Dec. 16, 1958 W. H. NICHOLS 2,864,249

COMBINATION WASHING AND DRYING MACHINE

Filed Dec. 1, 1953 3 Sheets-Sheet 1

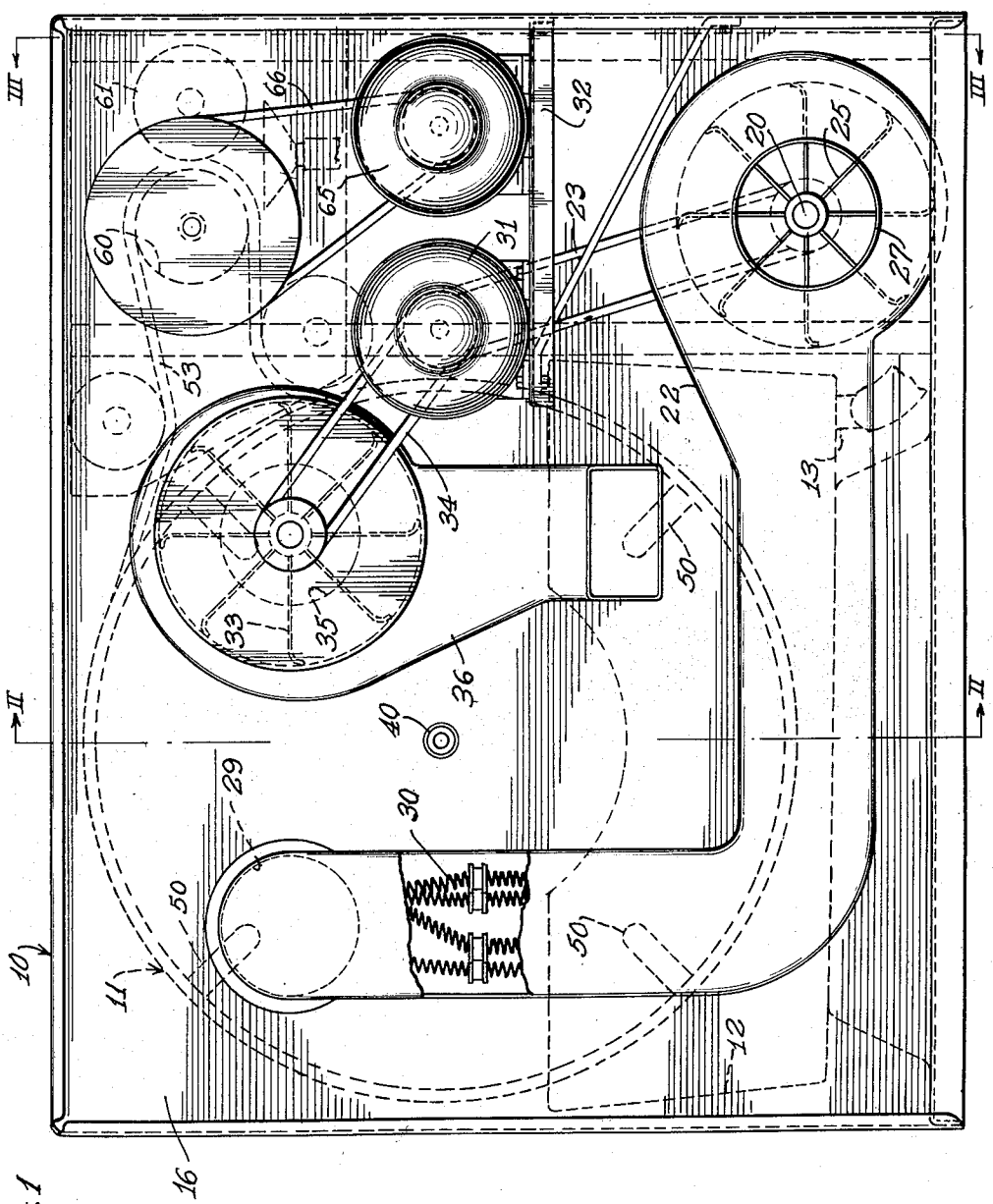


Fig. 1

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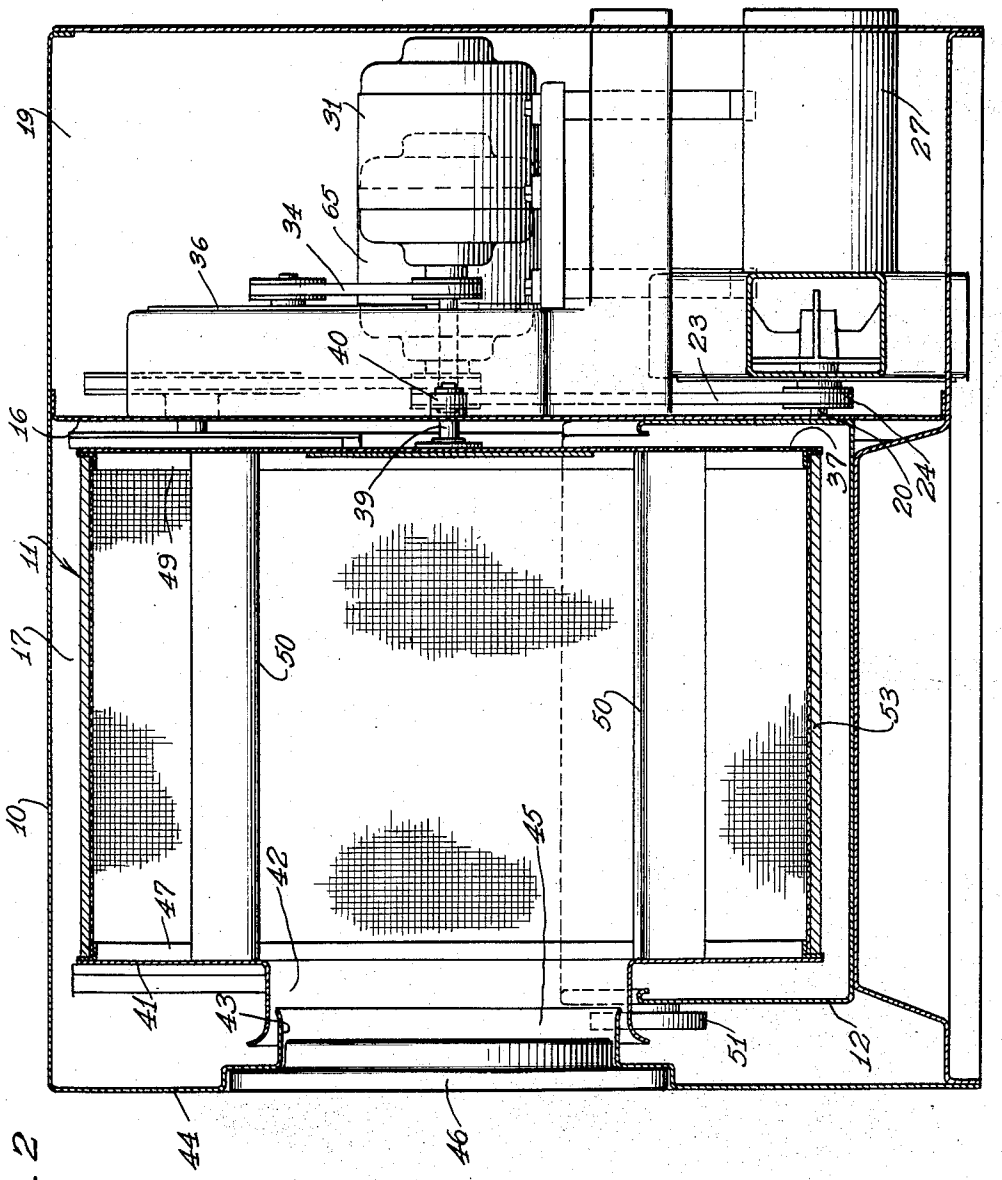


