June 5, 1956 J. T. HELLYER 2,748,496

CLOTHES DRYER

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Fig. 1.

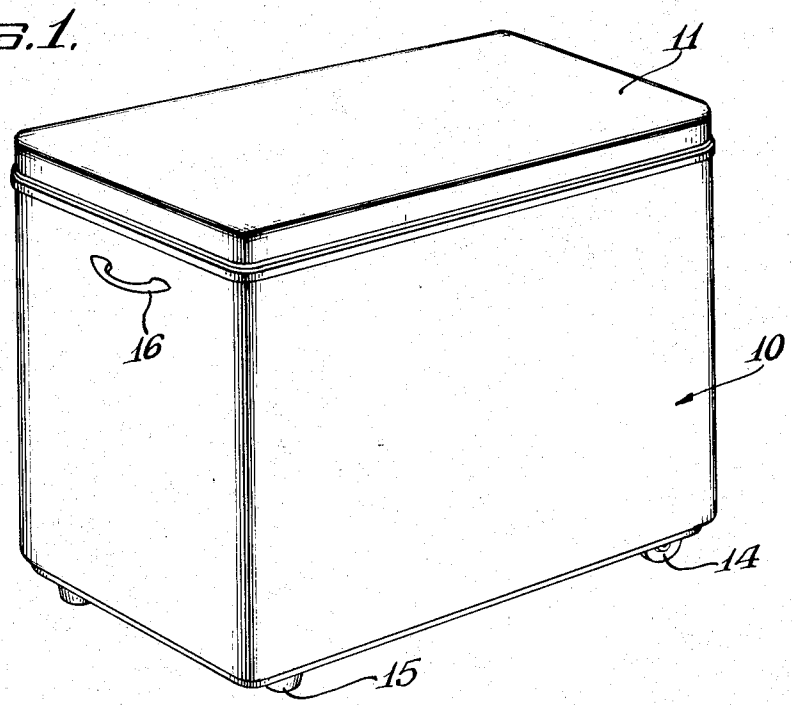
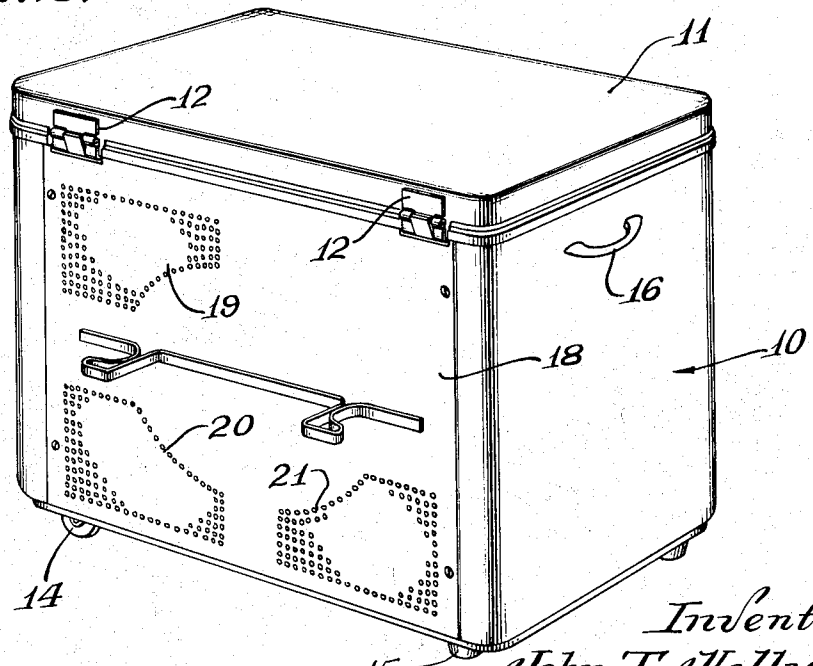


Fig. 2.



