July 9, 1957 A. L. REITER 2,798,304

MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Filed April 20, 1954 5 Sheets-Sheet 1

Fig. 1

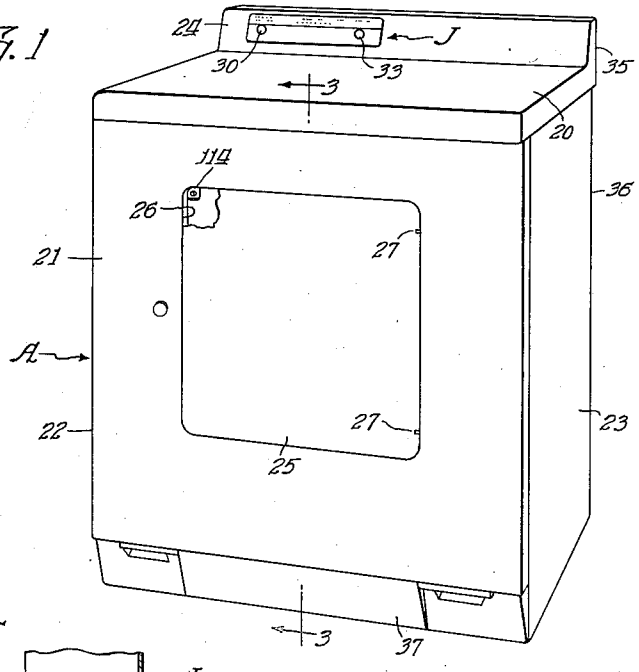
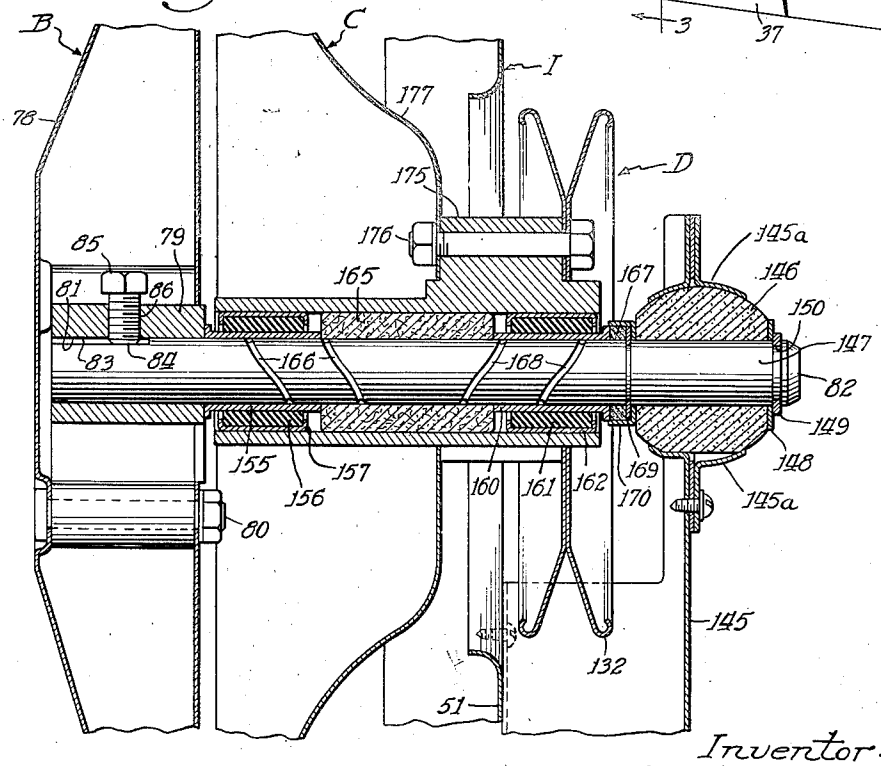


Fig. 5



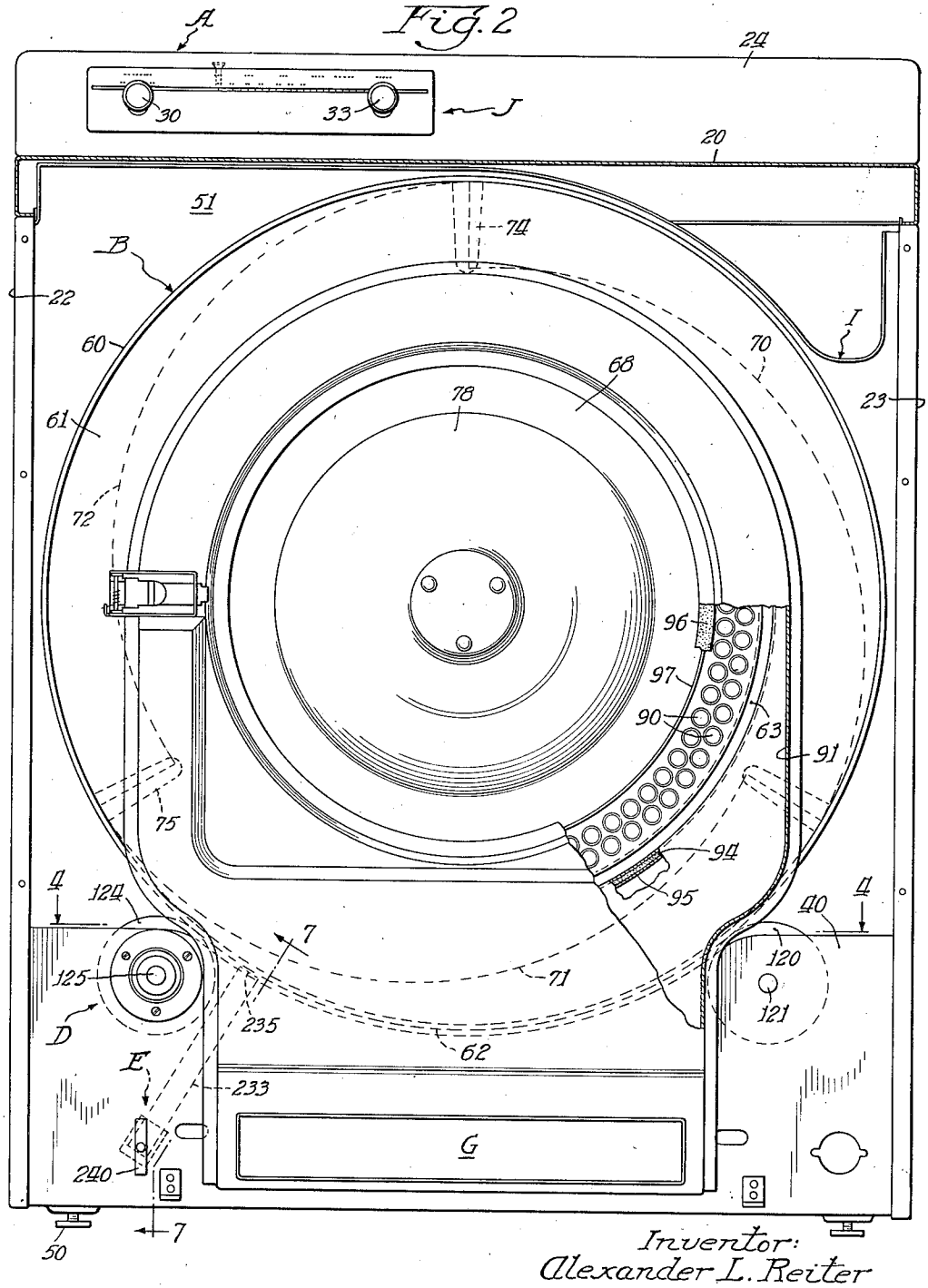
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MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Filed April 20, 1954 5 Sheets-Sheet 2