Fig. 2

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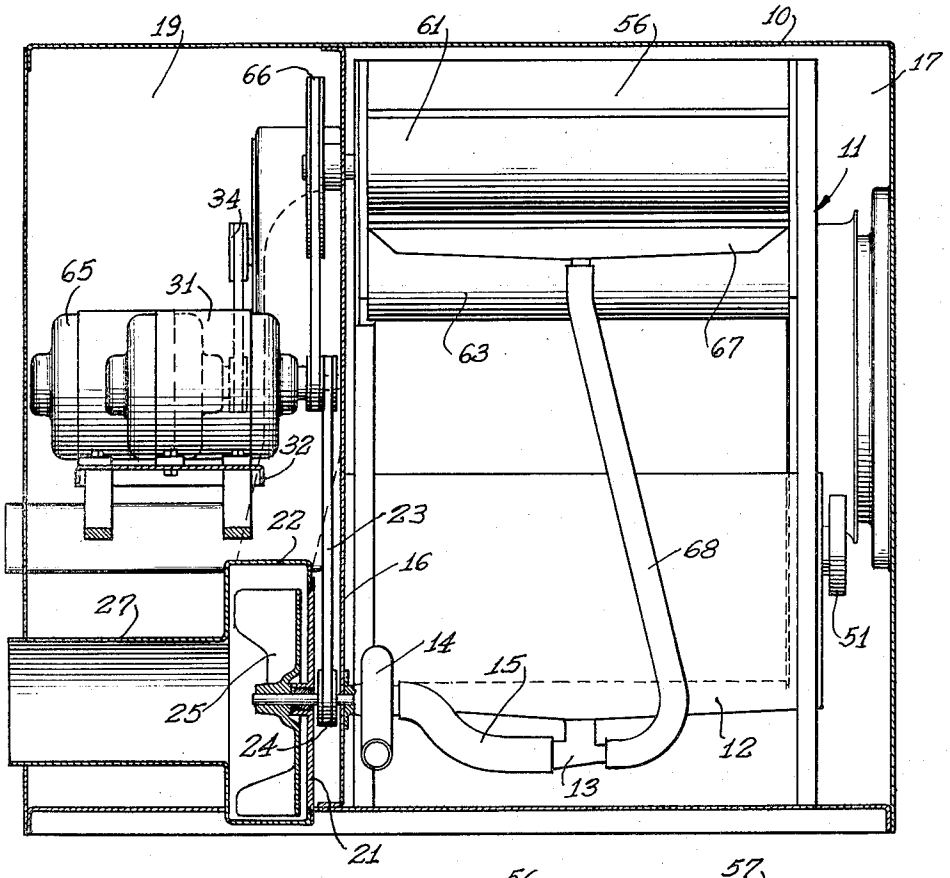
by Hill, Sherman, Meroni, Gross & Simpson Attys.

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Fig. 3



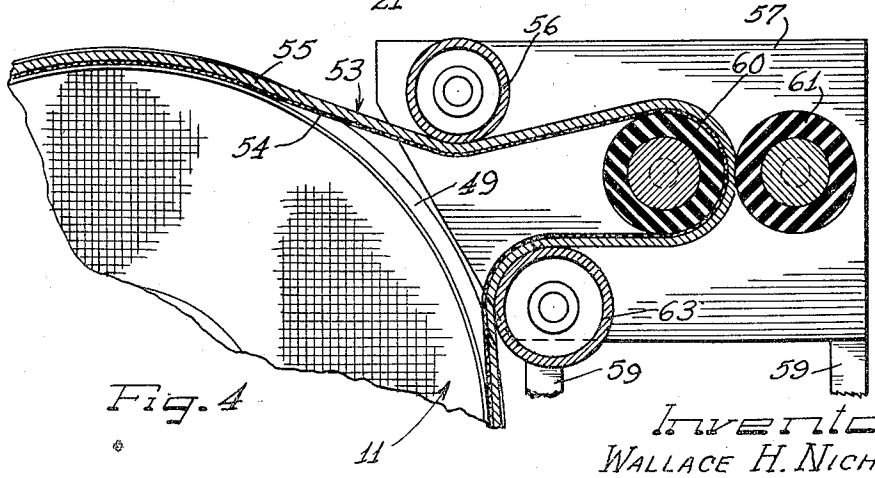


Fig. 4

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2,864,249

COMBINATION WASHING AND DRYING MACHINE

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Application December 1, 1953, Serial No. 395,535

5 Claims. (Cl. 68—19)

This invention relates to a new and improved apparatus for washing and drying clothes.

A principal object of my invention is to provide a novel and improved apparatus for washing and drying clothes wherein the heat required to evaporate water from the clothes is reduced by absorbing water from the clothes.

Another object of my invention is to provide a novel and efficient form of combined washing and drying machine in which the clothes are washed by tumbling in a drum, and water is absorbed from the clothes by a transfer agent contacting the drum.