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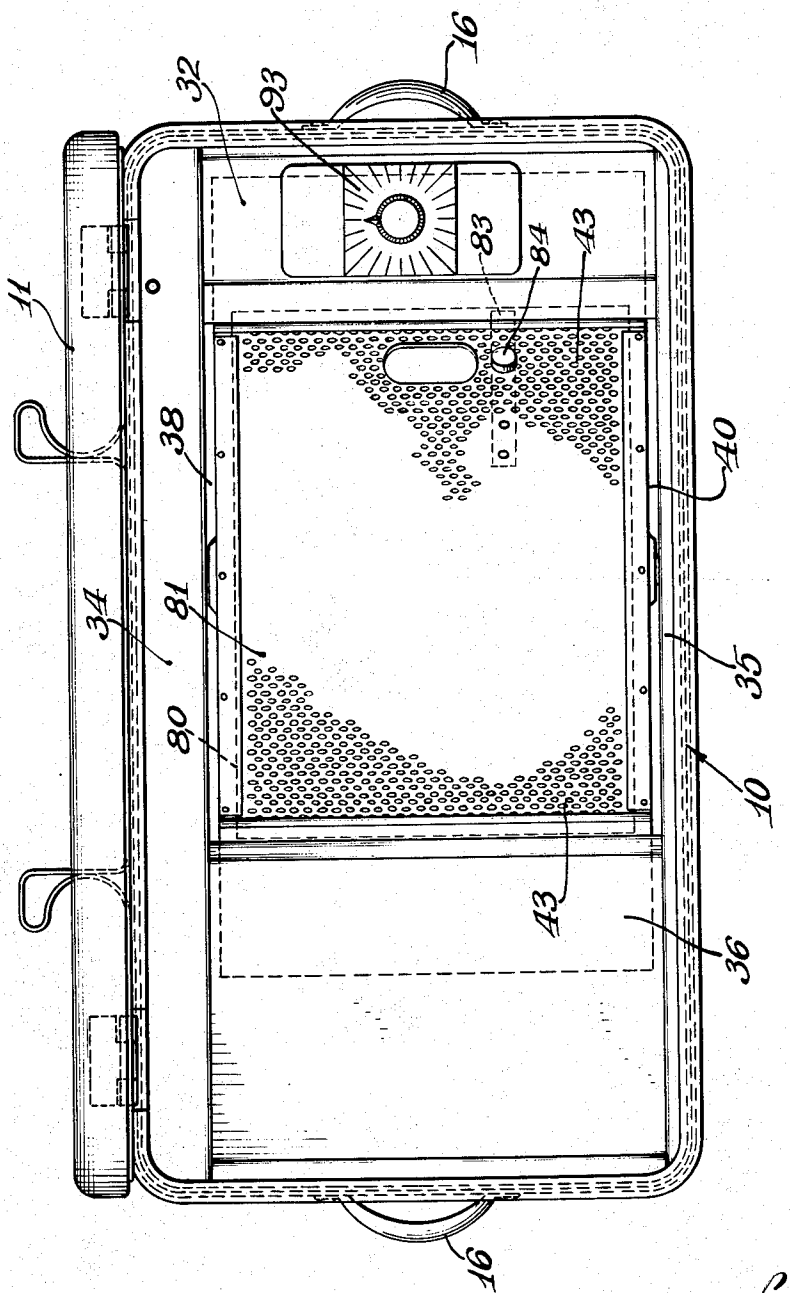


FIG. 3.

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CLOTHES DRYER

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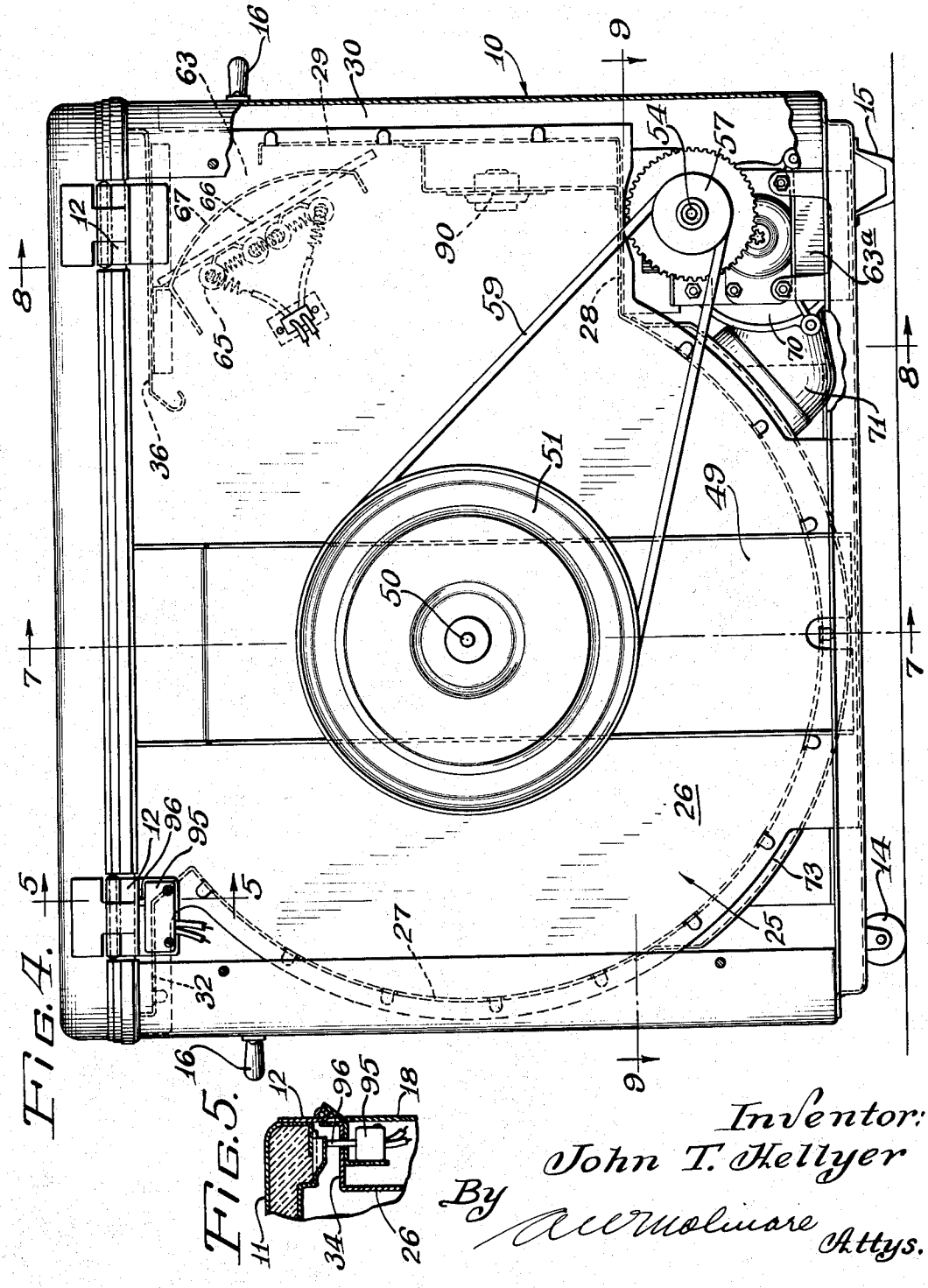


FIG. 4.

