Oct. 24, 1961 A. M. STONE 3,005,329

LAUNDRY MACHINE OVERFLOW CONSTRUCTION

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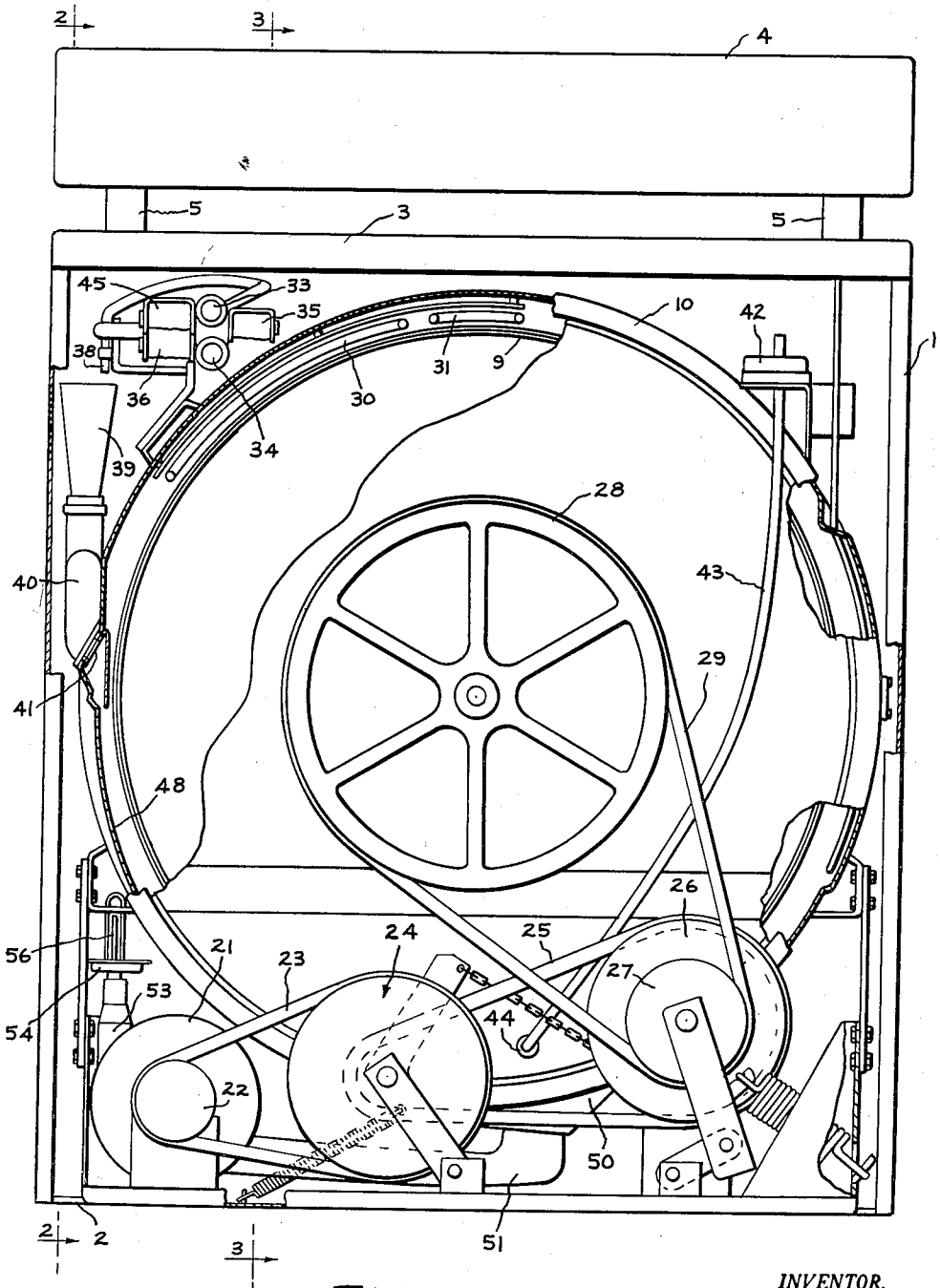