A further object of my invention is to provide an improved form of clothes drying machine greatly shortening the drying time of the clothes, by absorbing water from the clothes by an absorbent transfer agent contacting the clothes tumbling drum, and then removing the water from the transfer agent so as to reduce the drying time and the heat required to remove water from the clothes by evaporation.

Still another object of my invention is to provide a simplified form of clothes drying machine in which the clothes are contained in a rotating drum having an open periphery by a transfer agent of a water absorbing material, and in which water is removed from the water absorbing material by wringer means, engaging the same.

Still another object of my invention is to provide a new and novel form of clothes washing and drying machine in which the clothes are tumbled in a tumbling drum rotatable about a horizontal axis, and are contained in the drum by a web or belt of water absorbent material extending around the drum for a greater portion of periphery thereof and forming a drive means therefor as well as a water transferring agent for transferring water from the clothes.

Still another object of my invention is to provide a laundry machine for clothes and the like, arranged to facilitate the operation of drying the clothes, by contacting the periphery of the drum with an absorbent water transferring agent having the wet clothes in contact therewith, and by removing water from the water transfer agent and thereby reducing the amount of water to be evaporated by heat.

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

Figure 1 is an elevational view of a combined washing and drying machine constructed in accordance with my invention looking toward the rear end thereof and showing certain parts broken away;

Figure 2 is a sectional view taken substantially along lines II—II of Figure 1;

Figure 3 is a sectional view taken substantially along line III—III of Figure 1; and

Figure 4 is an enlarged partial fragmentary sectional view taken through the wringer rolls and through a portion of the clothes containing drum.

In the embodiment of my invention illustrated in the drawings, I have shown a combined washing and drying machine comprising a cabinet **10** having a clothes containing tumbler drum **11** journaled therein for rotation about a horizontal axis. I have also shown a tub **12** for washing water in the bottom of the cabinet **10** and extending upwardly along the sides and periphery of the tumbling drum **11**, for holding washing water in said tumbling drum for washing clothes therein.

The bottom of the tub **12** is shown as sloping toward a drain having a T **13** leading therefrom, one conduit of which is connected with a pump **14** by a conduit **15**. The pump **14** serves to withdraw water from the tub **12** at the end of the washing operation prior to the extracting or drying operation.

The pump **14** is shown as being mounted on a bulkhead or partition **16** extending along the cabinet **10** intermediate the walls thereof. The bulkhead **16** divides said cabinet into a washing and drying compartment **17** and an air circulating compartment **19**. The pump **14** located in the washing and drying compartment has a shaft **20** extending through the bulkhead **16** into the air circulating compartment **19** and journaled intermediate its ends in a wall **21** of an air duct **22**. The pump **14** is driven from a belt **23** trained around a pulley **24** on the shaft **20** in the space between the wall **21** and the bulkhead **16**. The shaft **20** also extends within the air duct **22** and is shown as having a suction blower **25** keyed thereto for drawing air into the duct 22 through an intake duct **27**.

The duct **22** is shown in Figure 1 as extending from the suction blower **25** along the bulkhead **16** to a position adjacent the opposite end of the cabinet **10** from the suction blower **25**. Said duct then extends upwardly along the bulkhead **16** and opens into the clothes washing and drying compartment through an intake opening **29** in said bulkhead.

The air duct **22** is also shown as having a heating element **30** therein, shown as being an electric heating element of a well-known form. It is, of course, obvious that the heating element need not be electric and that a gas burner (not shown) may communicate with the duct **22**, for heating the circulated air by gas.

The belt **23** is shown as being driven from a motor **31** on a platform **32** in the air circulating compartment **19**. The motor **31** also drives a suction fan or blower **33** through a belt drive **34**. The blower **33** is in communication with an exhaust opening **35** in the bulkhead **16** and serves to withdraw air from the washing and drying compartment for exhaust to the atmosphere through an exhaust air duct **36** leading through a rear wall of the cabinet. The exhaust duct may if desired, be connected with a condenser of a well known form. The air ducts **22** and **36** and blowers **25** and **33** thus serve to supply heated air to the washing and drying compartment **17** when desired, and to exhaust therefrom to the atmosphere.

Referring now in particular to the clothes tumbling drum **11** and certain novel features of my invention, the drum **11** is shown as having a rear wall **37**, which may be perforate and which confronts the bulkhead **16** and is rotatably journaled thereon on a transverse stub shaft **39** journaled in a bearing **40** mounted on the bulkhead **16**.