FIG. 5.

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CLOTHES DRYER

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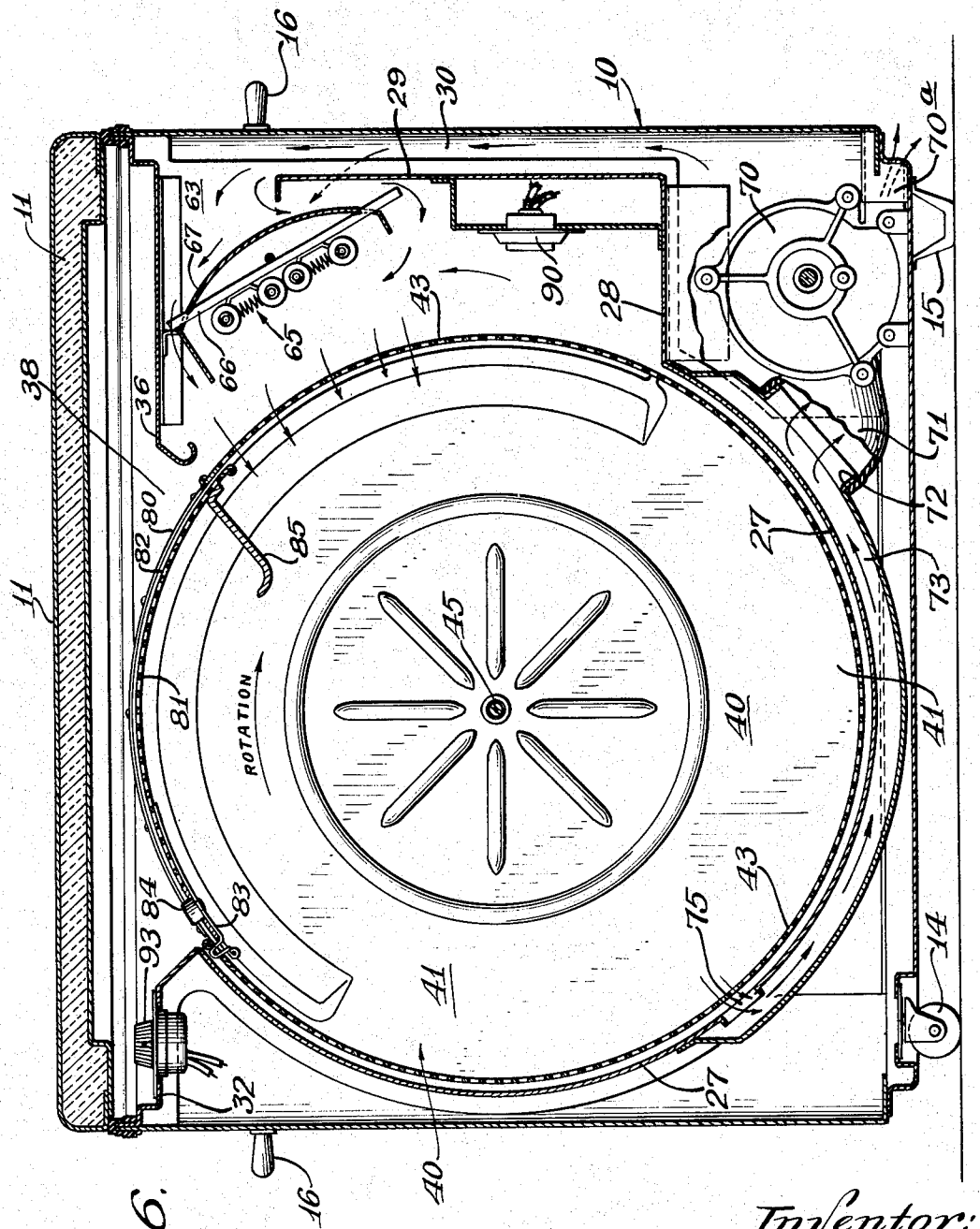


FIG. 6.