FIG. 1

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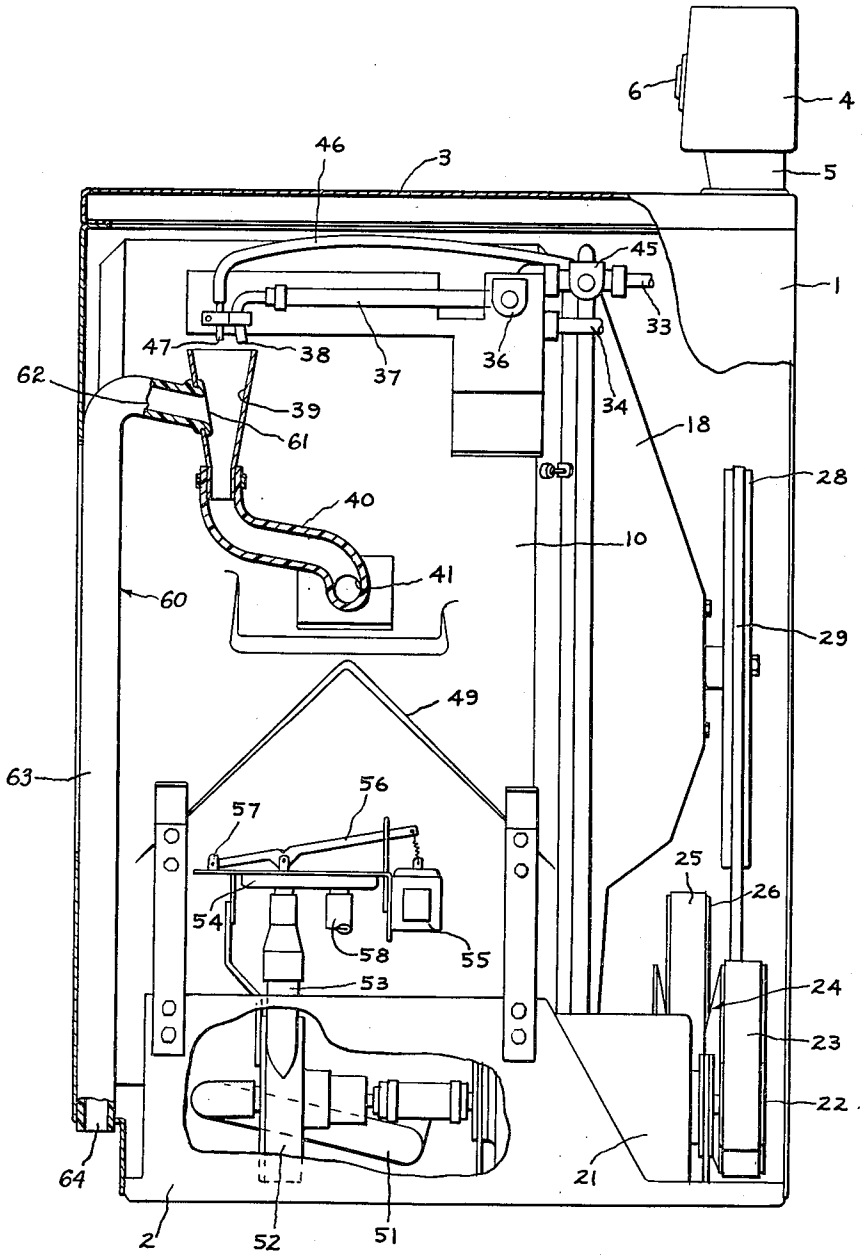