Fig. 2



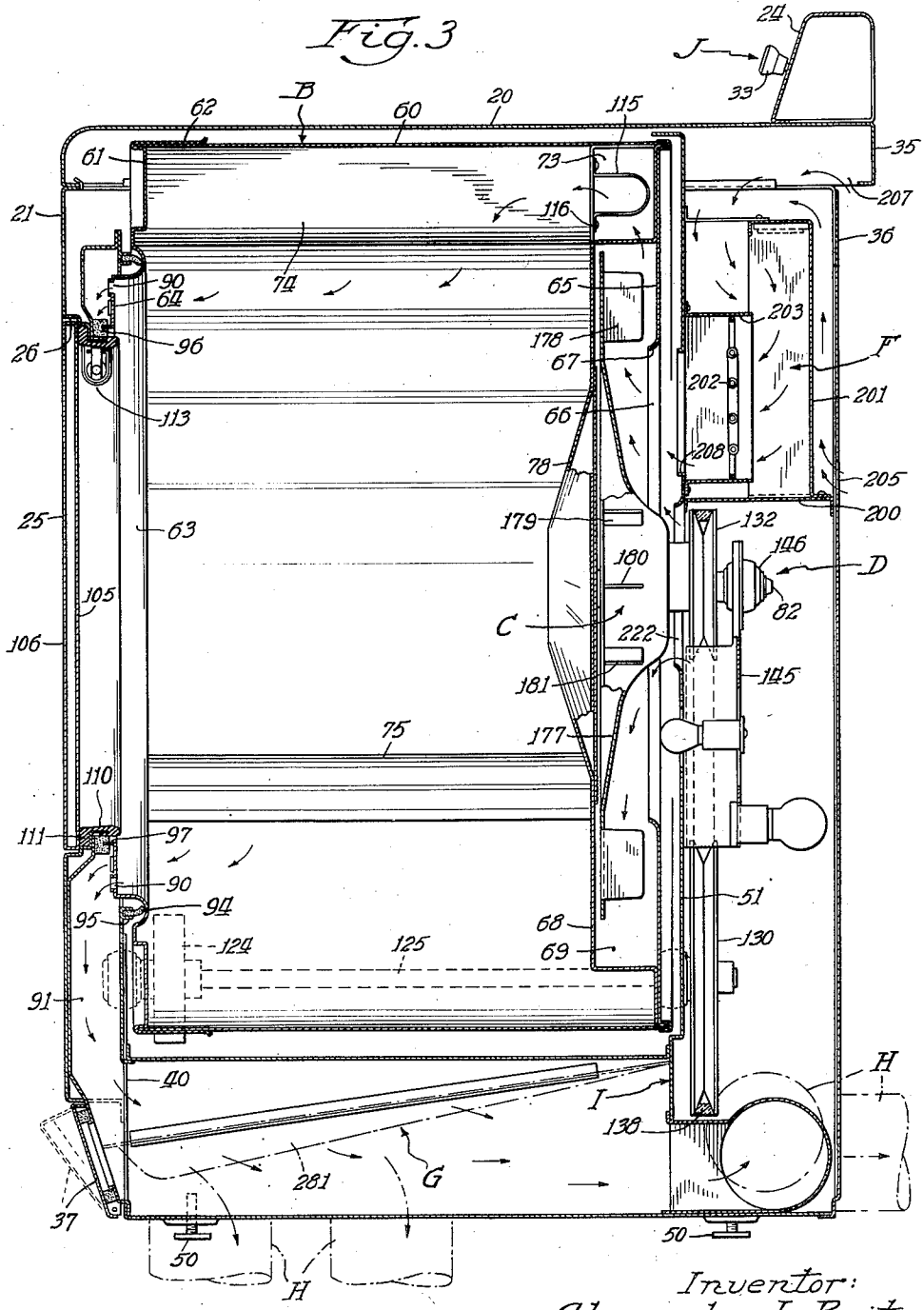
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MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Filed April 20, 1954 5 Sheets-Sheet 3

Fig. 3



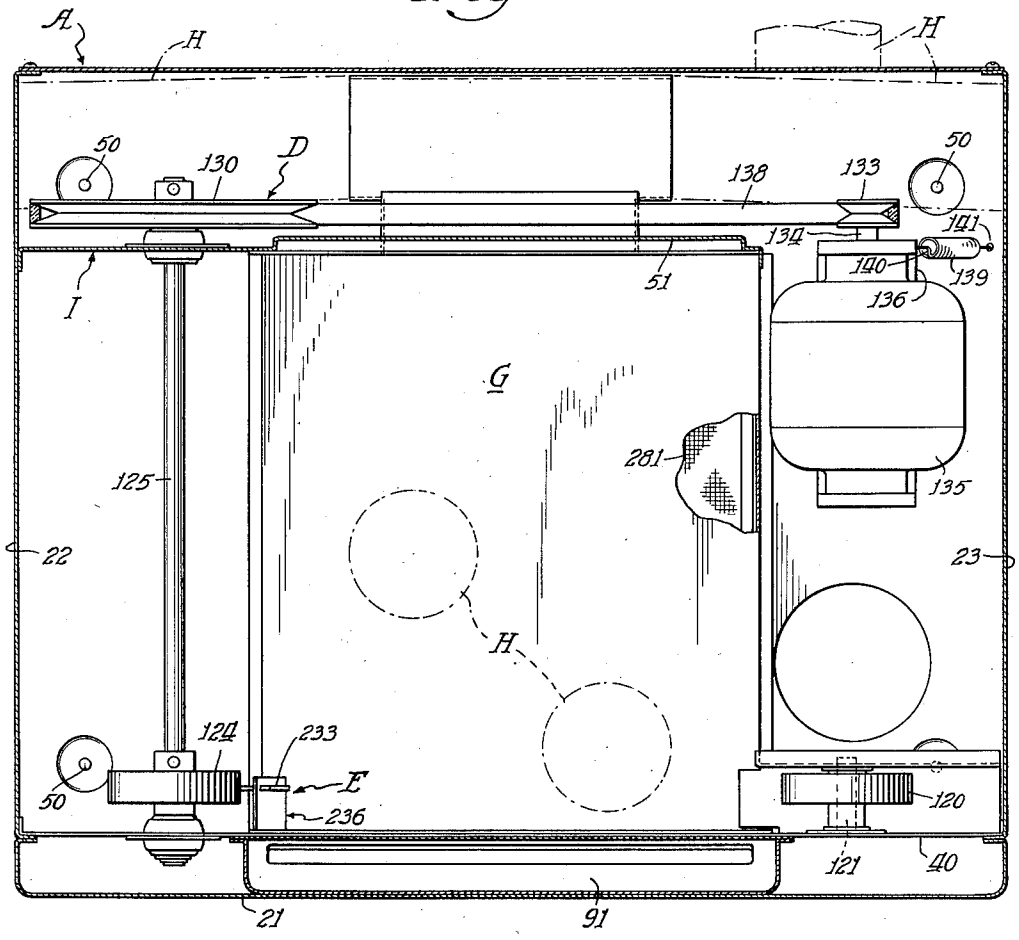
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MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Filed April 20, 1954 5 Sheets-Sheet 4