The drum **11** is also shown as having an opposite end wall **41** having a clothes receiving opening therein defined by a forwardly projecting flange **42** confronting a clothes receiving opening **43** in a front wall **44** for the cabinet **10**. The flange **42** is shown as overlapping a stepped flange **45** of the clothes receiving opening **43**. A door **46** is shown as closing the clothes receiving opening **43** in the front wall **44** of the cabinet **10** and may be sealed thereto to prevent the escape of air thereby.

The front and rear walls **41** and **37** of the drier drum **11** are each shown as having annular angles **47** and **49**, respectively, extending inwardly therefrom and opening toward each other. A plurality of circumferentially spaced tumbling bars **50—50**, are shown as connecting the front and rear walls **41** and **37** of the drum **11** together and as extending radially inwardly from the horizontal legs of the angles **49** and **47**.

The forward end portion of the drum **11** is shown as being supported on spaced rollers **51—51**, mounted on the outside of the tub **12**, and having rotatable supporting engagement with the flange **42**.

The drum **11** is also shown as being open at its periphery between the end walls **37** and **41**, and as having a web or belt **53** of water absorbent material extending therearound having direct contact with the clothes in said drum and retaining the clothes therein. The belt **53** may be of any well known form of water absorbent material, and as herein shown forms a means for driving the tumbling drum **11** as well as transferring water from the clothes at the end of the washing operation. One form of belt, which, may be used is a belt of copper screening as indicated by reference character **54** in Figure 4, and covered by a water absorbent material **55**, such as "Terry cloth," Dacron with a cotton filler, or cellulose sponge material or some other suitable water absorbent material. It is, of course, obvious that the absorbent material alone without the screen may be used if desired.

The belt **53** is shown as extending around all but a small part of the periphery of the drum **11** and as having driving engagement with the horizontal legs of the angles **49** and **47**. The belt **53** passes from the top of the drum **11** under an idler roll **56** rotatably journaled at its ends in parallel spaced bearing support plates **57—57**. The plates **57—57** are in turn supported on spaced vertical legs **59** extending upwardly from the base of the cabinet **10**. From the idler roll **56**, increasing the wrap of the belt **53** around the drum, the belt passes over and around a power driven wringer roll **60** rotatably journaled at its ends in the plates **57—57**. A cooperating reacting wringer roll **61**, which is also rotatably journaled between the plates **57—57**, is shown as pressing the belt against the wringer roll **60**. The reaction roll **61** may be mounted in the plates **57—57** for adjustable movement toward and from the wringer roll **60**. The adjusting means is not herein shown or described since it may be of any well known form and is no part of my present invention.

From the wringer rolls **60** and **61**, the belt then passes toward the drum **11** over an idler roll **63**, increasing the wrap of the belt around the drum **11**, into engagement with the horizontal legs of the angles **47** and **49**. The idler rolls **56** and **63**, thus wrap the belt **53** around the drum **11**, so that the belt extends around all but a small part of the periphery of the drum and confines the clothes within the drum during the tumbling operation, both when washing and drying. While the belt is shown as having maximum engagement with the periphery of the drum, the extent of engagement of the belt with the drum may be varied and under certain conditions the belt may have engagement with a small part of the periphery of the drum.

The wringer roll **60** is shown as being driven from a motor **65** mounted on the platform **32**. As herein shown the drive from the motor **65** to the wringer roll **60** consists in a V-belt drive indicated generally by a reference character **66**.

A tension idler (not shown) or some other conventional mechanical means may be provided to accommodate the normal stretch and shrinkage of the belt as it is alternately wet and dried.

A trough **67** is provided beneath the wringer rolls **60** and **61**, to collect the water squeezed from the web or belt **53**. As herein shown, a flexible conduit **68** leads from the trough **67** downwardly to the T **13** and is connected thereto and to the intake side of the pump **14**.

Referring now to the use and operation of the laundry machine of my invention, the tumbling drum **11** being filled with clothes, water and soap or a detergent may be supplied to the tub **12** in any well known manner. The motor **65** may then be energized to drive the wringer roll **60** and the belt **53**. This will then drive the drum **11** and tumble the clothes in the washing solution in the tub **12** and wash the same by tumbling.