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CLOTHES DRYER

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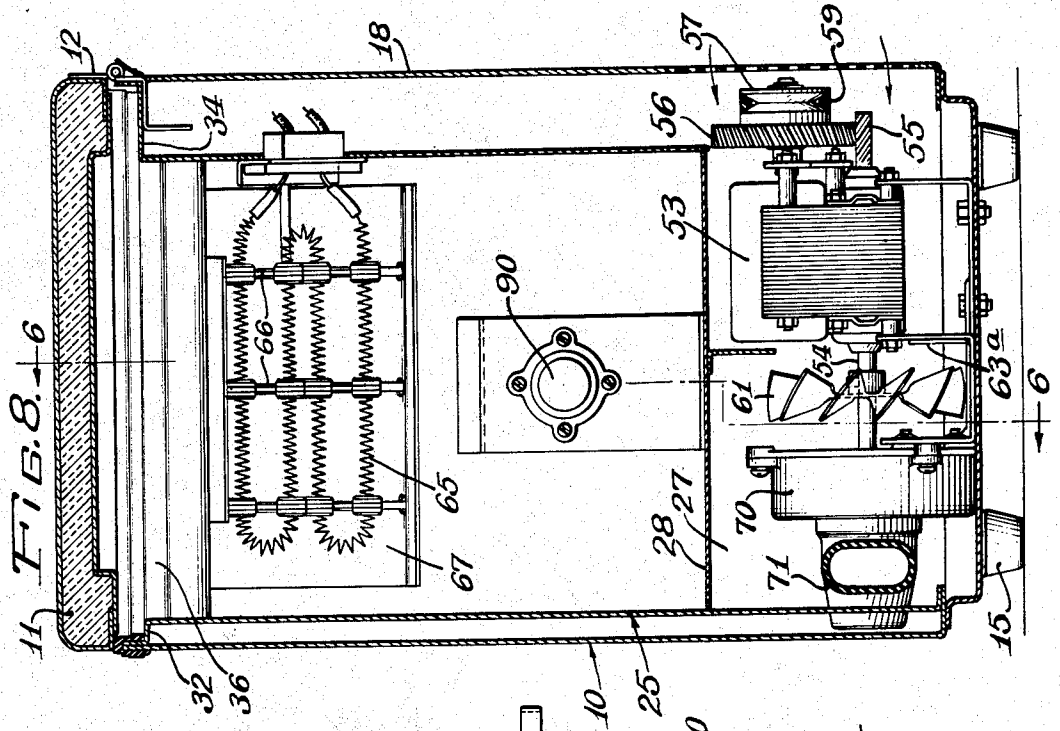


FIG. 8.

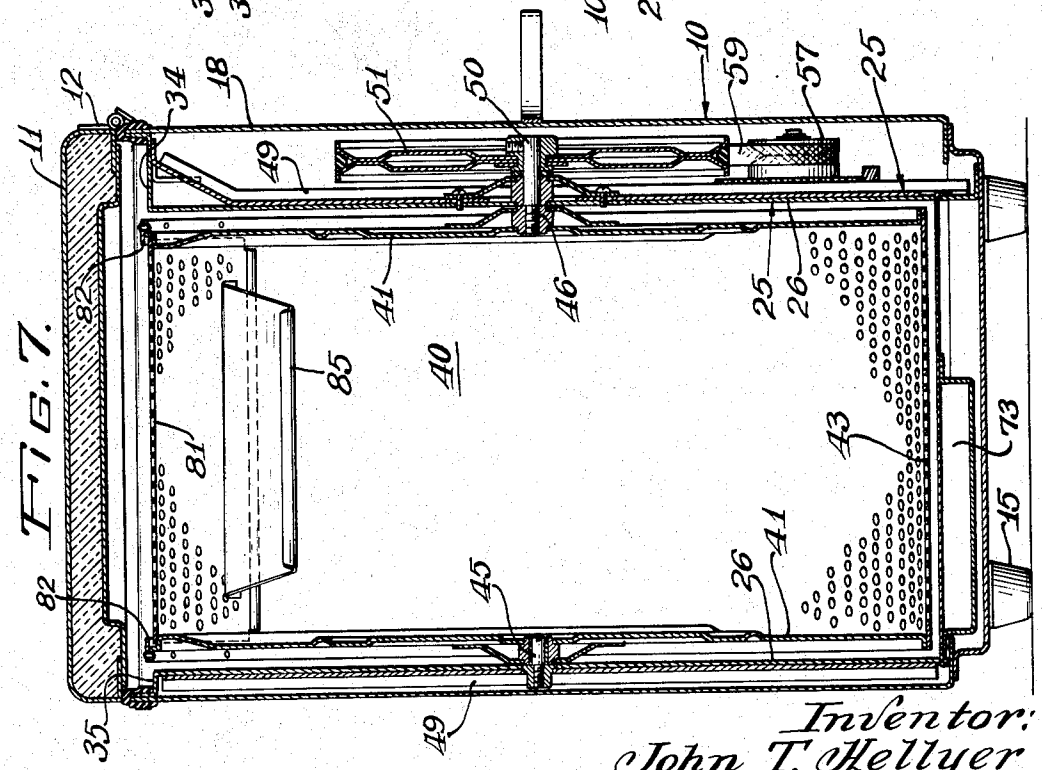


FIG. 7.

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CLOTHES DRYER

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FIG. 9.