Fig. 4



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MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Filed April 20, 1954 5 Sheets-Sheet 5

Fig. 6

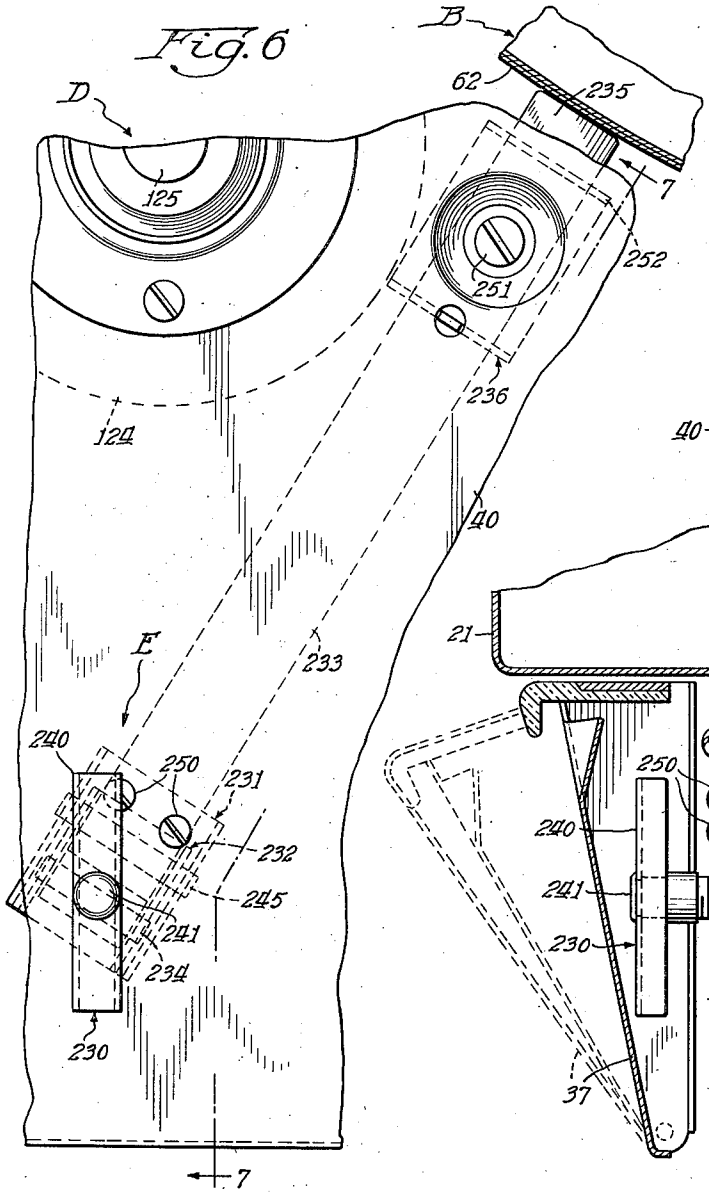


Fig. 7

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United States Patent Office

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Patented July 9, 1957

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MECHANICAL CONTROL MEANS FOR A CLOTHES DRIER CYLINDER

Alexander L. Reiter, Effingham, Ill., assignor to Borg-Warner Corporation, Chicago, Ill., a corporation of Illinois

Application April 20, 1954, Serial No. 424,468

13 Claims. (Cl. 34—91)

This invention relates, in general, to laundry apparatus, and has particular reference to a mechanical control means manually operable by the user for selectively stopping or permitting rotation of a clothes drier cylinder in order to afford either drying of fabrics by maintaining the cylinder stationary or tumbling the fabrics by permitting the cylinder to revolve.

Otherwise stated, the instant invention is concerned with a mechanical control means for a clothes drier cylinder adapted for advantageous incorporation in a domestic or household drier of the character completely disclosed in my copending patent application, Serial No. 424,318, filed April 20, 1954, and entitled "Automatic Drying Apparatus," and which is designed for effective operation in drying of even the most dainty fabrics.

It is well known that certain fabrics are not conducive to tumbling in the conventional revolving cylinder type drier. Moreover, certain fabrics cannot withstand the high temperatures normally employed in conventional driers of this general class. Furthermore, in order to facilitate the drying of fabrics and particularly fabrics which have been washed by a conventional washing machine or by hand, it is desirable not only to remove the surplus water from the fabrics, but it is also desirable to further dry the clothes by circulating air thereover and therethrough, the air so circulated may be either warmed by a heater or may be air of room temperature under certain conditions to favorably effect drying of the fabrics.

Accordingly, an important object and accomplishment of the present invention is to provide means including a selector whereby the user may choose to have passed through the drier either heated air or air of room temperature.

A further important object and accomplishment of the invention is to provide a clothes drier of the type hereinbefore described and having incorporated means whereby the user may select to have the drum rotate to tumble the clothes or cause said drum to be held stationary to effect a so-called "static drying" with a further selection by the user as to whether it is desired to have either heated air or room temperature air pass through the cylinder.

In connection with the above, another important object and accomplishment of the invention is to provide a drier having incorporated therein conveniently accessible means, whereby the user may selectively cause the drum to rotate or be maintained stationary.

A further object and accomplishment of the invention is to provide in a clothes drier of the type described a driving arrangement which is simple in construction, foolproof in operation, and which provides relatively quiet operation effective to rotate the drum and drive the mechanical air moving means to effect a relatively large volume of air movement through said cylinder and over and through the clothes contained therein.

In one of its aspects, the present invention contemplates a clothes drier having incorporated therein air moving means directly associated with the rotatable drum, the air moving means comprising a relatively large fan assembly driven by the same driving mechanism as that of the drum and effective to cause the passage of an unusually large amount of air through the drum for effective "wiping" of the clothes contained therein to more efficiently remove the moisture content therein, the relatively large volume of air passing through the drum assuring safe, fast, uniform drying for every fabric.

Additional objects, features and advantages of the invention disclosed herein will be apparent to persons skilled in the art after the construction and operation are understood from the within description.

It is preferred to accomplish the various objects of this invention and to practice the same in substantially the manner as hereinafter more fully described, and as more particularly pointed out in the appended claims.

Embodiments of the invention are illustrated in the accompanying drawings forming a part hereof and wherein:

Fig. 1 is a perspective view of a clothes drier embodying the features of the present invention;

Fig. 2 is a front elevational view of the interior of the drier cabinet depicted in Fig. 1 with the front panel thereof removed and parts thereof being shown in section to more clearly illustrate the construction thereof;

Fig. 3 is a sectional view of the drier depicted in Figs. 1 and 2 and being taken substantially on the plane of the line 3—3 in Fig. 1;

Fig. 4 is a plan sectional view of the drier contemplated herein and being taken substantially on the plane of the line 4—4 in Fig. 2;

Fig. 5 is a sectional view through the rotatable drum drive shaft and supporting means therefor and including mounting structure for the air fan contemplated by this invention;

Fig. 6 is a fragmentary elevational view of a drum lock contemplated by this invention effective to lock said drum for stationary drying without tumbling;

Fig. 7 is a sectional view of the drum lock depicted in Fig. 6 and being taken substantially on the plane of the lines 7—7 in Figs. 2 and 6.

The drawings are to be understood to be more or less of a schematic character for the purpose of illustrating and disclosing a typical or preferred form of the improvements contemplated herein, and in the drawings like reference characters identify the same parts in the several views.