At the end of the washing cycle, which may be controlled by a cycling control of a form commonly used in automatic washing machines, the motor **31** is energized to drive the pump **14** and drain water from the tub **12**. As herein shown, when the motor **31** is driving the pump **14**, the blowers **25** and **33** are also in operation to establish a circulation of air through the washing and drying compartment **17**. It is obvious, however, that the blowers need not be driven by the pump, and that a clutch may be provided in the drive to the pump or the blowers **25** and **33** if desired.

As the level of the water in the tub **12** drops beneath the tumbling drum **11**, the clothes in the drum **11** having direct contact with the traveling belt **53** will transfer water therein directly to said belt and thereby to the wringer rolls **60** and **61**, which serve to squeeze water therefrom for discharge from the washing and drying compartment **17** down the trough **67** and return line **68** to the pump **14**. This operation may be continued until the clothes are damp dried where it is dseired to damp dry the clothes only. When damp drying the clothes, the transfer of water from the clothes to the absorbent belt reduces the water to be evaporated by heat and markedly shortens the damp drying operation over such operations which are effected in the well known forms of washing and extracting machines due to the direct contact of the absorbent agent with the clothes and the absorption of the water therefrom.

When desired to entirely dry the clothes, the heating element **30** may be energized, the blowers **25** and **33** circulating heated air through the washing and drying compartment **17** and rapidly drying the clothes therein, it being understood that the transfer of water from the clothes by direct contact with the absorbent agent as the heated air circulates therethrough, greatly shortens the drying time over the time which would normally be required if the heated air only were circulated through the tumbling clothes by reducing the amount of water to be evaporated by heat.

It is of course obvious that while the drum is shown as having an open periphery that it may have a perforate periphery if desired, and that the openings in the periphery of the drum may vary in size dependent upon the adsorptive qualities of the absorbent medium contacting the periphery of the drum.

It should here be understood that while the absorbent belt **53** has a substantial thickness and bulk, that the material from which the belt is made is selected for the high absorbent qualities and its ability to give up its moisture at a rapid rate.

It should further be understood that the high absorbent qualities of the belt and its ability to give up its moisture at a rapid rate results in a rapid taking away of moisture from the clothes before the heat is turned on, thus making it possible to turn the heat on earlier in the cycle and resulting in a more efficient introduction of air into the clothes, and a considerably reduced drying time over conventional drying operations.

It may be seen from the foregoing that I have provided a novel and improved method and apparatus for washing and drying clothes, wherein the damp and finished drying operations are shortened, by reducing the amount of water to be evaporated by contacting the clothes with

the absorbent medium and transferring the water therefrom.

It may also be seen that besides transferring the water from the clothes to drain by the absorbent belt contacting the clothes, that the absorbent medium may also serve to retain the clothes within the drier drum and as a drive means therefor.

It will be understood that modifications and variations of the present invention may be effected without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a laundry machine, a clothes tumbling drum journaled for rotation in a vertically extending plane and having opposite end walls and an open periphery and an absorbing agent confining the clothes to said drum during tumbling and transferring substantial amounts of water therefrom by absorption comprising an endless absorbent belt wrapped around said drum, wringer rolls spaced from said drum and engaging the opposite sides of said belt for wringing the water therefrom, a motor for driving said wringer rolls and belt, and other rolls spaced from said wringer rolls and wrapping said belt around substantially the entire periphery of said drum.

2. In a laundry machine, a cabinet, a tub within said cabinet, a clothes tumbling drum journaled within said cabinet for rotation within said tub, means for withdrawing water from said tub, said drum having spaced end walls and tumbling bars connecting said end walls together and being open in the space between said end walls, and means for retaining clothes within said drum and absorbing water therefrom comprising an endless absorbent belt having a perforate inner surface having driving engagement with said drum and contact with the clothes within said drum, and having a water absorbent cloth on the outside of said perforate inner surface, and wringer rolls pressed into engagement with said belt from opposite sides thereof for driving the same and wringing water therefrom.

3. In a laundry machine as defined in claim 1, a cabinet and a tub in said cabinet for housing said drum and in which the water rejected by the wringer rolls is collected, and a pump connected to said tub to remove the water to drain.

4. In a laundry machine as defined in claim 1, a cabinet and a tub in said cabinet for housing said drum, and means for circulating drying air through said tub for drying clothes in said drum.

5. In a laundry machine as defined in claim 2, and means to rotatably drive said wringer rolls thereby to rotate said drum through said absorbent belt.

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