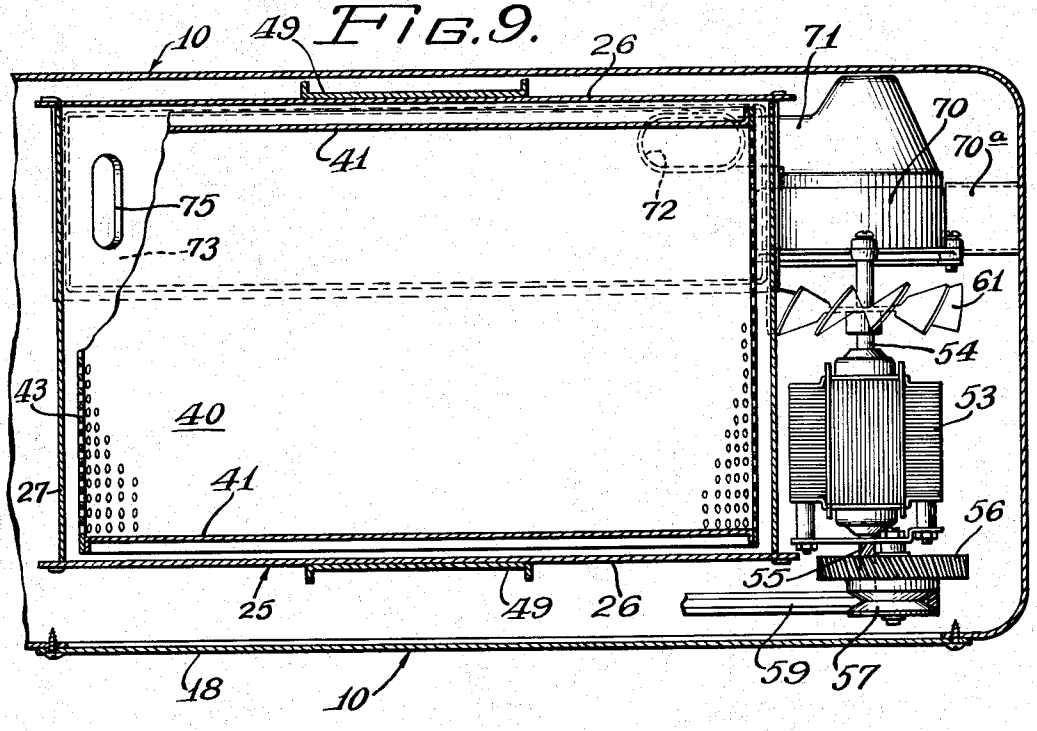
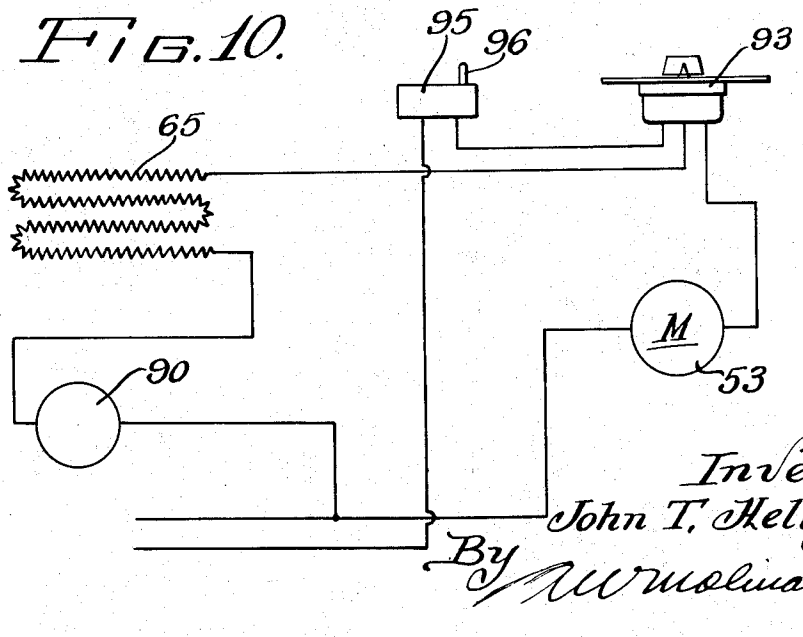


FIG. 10.



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United States Patent Office 2,748,496 Patented June 5, 1956

2,748,496

CLOTHES DRYER

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Application October 24, 1952, Serial No. 316,674

5 Claims. (Cl. 34—133)

This invention relates to clothes dryers of the domestic type in which clothes are caused to be tumbled in a rotatable drum and dried by heat and air supplied to the drum. While the dryer embodying the present invention may be of a size for handling a usual size batch of wet clothes as washed and extracted in a conventional clothes washing machine, it is particularly suitable for embodiment in a small size unit which may be operated by connection to a conventional electrical outlet source of energy, in the range of 110 volts. The dryer lends itself for embodiment in a size and form for convenient use in any room of an apartment or home, or in the basement, without the necessity for special electrical wiring for high voltage as is necessary with most electrically operated domestic dryers now currently available.

One of the objects of this invention is to provide an improved clothes dryer having a novel constructional arrangement which insures forced circulation of air over and around the heater and into the drum of the dryer.

Another object of this invention is to provide an improved clothes dryer of the character indicated, having a fan for delivering air past a heater into the rotatable drum and an exhaust blower for positively exhausting air from the drum.

A further object is to provide an improved clothes dryer of the character indicated, having an inner and outer casing structure, forming an air passageway between the side walls, end walls and bottom walls of said casings for the passage of air therebetween and effecting cooling of the outer casing when the dryer is operating.

Still another object is to provide an improved dryer of the character indicated, having a novel arrangement of heating and reflecting elements, together with a fan for blowing air over and around the reflector for efficiently heating air prior to passage into the rotatable drum.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawings in which:

Figure 1 is a front perspective view of the dryer embodying the present invention.