In the exemplary embodiment of the invention depicted in Figs. 1, 2, 3, 4 and 5, the drier contemplated by this invention comprises, in general, the component part assemblies respectively indicated in their entirety by the letters as follows: A cabinet A exemplifying the external appearance of the automatic drying machine as shown in Fig. 1 and being hereafter referred to simply as a "clothes drier"; a clothes drum B disposed within the cabinet A and revolvable on a substantially horizontal axis and effective to tumble the fabrics disposed therein; an air moving fan assembly C axially disposed with respect to the drum B and effective to cause a relatively large volume of air to pass through said drum B for contact with the fabrics disposed therein for absorption of moisture whereupon said moisture is conveyed outwardly and away from the machine with said air; a driving mechanism assembly D effective to cause rotation of said drum B and said air moving fan assembly C; a static dry control E associated with said drum B and effective to control rotation or nonrotation of said drum responsive to manual operation of said static dry control means by the user as desired; an air heating assembly F over and through which ambient air is drawn by said air moving fan assembly C effective to raise the temperature of said am-

bient air before entry thereof into said drum B whereby said air will be more effective to absorb moisture in the fabrics contained in said drum B; a lint trap assembly G effective to filter out lint contained in the air passing from said clothes drum before it is discharged from the drier to provide substantially lint-free air at the discharge openings; air discharge ports H providing a 5-way vent system permitting flush-to-wall installation in any location without special fittings and whereby said drier may be vented from left or right sides, from rear or bottom of the cabinet, or direct exhaust through the front of the machine by tipping the hinged base panel to a desired open position; a supporting structure I for the operating mechanism disposed within the cabinet and including support means for the driving mechanism assembly D; and a timer mechanism J adapted to regulate the operation of the drier with respect to a selected drying time and permitting selection by the user of drying only by air or by air with heat, the timer mechanism J including the selector switch cooperating with said static dry control means E whereby the user has finger-tip choice of drying fabrics (1) by employing heated air, or (2) air alone, (3) with the drum revolving or (4) maintained in a static condition by operation of the static dry control means E as selected by the user.

Attention is directed to Fig. 1 wherein there is illustrated the cabinet A which houses the entire mechanism and control system therefor and which comprises a cover **20**, a front panel **21**, side panels respectively indicated at **22** and **23**, and a control panel **24** forming a part of and projecting upwardly from the cover **20** as illustrated in Figs. 1, 2 and 4.

In Figs. 1 and 3, it can be seen that the front panel **21** is provided with a hinged door **25** to form the closure member for an opening **26** through which clothes or other fabric articles to be dried may be introduced to the machine. The hinged door **25** is so disposed with respect to the opening **26** that it will be flush with the surface of the front panel **21** when it is in its closed position. One or more metal straps **27** pivotally disposed in mountings secured to the inside surface of the front panel **21** serve to provide a hinged mounting for the access door **25** with respect to the front panel **21**.

On the left-hand side of the control panel **24** there is disposed a control switch knob **30** which provides a means for manually selectively controlling (1) air dry or (2) air dry with heat as desired by the user. The construction and operation of the control switch **30** will be more fully described hereinafter.

On the right-hand side of the control panel **24** there is disposed a control knob **33** which provides a means for manually regulating the timer J. The length of the drying cycle may thus be predetermined and set within certain limits by the manual adjustment of the control knob **33** in a manner to be described in detail hereinafter.

It is notable that both the control switch **30** and the control knob **33** are shown as being disposed on the panelled surface **24** so that they provide no obstruction to the operator in the use of the top surface **20** or in the introduction of the articles to be dried to the machine, or their removal therefrom.

Particular attention is directed to Fig. 1, wherein there is clearly illustrated a recess **35** arranged adjacent the back portions of the drier cabinet, this recess being adaptable for convenient receipt of pipes, wiring cables and the like so that the rear portions **36** of the top of the cabinet A may be positioned so as to be in engagement with a wall or the like to provide continuity when the drier is disposed in kitchen and/or laundry cabinet arrangements and yet provide, by means of the recess **35**, for accommodation of obstructions running horizontally along the wall which could be supply pipes and/or electrical conduits and the like.

An angularly disposed recessed toe plate **37** is provided in the lower front portions of the cabinet as shown in Figs. 1, 3 and 7. This also is to provide obvious advantages of utility, and yet giving design considerations to uniformity when the drier is disposed in a kitchen and/or laundry cabinet arrangement. Moreover, the recessed toe plate **37** is hinged to the lower regions of the cabinet A and is movable between opened and closed positions respectively illustrated in dotted lines and in full lines in Fig. 7. The opening of said recessed toe plate and lint trap access door **37** provides one of five possible means for venting the drier and will be more fully described hereinafter.

Attention is now directed to Figs. 2, 3, 4 and 5 wherein there is clearly disclosed the structural support I which comprises a base formed of sheet steel members indicated in their entirety by the numeral **40** and suitably formed and interconnected by welding or the like to define a substantially box-like base having disposed at the four corners thereof suitable adjustable legs as at **50** adaptable to provide a levelling means for the drier when placed in operative position on a floor or the like, and a superstructure formed of suitably bent sheet steel member **51** arranged vertically to provide a supporting structure for portions of the driving mechanism assembly D and the air heating assembly F.

It can be seen in Figs. 2, 3 and 4 that the lower portions of the cabinet A are secured to and supported by the members **40** of the base. Thus, it can be seen that the supporting structure I is a relatively self-contained unit, and is constructed so as to place the center of gravity in the lower portions of the drier which is to provide advantageous stabilization of the drier in operation, thereby to reduce noise and objectionable vibration to the minimum.

It is important to note that it is highly desirable in clothes driers of the class contemplated herein to provide a drum effective to cause advantageous tumbling of the clothes so that the air passing through the drum advantageously wipes the clothes to more efficiently remove the moisture content therein, thereby providing and assuring safe, fast, uniform drying for every fabric.

In this connection, particular attention is invited to Figs. 2, 3 and 5 wherein the drum B contemplated by the present invention is set forth in detail and may comprise, in general, a cylindrical metal shell **60** made of a solid, imperforate piece of metal in contrast to the usual wire mesh screen heretofore employed, this imperforate construction preventing accumulation of lint which has always been present in perforated cylindrical drums, a forward drum end **61** suitably secured to the front end of the cylindrical shell **60** and a portion of which is bent over the cylindrical shell **60** to define a tire **62**, and said front drum end **61** defining a curved ring **63** provided with a flange **64** extending radially inwardly towards the axis of the cylindrical shell **60**, and a rear end **65** having a central aperture **66** defined by an inturned flange **67**, said rear end **65** of said drum having secured thereto a wall **68** projecting into the cylindrical shell **60** and adapted to define an annular chamber **69** adapted to contain portions of said air moving fan assembly C, and said wall **68** being formed to define elliptically shaped air passages **70**, **71**, and **72**, each respectively having an air opening as at **73** which is in communication with the annular chamber **69**, and baffle means as at **74** and **75** effective to pick up clothes and carry them upwardly during rotation of the drum until a high point is reached whereupon the clothes are dropped to the lower portions of the cylinder and are picked up by another baffle to repeat this cycle.

In order to further reinforce the rear end of the drum, there is provided the conically shaped depressed portions **78** providing a mounting means for a hub **79** which is secured to the conically shaped portions **78** by means of bolts such as at **80**. The hub **79** is provided with a central through aperture **81** adapted to receive a driven shaft **82** having an axially extending groove **83** disposed

on the periphery thereof, said groove being adapted to receive end portions 84 of a set screw 85 received into a threaded aperture 86 in said hub 79, thereby maintaining said shaft 82 in fixed relationship with respect to the hub 79 which is carried in fixed relationship with respect to the conical shaped portions 78 forming a part of the rear wall of the drum B.

