shaft is mounted for rotation in a bracket **84** secured on the inner portion of front wall **32** of the dryer cabinet and extending through an appropriate opening therein. The outer end of shaft **83** is provided with a manually operable handle **85**. By rotation of handle **85**, the user may cause inner wire **75** to be moved to the right, as shown in FIGURE 2, and thus rotate yoke **69** about pin **70**, this causes arms **72** and **73** to engage the radially extending portion **61** of first clutch member **59** and forces first clutch member **59** out of engagement with second clutch member **64**. Then pulley **48** is effectively free wheeling with respect to hub **52** and the friction of bearing **56** is insufficient to cause pulley **48** to rotate drum **8**. In order to prolong the life of the clutch and prevent binding, radially extending wall portion **61** is provided with a low resistance liner **86** while arms **72** and **73** are provided with low friction tabs **87** and **88** respectively. It is the tabs **87** and **88** which come into contact with liner **86** in order to move first clutch member **59**.

When it is desired to re-engage clutch members **59** and **64**, handle **85** is rotated in the other direction and inner wire **75** is moved to the left (as seen in FIGURE 2). When this occurs, spring **67** moves first clutch member **59** axially along hollow portion **53** of hub **52** until teeth **65** engage cooperating teeth **66** of the second clutch member **64**. The spring **74** acts against the base portion **71** of yoke **69** to rotate the yoke about pin **70** and insure that the tabs **87** and **88** are disengaged from liner **86**. The clutch members **59** and **64** again provide an effective driving connection from hub **52** to pulley **48** so that drum **8** may again be driven by motor **46** through the shaft **47**, hub **52**, clutch members **59** and **64**, pulley **48**, and belt **49**.

Referring now to FIGURE 4, there is shown therein a second embodiment of my invention similar to the embodiment of FIGURES 2 and 3 and, in the discussion of this second embodiment, like numerals are used to designate like elements. In the embodiment illustrated in FIGURE 4, the clutch mechanism and the yoke mechanism are the same as the embodiment shown in FIGURES 2 and 3. The only difference in the over-all mechanism lies in the utilization of a solenoid for movement of the yoke into engagement with clutch member **59** in place of the choke wire mechanism. For this purpose, a solenoid **89** may be mounted on support member **51** and includes an armature **90** which is extendable toward yoke **69**. The end of armature **90** is connected to the yoke **69** by means of a link **91** which is attached at one end to the armature **90** and at the other end to the yoke. In this regard the link **91** extends through the opening **78** in the yoke and is bent over in a manner similar to the first end **77** of wire **75**.

When it is desired to provide a stationary drying operation, the solenoid **89** may be connected to a suitable source of electrical energy, normally this would be the same source of electric energy to which heater **25** is connected for providing heat to the dryer and to which the usual control circuits for electric dryers are normally connected. For this purpose, manual control or selector switch **6** may be interconnected to solenoid **89** and appropriate terminals for connection to the source of electric energy so that proper movement of manual control **6** by the user is effective to connect solenoid **89** to the source of electric energy.

Energization of solenoid **89** draws armature **90** to the right (as seen in FIGURE 4) so as to pivot yoke **69** about pin **70** and move first clutch member **59** out of engagement with second clutch member **64**. When it is again desired to recondition the dryer for normal, tumble-type drying, manual control member **6** may be moved to a position effectively disengaging solenoid **89** from the source of electrical energy. When solenoid **89** is disengaged, armature **90** is free to move and spring **67** is effective to move first clutch member **59** back into engagement with second clutch member **64** to re-establish the driving connection from motor **46** to belt **49**. Also, spring **74** is effective to insure that yoke **69** pivots about pin **70** sufficiently to disengage tabs **87** and **88** from liner **86**.

As has been explained, motor **46** is directly connected to blower **44** so that blower **44** is rotated at all times when motor **46** is energized. Thus, it can be seen that the clutch mechanism illustrated and described herein is effective to interrupt rotation of the clothes container or drum independently of the motor so that a staionary dry cycle may be provided in the most efficient manner.

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

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

1. A clothes drying machine comprising:

(a) a rotatable container to receive clothes to be dried;

(b) air circulating means to force air through said container;

(c) a motor including a first shaft adapted to drive said air circulating means and a second shaft to rotate said drum;

(d) a pulley mounted for rotation independently of rotation of said second shaft;

(e) a belt mounted around said pulley and said drum for drivingly connecting said pulley and said drum;

(f) a positive engagement type clutch normally connecting said second shaft and said pulley so that said motor drives said drum;

(g) and manually controllable means adapted to disengage said clutch to interrupt rotation of said container independently of said motor.

2. The invention as set forth in claim **1** wherein said pulley is mounted on said second shaft for rotation independently of rotation of said second shaft.

3. The invention as set forth in claim **1** wherein a hub is mounted on said second shaft for rotation therewith; said pulley is mounted on said hub for rotation independently of rotation of said hub; said positive engagement clutch includes a first member mounted on said hub for rotation therewith and a second member mounted on said pulley for rotation therewith, said members normally being in engagement to provide a driving connection between said motor and said pulley; and said manually controllable means being adapted to disengage said members to interrupt rotation of said container independently of said motor.

4. A clothes drying machine comprising:

(a) a rotatable container to receive clothes to be dried;

(b) air circulating means to force air through said container;

(c) a motor including a first shaft adapted to drive said air circulating means and a second shaft to rotate said drum;

(d) a hub mounted on said second shaft for rotation therewith;

(e) a pulley mounted on said hub for rotation independently of rotation of said hub;

(f) a positive engagement type clutch normally connecting said second shaft and said pulley so that said motor drives said drum;

(g) said positive engagement clutch including a first member mounted on said hub for rotation therewith, a second member mounted on said pulley for rotation therewith, and a first spring normally forcing said first member into engagement with said second member to provide a driving connection between said motor and said pulley;

(h) a yoke member pivotally mounted for engagement with said first member to disengage said first member from said second member, a second spring normally holding said yoke out of engagement with said first member;

(i) manually controllable means engaging said yoke and movable between first and second positions, said manually controllable means being effective on movement from said first to said second position to pivot said yoke into engagement with said first member and disengage said first member from said second member, said manually controllable means being effective upon movement from said second to said first position to release said yoke so that said first spring will move said first member into engagement with said second member and said second spring will insure disengagement of said yoke from said first member.

5. A clothes drying machine as set forth in claim 4 wherein said manually operable means includes a flexible cable attached at one end to said yoke and at the other end to a manually operable handle.

6. A clothes drying machine as set forth in claim 4 wherein said manually operable means includes an electrically energizable solenoid connected to said yoke and a manual selector switch for selectively connecting said solenoid to a source of electric power.

References Cited

UNITED STATES PATENTS

1,398,114	11/1921	Prell	34—87 XR
2,307,264	1/1943	Hamlin	192—90 XR
2,462,363	2/1949	Cook	192—67 XR
2,679,112	5/1954	Thompson	34—55 XR

JULIUS E. WEST, *Primary Examiner.*

A. D. HERRMANN, *Assistant Examiner.*

U.S. Cl X.R.

192—67, 90