Figure 2 is a rear perspective view of the dryer.

Figure 3 is a top plan view of the dryer with the lid or cover in open position.

Figure 4 is an enlarged rear elevational view of the dryer with the back plate of the outer casing removed.

Figure 5 is a detailed sectional view, taken as indicated at line 5—5 on Figure 4.

Figure 6 is an enlarged vertical, longitudinal section through the dryer, taken as indicated at line 6—6 on Figure 8.

Figure 7 is an enlarged vertical, transverse sectional view, taken as indicated at the axis of the rotatable drum at line 7—7 on Figure 4.

Figure 8 is an enlarged transverse vertical section, taken as indicated at line 8—8 on Figure 4.

Figure 9 is a horizontal sectional view, taken as indicated at line 9—9 on Figure 4.

Figure 10 is a wiring diagram showing the various electrically operated elements and controls embodied in the dryer.

As may be seen in the drawings, the dryer includes an outer casing or cabinet as indicated at **10**, of generally rectangular form, open at its upper end, and provided with a lid or cover **11**, hinged at **12** to the back wall of the outer casing. A pair of caster wheels **14** are mounted at one end of the bottom of the outer casing and the opposite end being provided with a pair of depending feet **15**. The opposite end walls of the outer casing are provided with handles **16** for conveniently lifting the entire dryer from place to place or for permitting convenient movement of the dryer by raising the end provided with the fixed feet **15**, so that the dryer may be conveniently rolled to a desired location on the caster wheels **14**.

As may be seen in the drawings, the outer casing is formed of sheet metal, the front wall and two end walls being integrally formed, and a back wall **18** being detachably connected, by screws **18***a*, to the terminal edges of the end walls, as clearly seen in Figure 2 of the drawings. The back wall **18** of the outer casing is provided with three separate areas, indicated at **19**, **20** and **21**, which are perforated so as to insure free entry of air through the outer casing for circulation through the dryer as will be presently described.

Mounted within the outer casing is an inner casing **25**, in the nature of shell, comprising a pair of transversely spaced side walls **26**, to which is rigidly connected a main wall **27** of arcuate contour, providing a bottom and end wall portions. As may be seen in Figure 4 of the drawings, said arcuate wall **27**, at the right hand end, continues laterally into a horizontally extending wall portion **28**, and which in turn continues into a vertically extending wall portion **29**, disposed in relatively close spaced relation to the adjacent end wall of the outer casing **10**, thereby forming a vertical air passageway or chimney indicated at **30**. The upper end of the opposite portion of said arcuate wall **27** terminates in a horizontally extending shelf portion **32**. The upper end of each of the side walls **26**, as may be seen in Figure 7 of the drawings, terminate respectively in horizontally extending flanged portions **34** and **35**, which are rigidly secured to the walls of the outer casing and which thus serve to support the inner casing **25** within the outer casing, with the walls thereof in spaced apart relation to the walls of said outer casing. Connected to the upper marginal portion of one of the end walls of the outer casing, opposite the horizontal portion **32** of the inner casing, is a baffle member **36**, which member, together with the horizontal wall **32**, defines an opening **38** to afford access to a rotatable drum **40**, mounted within the inner casing, as will be presently described.

The rotatable drum **40** includes a pair of spaced apart end walls **41** of generally circular contour, to the peripheries of which are secured an arcuate perforated sheet of metal as indicated at **43**. The rotatable drum **40** is removably mounted within the inner casing **25** on a pair of trunnions, as indicated generally at **45** and **46** respectively, and as clearly seen in Figure 7 of the drawings. The trunnion assemblies are totally supported in the side walls **26** of the inner casing, which are reinforced in the area of said trunnions, by channel shaped structural members **49**. The trunnion member **46** includes a horizontally extending shaft portion **50**, on which is mounted a drive pulley **51**, positioned between the back walls of the inner and outer casings, as seen in Figure 7, and serves to drive the drum.

The driving means for rotating the drum **40**, comprises a motor **53**, mounted on the bottom wall of the outer casing, below the horizontal wall **28** of the inner

casing. Said motor has a shaft 54, extending at opposite ends thereof, and mounted or at the outer end of one of its extensions is a helical pinion 55, for driving a helical gear 56. Rigidly attached to the gear 56 is a pulley 57 which drives the drum pulley 51, through the medium of a belt 59.

Mounted on the shaft 54, at the end opposite the pinion 55, is a fan 61, which serves to direct air over the motor 53, for the purpose of cooling said motor and thereby causing said air to become heated incident to passage over the motor. The heated air is caused to circulate primarily in an upward direction, through the passage 30, as well as between the vertical walls of the inner and outer casings, insuring adequate circulation of air within the drum, and for cooling the walls of the outer casing.