As may best be seen in Figs. 2 and 3, the flange 64 of the drum B has a plurality of apertures as at 90 in an annular array as shown, these apertures being in open communication with an air chamber 91 which surrounds the access opening 26 to provide an air conduit directing moisture and lint laden air toward the lint screen G. The chamber 91 is formed of sheet metal plates to define a relatively air tight conduit.

It is notable that the air chamber 91 remains stationary while the flange 64 rotates with the drum B. In order to effectively seal these relatively movable parts, there is provided a felt seal 94 fixedly secured to an outside surface of the air chamber 91 by means of a clamp 95 so that the projecting end of the annular felt seal 94 is in intimate engagement with portions of the curved ring 63, thereby providing an effective air seal between these movable parts.

In order to further seal the chamber 91, there is provided an annular felt seal 96 carried by an annular flange 97 integral with the flange 64 whereby said seal will remain stationary while the drum B rotates.

The opening 26 in the front panel 21 is formed to define a plurality of panels. In Fig. 3 it can be seen that the access door 25 comprises inner and outer panels respectively indicated at 105 and 106, these panels being suitably bent to define flanges which are suitably welded or otherwise secured to provide an integral door. As may best be seen in Fig. 1, the door is of a substantially square shape. Accordingly, portions of the opening 26 adjacent the door 25 are of a substantially square shape in order to accommodate the door as shown in Fig. 3.

Arranged to fit and be attached to the annular circular shaped portions of the opening 26 is a seal 110 formed of rubber or the like and having portions 111 adapted to engage the inner panel 105 of the door 25. Secured to the upper regions of the annular seal 110 is an illuminating lamp fixture 113 adapted to provide suitable illumination in the drum B so that the user can readily identify the fabrics disposed therein. The lamp is controlled by a door switch 114 (Fig. 1) which is spring pressed to a normally closed position and upper left-hand portions of the door 25 are adapted to engage a plunger of the switch 114 upon closing of the door which will cause said switch to be opened and the current to the lamp 113 will be interrupted to shut off the lamp. Upon opening the door 25, the switch will be closed by virtue of the spring means disposed therein, thereby to light the lamp 113 so that the user may conveniently view the inside of the drum.

As may best be seen in Figs. 2 and 3, the air openings 73 each is provided with a U-shaped wire 115 secured to the wall 68 by means of screws or rivets as at 116 to provide an obstruction preventing clothes or fabrics disposed in the drum from entering into the opening 73.

Thus, it can be seen that the drum B is cylindrical in form defined by the imperforate cylindrical wall 60 and which is provided with new and improved air entry means comprising the openings 73 and the elliptically shaped air chambers 70, 71, and 72 which effectively cooperate with the cylindrical wall 60 to efficiently distribute the air throughout the cylinder for advantageous contact with the clothes disposed therein whereby to more rapidly and efficiently cause absorption of moisture by the air to assure rapid, safe and effective drying of the fabrics.

It is important to note that it is highly desirable in clothes driers of the class contemplated herein to provide a drive mechanism which is quiet in operation and has a minimum of vibration.

In this connection, particular attention is invited to Figs. 2, 3 and 4 wherein the driving mechanism assembly D contemplated by the present invention is set forth in detail and may comprise, in general, an idler wheel 120 having a shaft 121 suitably journalled in and carried by the support plate 40 of the supporting structure I and so arranged that the periphery of the wheel 120 is in intimate engagement with the tire 62, the driven shaft 82 as hereinbefore described, a drive pulley 130 mounted on the shaft 125 remotely from the wheel 124, a drive pulley 132 rotatably mounted on the driven shaft 82 (Fig. 5) for relative rotation therebetween, a drive pulley 133 mounted on a drive shaft 134 of an electric motor 135, and an endless V-belt 138 suitably mounted on the drive pulleys 130, 132 and 133 as shown in Figs. 3, 4 and 5.

The motor 135 is carried by a bracket 136 which is hinged to a supporting bracket (not shown) secured to the lower frame structure of the drier. A spring 139 one end 140 of which being attached to portions of the bracket 136 and the other end 141 of which is secured to the lower frame assembly of the clothes drier, whereby to provide a resilient force urging pivotal movement of the motor in a generally downwardly direction in order to facilitate at all times proper tension of the V-belt 38 in its driving contact with the drive pulleys 130, 132 and 133.

Attention is invited to Fig. 5 which is an enlarged view of portions of the driving mechanism assembly D. It can be seen that the shaft 82 is fixedly secured to the drum B and is rotatable therewith by means of the set screws 85 disposed in the hub 79 which is carried by portions of the rear wall of the drum B. Carried by the vertical support 51 is a bracket 145 adapted to support a sintered powdered metal bearing 146 in which outer end portions 147 of the shaft 82 are effectively journalled. In order to prevent relative axial movement of the shaft 82 with respect to the bearing 146 there is provided a washer 148, and a snap ring 149 disposed in a groove 150 in the shaft 82. It is to be noted that the powdered metal bearing 146 is generally spherical in configuration. The shape of bracket portions 145*a*, supporting the bearing 146, are complementary to the bearing configuration so that the shaft 82, the bearing 146, and thus the cylinder 60 are pivotal with respect to the bracket 145 in the manner of a universal joint.

As may best be seen in Fig. 5, the air moving fan assembly C is mounted upon the shaft 82 for relative rotation therebetween. It is notable that the shaft 82 will rotate in one direction while the fan assembly C will rotate in the opposite direction. In order to accomplish this there is provided a bronze bearing 155 having a rubber sleeve 156 encased in a suitable cover or case 157. In like manner, there is also provided a second bronze bearing 160 having a rubber sleeve 161 encased in a cover or case 162. It is notable that the bearings 155 and 160 are disposed in spaced relationship. Surrounding the shaft 82 in the space between the bearings 155 and 160 there is disposed an oil soaked wick felt 165 arranged to cooperate with the oil grooves 166 and 168 in the shaft 82 so that lubrication is effectively provided to the bronze bearings 155 and 160. Adjacent the end portions of the bearing 160 there is disposed a felt seal 167 maintained in its proper position as shown by a snap ring 169 encased in a housing 170 and operable to effectively prevent lubrication from running axially along and outwardly of said shaft 82.

The drive pulley 132 is mounted on a hub 175 by means of bolts as at 176 which also secure to the hub 175 an annular fan blade support 177 having attached thereto adjacent the periphery thereof projecting blades as at 178, 179, 180, 181. It is notable that the hub 175 is suitably journalled on the shaft 82 by means of the bearings 155 and 160. A particular advantage of the rubber sleeves 156 and 161 is that the resiliency of the rubber permits hub 175 to pivot with respect to the shaft 82 about an axis transverse to the longitudinal axis of the shaft. This freedom for a pivotal movement of the hub 175 with re-

spect to the shaft 82 prevents jamming between these members whenever the shaft 82 is pivoted about bracket 145 in the manner previously described.

Attention is invited to Figs. 2, 3 and 4 wherein it can be seen that the drum B is supported for rotation on the wheels 120 and 124, the peripheries of which are in engagement with the tire 62 so that the drum B may effectively rotate thereon. In Fig. 2 it can be seen that the wheel 120 is an idler wheel and is not driven by the driving means but merely acts as a support for the drum B. However, the wheel 124 is driven through the shaft 125 by means of the pulley 130 which is caused to rotate by means of the V-belt 138 (Fig. 3) which in turn is rotated by the drive pulley 133 attached to the motor shaft 134. Accordingly, because the drier drum B rests upon the wheel 124, the drum will be caused to rotate by rotation of the wheel 124, thereby to drive the drum to effectively tumble the fabrics contained therein.

In Figs. 3 and 5 it can be seen that the rear end of the drum is supported by the centrally disposed shaft 82 which is journalled in the sintered powdered metal bearing 146. Because the shaft 82 is fixedly secured to the drum B, it will rotate therewith and act as a driven shaft, the rotation of the drum being accomplished by rotation of the wheel 124.

Because the driving mechanism for the drum B is interrelated with the driving mechanism of the air moving fan assembly C, it can be seen that when the drum rotates the air moving fan assembly will also be operative. Movement of the endless V-belt 138 will cause rotative movement of the pulley 132 and because the pulley 132 is secured to the hub 175 which in turn carries annular fan blade support 177, the air moving fan assembly C will be caused to rotate.

Attention is invited to Fig. 3 wherein it can be seen that the air heating assembly F comprises, in general, a housing 200 formed of metal plates to define the shape as shown and to provide a baffle 201, whereby to control the flow of ambient air for passage over and through an electric heating element 202 suitably carried in a sheet metal frame 203 which is attached to the vertical support 51, the sheet metal frame 203 being formed to define a tunnel-like shape with the electric heating elements as at 202 disposed therein. Ambient air is drawn by the air moving fan assembly C through a plurality of apertures as at 205 disposed in the rear enclosure panel 206 in the direction indicated by the arrows, and through the opening 207 in the upper regions of the cabinet for passage into the housing 201 and through the tunnel-like shaped enclosure 203 for contact with the heating elements 202 and thereafter through an aperture 208 in the vertical support 51.

Thus, the ambient air coming in contact with the heating elements 202 will be raised in temperature for more effective absorption of the moisture contained in the fabrics disposed in the drum.

Although an electric heating element 202 is disclosed herein, it is obvious that other means may be employed for air heating such as, for example, gas or the like.

The control of the operation of the heating elements 202 will be further discussed hereinafter in detail in the description of the wiring diagram illustrated in Fig. 8.

It is important to note that this invention contemplates a drier having relatively low operating temperatures ranging from 110° F. to 140° F., the moisture in the fabrics when first deposited in the clothes drier being effective to maintain the operating temperature at 110° F. and as the moisture is withdrawn from the fabrics to a point where 90 percent of the moisture has been removed from the fabrics, the temperature range will rise to approximately 140° F. and a control means to be hereinafter described will be effective to cause inoperation of the heating means while the drum continues to rotate to tumble the clothes for effective fluffing thereof and the air continues to pass thereover and therethrough to effectively aerate the clothes for whatever length of time to which the timer has been set.

As may best be seen in Figs. 3 and 5, the air moving fan assembly C comprises the annular support 177 having fixedly disposed adjacent the periphery thereof a plurality of fan blades 178, 179, 180 and 181, these fan blades being arranged in equally spaced relationship and disposed in the chamber 69 defined by the rear end wall assembly of the drum B.

It is notable that the drum B will rotate in one direction while the fan assembly C will rotate in a direction opposite to that of the drum. Thus, rotation of the fan assembly C effected by rotation of the pulley 132 by means of the endless V-belt 138 through the motor drive pulley 133 will cause ambient air to be drawn through the aperture 205 in the back panel 206 and through the opening 207 in the upper regions of the cabinet for passage through the housing 201 and in the tunnel-like shaped enclosure 203 for contact with the air heating elements 202, through the opening 208 in the vertical support 51 and through the annular opening 66 in the rear wall 65 of the drum B for passage through the openings 73 and into contact with the fabrics in the drum B where the air will absorb moisture contained in the fabrics and will be forced outwardly from the drum through the openings 90 in the flange 64 at the forward end of the drum for discharge into the air chamber 91 for transmittal to the lint trap assembly G disposed in the lower regions of the cabinet and thereafter outwardly from the cabinet via one of five possible vent openings H.

It is important to note that the vertical support 51 is provided with an annular opening 222 (Fig. 3) through which the shaft 82 and the assembly disposed thereupon projects, this opening permitting ambient air of room temperature to be drawn into the chamber 69 by the fan where the ambient air is mixed and co-mingled with the heated air entering into the chamber 69 via the opening 208. The passage of ambient air of room temperature around and adjacent the driving assembly and the bearings disposed adjacent the opening 222 provides an effective means for cooling the bearings hereinbefore described and located in this general region.

Moreover, it is of particular importance to note that the air flow is constantly away from the heating elements 202 which advantageously provides safety in operation and substantially eliminates any questions of fire hazards. Moreover, the relatively large volume of air afforded by the operation of the air moving fan assembly C slightly pressurizes the drum B, whereby contact of the air with the fabrics contained in the drum is effected more efficiently and more completely whereby moisture from the fabrics is more rapidly absorbed to effect drying of the fabrics quickly but at a relatively low temperature which is safe for even the most dainty fabrics.

Suffice it to say, since the invention is not particularly concerned with the precise construction of the complete automatic clothes drier herein described generally, and/or its associated parts, they will not be further described in detail, and it is deemed sufficient for all intentions and purposes herein contained to show only portions thereof adjacent to and cooperating with the mechanical control means with which the invention is particularly concerned. It is to be understood that details of construction of such automatic clothes drier, and/or its associated parts, may be modified to suit particular conditions or to satisfy the engineering genius of various competitive manufacturers, and I do not wish to be limited to the construction of these elements as set forth except where such construction particularly concerns the invention contemplated herein.

Having thus described, by way of example, a possible adaptation of the mechanical control means for a clothes drier cylinder and having described the general environment surrounding the adaptation, the specific construction and function of the parts of said mechanical control

means when disposed in an automatic clothes drier as herein disclosed, will now be described in detail.

Static drive mechanism E

In one of its most important aspects the present invention contemplates the provision of means whereby the operator may conveniently and advantageously cause non-rotation of the drum B in order to dry certain fabrics which would be damaged by the usual tumbling action universally employed by clothes driers. The operator may select by manual operation of the heat control switch knob **30** to have either air dry or air dry with heat. By operating the static dry control means E, the operator may further select whether the drum should rotate or be maintained in a stationary position.

Attention is invited to Figs. 6 and 7, wherein there is disclosed the static dry control mechanism generally indicated by the letter E and which may comprise, in general, a manually operable control handle indicated in its entirety by the numeral **230** and rotatably mounted in the support **40**, a first bracket **231** fixedly secured to said support **40**, a second bracket **232** hingedly mounted to said first bracket, an operating lever **233** one end of which is pivotally connected to the second bracket **232** by means of a pivot pin **234** and the other end **235** of which is adapted for engagement with the tire **62** surrounding the periphery of the basket B, and a third bracket **236** also fixedly secured to the support **40** and adapted to act as a guide for the upper end regions of the operating lever **233**.

It can be seen in Fig. 7 that the operating handle **230** comprises the handgrip **240** which is suitably mounted on a screw threaded shaft **241** adapted to be received into a nut **242** welded or otherwise secured to the first bracket **231** as shown. Accordingly, manual rotation of the handle **240** will cause axial movement of the screw threaded portions **241**. In order to prevent removal of the screw threaded portions **241** from its operative position with respect to the nut **242**, there is provided a washer **243** which will become engaged with the exposed surface of the nut **242** responsive to rotation of the handle **240** in a direction whereby the screw threaded portions **241** will be caused to move outwardly of the nut **242**.