As may be seen in Figure 4 of the drawings, the upper end of the end wall of the inner casing terminates a substantial distance below the horizontal wall 36 of the inner casing, thereby providing an air inlet 63 of substantial size in communication with the interior of the inner casing and the rotatable drum 40, and permitting passage therethrough of air currents traveling upwardly in the passageway 30, as seen in Figure 6 of the drawings. Mounted adjacent the air inlet 63, within the inner casing, is an electric heater comprising a heating element, as indicated at 65, carried on support rods 66, which in turn are connected to a reflecting shield indicated at 67. Said reflecting shield and heating element are supported from the underside of the baffle wall 36 of the inner casing. Thus, air is forced to travel in an upward direction, through the passageway 30 and inlet opening 63, so as to impinge against and travel around the reflector 67 and over and adjacent the heater 65 and thence passes through the perforated wall 43 of the drum into direct contact with the clothes within the drum. Air coming into contact with the reflecting shield is additionally heated prior to passing adjacent or over the heating element, after which it passes into the drum. The air displaced by the fan 61, is freely drawn into the lower portion of the outer casing through the perforated areas in the back plate 18. To insure that the major portion of the air moved by the fan passes over the motor 53, I provide an upright baffle 63*a* in front of the lower portion of the motor supports, as seen in Figures 4 and 8.

To insure adequate circulation of heated air through the drum and in contact with the clothes being tumbled therein, there is provided an air exhaust which comprises an exhaust blower 70 operatively connected to the motor shaft 54, as seen in Figure 8. A boot 71 of flexible resilient material, such as rubber, is connected at one end to the inlet of the housing of the exhaust blower 70 and its opposite end is connected telescopically over a flanged outlet 72, of an arcuate duct 73, extending around the bottom portion of the inner casing, as clearly seen in Figures 6 and 7 of the drawings. The duct or passageway 73 is formed by a sheet of metal of U-shaped cross section, rigidly attached to the outer surface of the arcuate wall 27 of the inner casing. The arcuate wall of the inner casing, at the end of the duct remote from the exhaust blower, is formed with an air outlet opening 75, in communication with the interior of the inner casing, which opening is located approximately diametrically opposite the heater 65, as seen in Figure 6 of the drawings.

Thus, by virtue of the motor driven fan 61 and the exhaust blower 70, air is caused to be forcibly moved over and preheated to a limited extent, by the motor 53, and is then caused to travel upwardly and impinge against the back of the reflector 67, for further heating of the air, after which the air travels around and adjacent the heater 65, in the general direction of and through the perforated arcuate wall of the drum 40. The heated air then passes in direct contact with the clothes being tumbled in the drum and is drawn by the exhaust blower 70, through the duct opening 75, in the lower portion of the casings, through ducts 73 and 71, and the blower, and finally discharges through duct 70*a*, at the lower corner of the casings, to the exterior.

The heater element employed is of a size so that together with the power requirements for driving the motor is capable of operation from a conventional electrical outlet supplying energy in the range of 110 volts.

To afford access to the interior of the rotatable drum 40, the perforated circular wall 43, is provided with a substantial size opening, as indicated at 80, so that when the lid or cover 11 is raised clothes may be inserted through said opening into the drum or may be removed therefrom. Said opening in the drum is adapted to be closed by an arcuate perforated door 81, the marginal side edges of which are mounted in guideways 82, formed at the outer marginal edge of the end walls 41, of the drum 40, as seen in Figure 7 of the drawings. By virtue of this construction, the perforated door 81 may be moved in a circumferential direction for full opening or closing of said opening 80 in the wall of the drum. One end of the door 81 is provided with a spring pressed latch 83, mounted on the arcuate wall 43 of the drum, having a circular nubbin 84 positioned for automatically engaging in an aperture formed adjacent one end of the door 81. The spring pressed nubbin 84 may be pressed downwardly, out of the opening in the door so that the door may be opened by movement of the door in an arcuate path.

To assist in agitating the clothes while they are being tumbled within the drum, a lifter 85 is provided. As may be clearly seen in Figure 6, said lifter is directly attached to the door 81, opposite the end engaged by the spring latch. As may be seen by the arrow in Figure 6, the drum rotates in clockwise direction so that in the event, due to inadvertence, the door 81 is permitted to remain in open position after the clothes have been inserted therein, said lifter, when the drum is rotated, will be caused to impinge against the clothes and thereby cause movement of the door 81 to a closed position of adjustment.

The dryer embodying the present invention, due to the manner of circulation of air, is relatively efficient in drying clothes while they are caused to be tumbled within the drum. Such efficiency is believed to be attributable to a large extent to the manner of circulation of air into and out of the drum, and in addition by utilization of the heated eddy currents which are channeled over or adjacent the heating element and reflector.

In order to insure against possible overheating of the drying chamber within the inner casing, which might cause damage to certain types of fabrics being dried, a "Thermo-Disc" control element 90, is mounted within the inner casing, as seen in Figure 6 of the drawings, immediately below the heater element, and in close association with the drum 40. The "Thermo-Disc" is connected in the electric circuit with the motor, heater and timer, and functions to break the circuit to the heater 65, when the temperature within the drying chamber, that is, within the inner casing, attains a predetermined temperature, and reestablishes the electric circuit when the temperature in the drying chamber drops to a predetermined value.

Because of the possible wide variation of the quantity of and variation in the character of the textile material, comprising the clothes to be dried in the dryer, there is provided a suitable timer 93, mounted on the horizontal wall portion 32, at the upper end of the inner casing, and which is manually adjustable for selecting a desired period of time for operation of the dryer. The timer, it is to be understood, is so constructed that after the lapse of the selected time period, the electrical circuits to the motor 53 and heater 65 are broken.