It is notable that the end portions **244** of the screw threaded portions **241** are engageable with the second bracket **232** and manual rotation of the handle **240** in a direction whereby the screw threaded portions **241** are moved inwardly of the nut **242** will force pivotal movement of the second bracket **232** with respect to the first bracket **231** on an axis defined by the pivot pin **245** and, because of the pivotal interconnection between the second bracket **232** and the operating lever **233** by means of the pivot pin **234**, the operating lever will be caused to move upwardly, whereby the upper end portions **235** will become engaged with the tire **62** of the drum B, whereby said drum will be raised slightly from its normal engagement with the drive wheel **124** and thereby remain stationary while the drive wheel **124** continues to rotate.

Manual operation of the handle **240** in a direction whereby the screw threaded portions **241** will be moved axially outwardly of the nut **242** will cause the second bracket **232** to assume its normal position and because of this movement the operating lever **233** will be moved downwardly to a normally disengaged position with respect to the end portions **235** and the tire **62** of the drum B. It is notable that the weight of the drum B will cause said downward movement when permitted by rotation of the handle **240**.

It can be seen in Fig. 7 that the first bracket is of a generally U-shape and is fixedly secured to the support **40** by means of screws as at **250**.

The second bracket is also of a generally U-shape and of a dimension somewhat smaller than the first bracket **231** so that the second bracket **232** will fit into the confines of the generally U-shape of the first bracket **231**. The pivot pin **245** pivotally interconnects the second bracket **233** with respect to the first bracket **231**.

In Figs. 6 and 7 it can be seen that the third bracket **236** is fixedly secured to the support **40** by means of a screw as at **251**. This bracket is provided with a depending flange **252** projecting away from the support **40** and is provided with an aperture **253** adapted to receive the upper end regions of the operating lever **233**. It is notable that the third bracket **236** acts as a guide for the upper regions of the operating lever **233** so as to assure proper contact between the upper end **235** of the operating lever **233** and the tire **62** of the drum B.

In order to provide access to the handle **240** the lint trap access door **37** may be pivoted to its open position and the operator can then manually rotate the handle **240** to effect either static dry or drying of the fabrics by rotation of the drum which will tumble the fabrics contained therein.

Summary of operation

The clothes drier contemplated herein is an indoor clothes drier advantageously applicable for domestic use in homes, apartment buildings and self-service laundries. It will damp dry an average eight to nine pound load of clothes (dry weight) ready for ironing in approximately thirty minutes. It will completely dry an average washer load of clothes in approximately forty-five minutes.

The wet clothes are placed into the solid, smooth drum B which revolves at 45 R. P. M., gently tumbling the clothes by means of three smooth baffles as at **74** disposed within the drum B.

The clothes are dried by air which is drawn through a number of openings **205** in the back panel **206** and through other openings to come in contact with the air heating element **202**. The heated air is then forced by pressure from the fan assembly C through the three ducts as at **73** provided in the rear wall of the drum B, into the drum B proper and circulated over and through the clothes contained therein. The heated moisture laden air is then expelled through the relatively small openings **90** in the drum front wall where it is directed down through an air duct **91**, through the lint screen **281** of the lint trap means G and into the exhaust duct H. This type of circulation allows the use of a relatively high volume of air, resulting in an over-all cooler unit and increased efficiency due to less heat leakage.

The drum B may be stopped by means of the static drive mechanism E which is operable to lift the drum B up off the drive pulley **124**. The static drive mechanism E is operated by a handle **240** located at the lower left-hand corner of the drier, in back of the lint trap access door **37**. Turning the handle **240** clockwise lifts or stops the drum B. Turning the handle counterclockwise lowers the drum B on the drive pulley **124** and starts the drum B revolving.

While I have illustrated preferred embodiments of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth but wish to avail myself of all changes within the scope of the appended claims.

I claim:

1. Mechanical control apparatus for a laundry machine comprising a cylinder rotatably mounted on a support and adapted for receiving fabrics to be tumbled therein, said cylinder having a front end and a rear end, the rear end of said cylinder being pivotally connected to said support, and drive means supporting the front end of said cylinder and for rotating the cylinder, said mechanical control means comprising a manually operable handle having a shaft fixedly secured thereto, a first bracket fixedly secured to the cylinder support, a second bracket hingedly mounted on said first bracket, one end of said handle shaft being adapted for engagement with said second bracket upon manual rotation of said handle, and

an operating lever one end of which is pivotally connected to said second bracket and the other end of which is adapted for engagement with said cylinder to lift said cylinder off the drive means so that said cylinder will remain stationary while said drive means continues to operate.

2. Mechanical control apparatus for a laundry machine comprising a cylinder rotatably mounted on a support and adapted for receiving fabrics to be tumbled therein, said cylinder having a front end and a rear end, the rear end of said cylinder being pivotally connected to said support, drive means supporting the front end of said cylinder and for rotating the cylinder, air translating means driven by said drive means for circulating air through the cylinder in contact with the fabrics, a heating means for imparting heat to the air prior to its entry into the cylinder, a switch manually operable to open and closed positions for respectively controlling energization and deenergization of said heating means, said mechanical control means comprising a manually operable handle having a shaft fixedly secured thereto, a first bracket fixedly secured to the cylinder support, a second bracket hingedly mounted on said first bracket, one end of said handle shaft being adapted for engagement with said second bracket upon manual rotation of said handle, and an operating lever one end of which is pivotally connected to said second bracket and the other end of which is adapted for engagement with said cylinder to lift said cylinder off the drive means so that said cylinder will remain stationary while said drive means continues to operate said air translating means.

3. A laundry machine comprising a cylinder rotatably mounted on a support and adapted for receiving fabrics to be tumbled therein, said cylinder having a front end and a rear end, the rear end of said cylinder being pivotally connected to said support, drive means supporting the front end of said cylinder and for rotating the cylinder, a manually operable handle having a shaft fixedly secured thereto, a first bracket fixedly secured to the cylinder support, a second bracket hingedly mounted on said first bracket, one end of said handle shaft being adapted for engagement with said second bracket upon manual rotation of said handle, and an operating lever one end of which is pivotally connected to said second bracket and the other end of which is adapted for engagement with said cylinder to lift said cylinder off the drive means so that said cylinder will remain stationary while said drive means continues to operate.

4. Laundry apparatus comprising a supporting frame, a clothes receiving cylinder, one end of said cylinder being substantially closed by a wall, said wall being provided with a shaft fixedly secured thereto and projecting therefrom to define a central axis for said cylinder, said shaft being pivotally and rotatably journalled in said supporting frame, means for precluding pivotal movement of said shaft, air moving fan means comprising a hub journalled on said shaft for independent relative rotation therebetween, an annular radially projecting vane support fixedly secured to said hub, a plurality of vanes secured to said vane support in equal spaced relationship adjacent the periphery of said vane support, a pulley fixedly secured to said hub, and power means including power transmission means connected to said pulley for rotating said fan means on said shaft.