As a safety feature, there is connected in the electrical circuit, as seen in Figure 10, for controlling the operation of the motor and heater 65, a suitable switch

95 having a spring pressed plunger 96 which, when extended, causes the switch to assume a normally open position. Said switch 95 is mounted on the rear horizontal portion 34, of the upper end of the inner casing, as clearly seen in Figure 5 of the drawings, with the plunger 96 positioned so as to be engaged by the lid or cover 11, when moved to a closed position, for effecting closure of the switch 95, and thereby completing the electrical circuit, subject to the control and the completion of the circuits through the timer 93. By virtue of this arrangement, any time that the lid or cover 11 is opened, the electrical circuits for the motor and heater are broken.

Although I have herein shown and described a certain and preferred embodiment of my invention, manifestly it is capable of modification and re-arrangement of parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiment herein disclosed, except as I may be so limited by the appended claims.

I claim:

1. In a clothes dryer, an outer casing, an inner casing having a main wall portion of arcuate contour, a clothes receiving drum rotatably mounted on a horizontal axis in said inner casing and having a perforated peripheral wall positioned in close spaced relation to said arcuate wall portion, a portion of the wall of the inner casing, constituting a continuation of said arcuate wall portion, being disposed adjacent an end wall of the outer casing to form a vertical air passageway opening at its upper end into the said inner casing, a heater positioned between the outlet end of the passageway and said drum, an exhaust blower, an air outlet duct interconnecting said blower with the bottom portion of the inner casing for exhausting air from said inner casing and drum, a motor for driving said blower, and a fan driven by said motor for directing air over and around said motor and up through said passageway over and around said heater into said drum, said air being preheated by the motor and further heated in passing over and around said heater.

2. In a clothes dryer, an outer casing, an inner casing having a main wall portion of arcuate contour, a clothes receiving drum rotatably mounted on a horizontal axis in said inner casing and having a perforated peripheral wall positioned in close spaced relation to said arcuate portion, a portion of the wall of the inner casing, constituting a continuation of said arcuate wall portion, being disposed adjacent an end wall of the outer casing to form a vertical air passageway opening at its upper end into the said inner casing, a heater positioned between the outlet end of the passageway and said drum, a fan for forcing air up through said passageway over and around said heater and through said drum, and an air outlet duct connected to the bottom portion of the inner casing, the sides, ends and bottom wall of the inner casing being spaced from the outer casing forming passageways around the inner casing, whereby a portion of the air circulated by said fan is caused to flow between said casings for cooling the same.

3. In a clothes dryer, a casing open at its upper end, a lid for normally closing said open upper end, a clothes receiving drum rotatably mounted on a horizontal axis in said casing and having a perforated peripheral wall, said wall having an opening through which clothes are placed in or removed from the drum, said drum, at each side of said opening being formed with arcuate guideways, a slidable door for said opening, having its marginal side edges seated in said guideways, said door being of the same contour as the periphery of the drum, and a clothes lifter connected to the underside of the leading end of said door with respect to the direction of rotation of said drum, whereby said lifter insures movement of said door to closed position, if inadvertently left open, as a result of contact of said lifter with the clothes in the drum.

4. In a clothes dryer, a casing open at its upper end, a lid for normally closing said open upper end, a clothes receiving drum rotatably mounted on a horizontal axis in said casing and having a perforated peripheral wall, said wall having an opening through which clothes are placed in or removed from the drum, said drum, at each side of said opening being formed with arcuate guideways, a slidable door for said opening, having its marginal side edges seated in said guideways, said door being of the same contour as the periphery of the drum, a clothes lifter connected to the underside of the leading end of said door with respect to the direction of rotation of said drum, whereby said lifter insures movement of said door to closed position, if inadvertently left open, as a result of contact of said lifter with the clothes in the drum, and a spring latch for automatically securing said door in a closed position of adjustment with respect to said opening of the drum.

5. In a clothes dryer, an outer casing, an inner casing positioned in spaced relation to the lateral walls of the outer casing to form a chamber around the inner casing, said inner casing having a main wall portion of arcuate contour, a clothes receiving drum rotatably mounted on a horizontal axis in said inner casing and having a perforated peripheral wall positioned in close spaced relation to said arcuate wall portion, a portion of the wall of the inner casing, constituting a continuation of said arcuate wall portion, being disposed adjacent an end wall of the outer casing to form a vertical air passageway, constituting a portion of said chamber, opening at its upper end into the said inner casing, a heater positioned across the outlet opening of the passageway and between the outlet end of the passageway and said drum, a fan for forcing air up through said passageway over and around said heater and through said drum, and forcing air through said chamber for cooling the lateral walls of the outer casing, and an air outlet duct connected to the bottom portion of the inner casing.

References Cited in the file of this patent

UNITED STATES PATENTS

938,542	Zehner	Nov. 2, 1909
1,255,162	Haney	Feb. 5, 1918
1,751,841	Pickens	Mar. 25, 1930
2,217,153	Bowdoin et al.	Oct. 8, 1940
2,398,880	Broglie	Apr. 23, 1946
2,399,555	Locke	Apr. 30, 1946
2,463,934	Allen	Mar. 8, 1949
2,477,820	Pokras	Aug. 2, 1949
2,505,041	Gorsuch	Apr. 25, 1950
2,570,437	Ellis	Oct. 9, 1951
2,590,808	Wagner	Mar. 25, 1952