5. Laundry apparatus comprising a supporting frame, a clothes receiving cylinder having a substantially imperforate peripheral surface and an axially aligned clothes receiving opening at one end, the other end of said cylinder being substantially closed by a wall, said wall being provided with a shaft fixedly secured thereto and projecting therefrom to define a central axis for said cylinder, said shaft being journalled in said supporting frame, air moving fan means mounted for independent rotation on said shaft, a plurality of bearings disposed between said fan means and said shaft, resilient means positioned between each bearing and the portion of the fan means individual thereto to permit said fan means to pivot with respect to said shaft about an axis transverse to said shaft, and power means including power transmission means for rotating said air moving fan means on said shaft, said power transmission means including means for rotating said cylinder in a direction opposite to the rotation of said fan means and at a different speed.

6. For laundry apparatus comprising a supporting frame, a clothes receiving cylinder having an axially aligned clothes receiving opening at one end, the other end of said cylinder being substantially closed by a wall, a shaft fixedly secured to said wall and projecting therefrom to define a central axis for said cylinder, and said shaft being journalled in said supporting frame: air moving fan means disposed between the frame and the cylinder, said air moving fan means comprising a hub journalled on said shaft for independent relative rotation therebetween, automatic lubrication means disposed between the shaft and the hub, an annular radially projecting vane support fixedly secured to said hub, a plurality of vanes secured to said vane support in equal spaced relationship adjacent the periphery of said vane support, a pulley fixedly secured to said hub, and power means including power transmission means connected to said pulley for rotating said fan means on said shaft.

7. The combination with a clothes receiving cylinder having a shaft fixedly secured thereto and projecting therefrom to define a central axis for said cylinder, of air moving fan means disposed coaxial with said cylinder and mounted for independent rotation on said shaft, at least two bearing elements disposed between said fan means and said shaft, automatic lubrication means adjacent said bearings and including spiral grooves formed on the shaft for distributing lubricant to the bearings, power means including power transmission means for rotating said air moving fan means on said shaft, and said power transmission means including means for rotating said cylinder in a direction opposite to the rotation of said fan means.

8. A clothes receiving cylinder having a shaft fixedly secured thereto and projecting therefrom to define a central axis for said cylinder, in combination with air moving fan means comprising a hub surrounding said shaft for independent relative rotation therebetween, said hub being spaced radially from the shaft, resilient means disposed between the hub and the shaft so as to align said hub and said shaft coaxially, an annular radially projecting vane support fixedly secured to said hub, a plurality of vanes secured to said vane support in equal spaced relationship adjacent the periphery of said vane support, a pulley fixedly secured to said hub, and power means including power transmission means connected to said pulley for rotating said fan means on said shaft.

9. Air moving fan means for laundry apparatus comprising a hub journalled on a shaft for independent relative rotation therebetween, said hub defining an elongated sleeve radially spaced from the shaft, resilient means disposed between the sleeve and the shaft to permit the sleeve to pivot with respect to said shaft about an axis transverse to the longitudinal axis of said shaft, an annular radially projecting vane support fixedly secured to said hub, a plurality of vanes secured to said vane support in equal spaced relationship adjacent the periphery of said vane support, a pulley fixedly secured to said hub, and power means including power transmission means connected to said pulley for rotating said fan means on said shaft.

10. Laundry apparatus comprising a supporting frame, a cylinder having a clothes receiving opening at the forward end and a wall at the rear end provided with a plurality of air inlet openings, air heating means for heating air prior to its entry into said cylinder through said air inlet openings, a pair of spaced wheels rotatably mounted on said supporting frame adjacent the forward

end of said cylinder and in engagement with the periphery of said cylinder for rotatably supporting said cylinder at the forward end thereof, a shaft rotatably and pivotally journalled on said frame and secured to the rear wall of said cylinder for supporting said cylinder at the rear end thereof, one of said wheels being mounted on a shaft carried by said support frame, a pulley mounted on said shaft, fan means rotatably journalled on said shaft coaxial with said cylinder and arranged to cause air to pass through said air inlet openings and axially through said cylinder while it is rotated, said fan means including a pulley fixedly secured thereto, motor means having a drive pulley, at least one belt mounted on said drive pulley and said shaft mounted pulley and said fan pulley effective to rotate said cylinder and said fan, and control means operable to raise the cylinder off said wheels whereby said shaft is pivoted with respect to said frame, the normal tension of said belt causing the fan means to pivot with said shaft without disturbing the rotatable condition of said fan means.

11. Laundry apparatus comprising a supporting frame, a cylinder having a clothes receiving opening at the forward end and a wall at the rear end provided with a plurality of air inlet openings, air heating means for heating air prior to its entry into said cylinder through said air inlet openings, a pair of spaced wheels rotatably mounted on said supporting frame adjacent the forward end of said cylinder and in engagement with the periphery of said cylinder for rotatably supporting said cylinder at the forward end thereof, a shaft rotatably and pivotally journalled on said frame and secured to the rear wall of said cylinder for supporting said cylinder at the rear end thereof, one of said wheels being mounted on a shaft carried by said support frame, a pulley mounted on said shaft, fan means rotatably journalled on said shaft coaxial with said cylinder and arranged to cause air to pass through said air inlet openings and axially through said cylinder while it is rotated, said fan means including a pulley fixedly secured thereto, motor means having a drive pulley, belt means mounted on said drive pulley and said shaft mounted pulley and said fan pulley effective to rotate said cylinder and said fan, and mechanical control means manually operable to pivot said shaft with respect to said frame whereby said belt means causes the fan means to pivot with said shaft without disturbing the rotatable condition of said fan means.

12. For laundry apparatus having a support frame, and a cylinder having a clothes receiving opening at the forward end and a wall at the rear end provided with a plurality of air inlet openings: a pair of spaced wheels

rotatably mounted on said supporting frame for rotatably supporting said cylinder at the forward end thereof, driving means connected to one of said wheels whereby said cylinder is rotated responsive to rotation of said wheel by said driving means, a shaft rotatably and pivotally journalled on said frame and secured to the rear wall of said cylinder at the central axis thereof, said laundry apparatus having fan means rotatably journalled on said shaft coaxial with said cylinder and arranged to cause air to pass through said air inlet openings and axially through said cylinder while it is rotated, said driving means for said cylinder including power transmission means for driving said fan means, and means for disengaging said cylinder driving means whereby said shaft is pivoted about the frame and the fan means is pivoted with the shaft without disturbing the driving connection to said fan means.

13. For laundry apparatus having a supporting frame, and a cylinder having a clothes receiving opening at the forward end and a wall at the rear end provided with a plurality of air inlet openings: a pair of spaced wheels rotatably mounted on said supporting frame adjacent the forward end of said cylinder and in engagement with the periphery of said cylinder for rotatably supporting said cylinder at the forward end thereof, a shaft rotatably and pivotally journalled on said frame and secured to the rear wall of said cylinder for supporting said cylinder at the rear end thereof, one of said wheels being mounted on a shaft carried by said support frame, a pulley mounted on said shaft, said laundry apparatus having fan means rotatably journalled on said driven shaft coaxial with said cylinder and arranged to cause air to pass through said air inlet openings and axially through said cylinder while it is rotated, said fan means including a pulley fixedly secured thereto, motor means having a drive pulley, and single belt means mounted on said drive pulley and said shaft mounted pulley and said fan pulley effective to rotate said cylinder and said fan, and means for pivoting said fan means with said driven shaft whereby said cylinder is held stationary and said fan means remains rotatable.

References Cited in the file of this patent

UNITED STATES PATENTS

1,800,228	Pierce	Apr. 14, 1931
2,424,737	Broglie	July 29, 1947
2,486,058	Patterson et al.	Oct. 25, 1949
2,500,062	Clark	Mar. 7, 1950
2,503,329	Geldhof et al.	Apr. 11, 1950