FIG. 2

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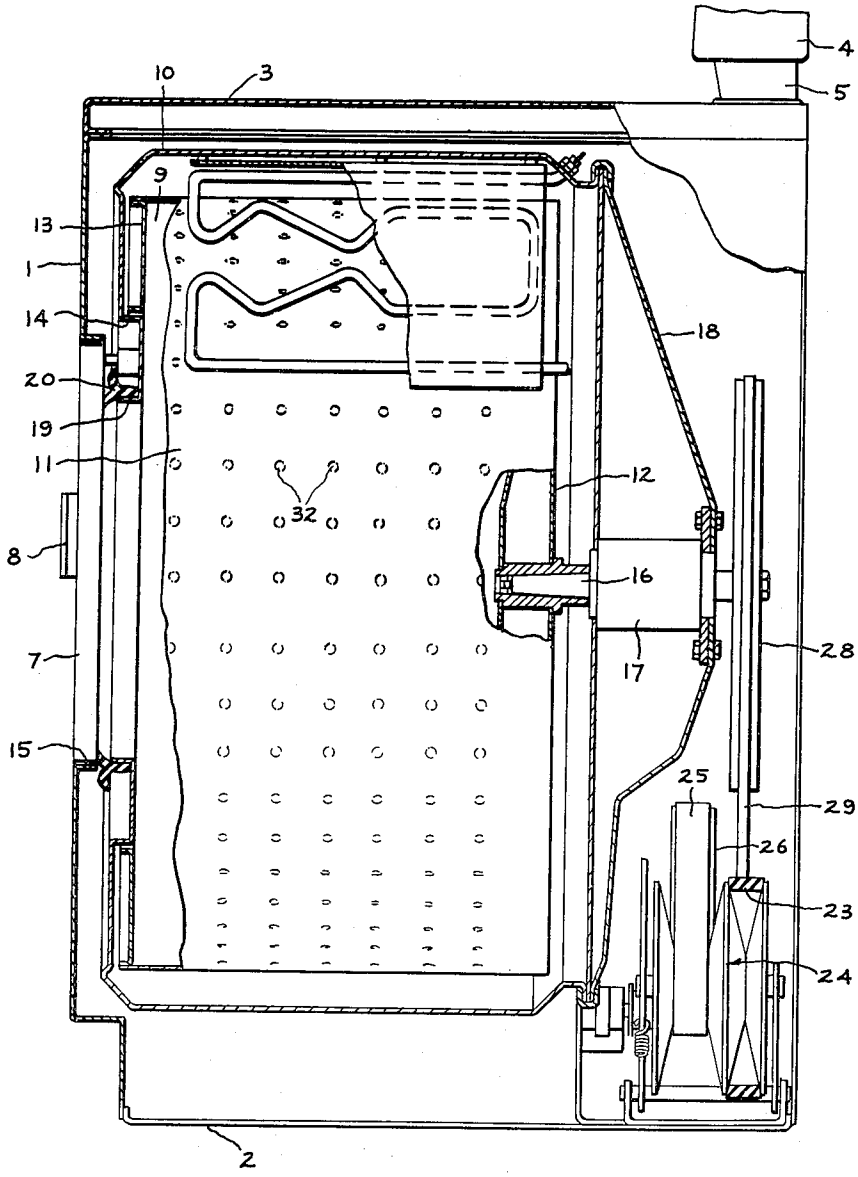


FIG. 3

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United States Patent Office

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3,005,329

LAUNDRY MACHINE OVERFLOW CONSTRUCTION

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3 Claims. (Cl. 68—20)

This invention relates to laundry machines, and more particularly to an improved overflow arrangement for use in domestic laundry machines to prevent damage to components of the machine from contact with the liquids used in the washing process.

Domestic laundry machines generally provide an automatic sequence of washing and rinsing clothes, followed by a high-speed centrifugal extraction of liquid from the clothes. In machines which combine washing and drying functions those steps may then be followed by a heat drying step to effect drying of the clothes. The structure of the machine usually includes a tub which is filled with water to a predetermined level during the washing and rinsing steps, the water being provided from a suitable source such as a municipal water supply or a well; as a health safeguard, there is usually provided an air gap between the supply source and the inlet conduit provided to introduce the water to the tub so as to prevent any possibility of siphoning water back to the source from the tub and the drain. In many types of machines, particularly those with a clothes receptacle rotatable on a non-vertical axis, the inlet of the conduit connecting with the tub, i.e., the location of the air gap within the machine, is substantially lower than the top of the tub; such machines are generally intended to be operated with a relatively low level of liquid in the tub. If the usually provided safety devices should fail to operate, and the tub should become excessively full either of water or soap suds, there will be an overflow back through the inlet of the conduit leading to the tub; in such an event, water and wet soap suds may come into contact with the interior parts of the machine with harmful effects.

It is accordingly most desirable to provide a structure which insures that, should all other safety devices provided fail, the overflow from the tub should be directly to the outside of the machine so as to perform the double function of bringing the faulty operation to the attention of the machine operator and preventing harm to the interior parts of the machine.

It is, therefore, an object of this invention to provide a domestic laundry machine including an improved overflow arrangement which insures that an unduly high liquid level will cause an overflow to the exterior of the machine rather than permit the overflow to occur within the machine itself.

It is a further object of the invention to provide a structure wherein an excessively high level of soap or detergent suds will also be caused to pass to the outside of the machine rather than to overflow within the machine with harmful effects to the operating components thereof.

A further object of this invention is to provide an overflow construction having a siphoning action on the suds, so that despite their tendency to billow when present in excessive quantities they will be subject to a siphoning force pulling them to the exterior of the machine and preventing overflow within the machine.

Yet a further object of the invention is to provide in a domestic laundry machine overflow means which is directly associated with the inlet means so that the predetermined relationship of the two structures provides the desired result of overflow of water and suds to the exterior of the machine rather than within the machine.

In accordance with the invention, I provide a domestic laundry machine which has the usual enclosing cabinet with a tub within the cabinet. The tub is provided with water supply means which includes a first conduit connected to a source of water and a second conduit with an inlet which is separated from the outlet of the first conduit by an air gap and is positioned to receive the flow therefrom. The second conduit extends downwardly from its inlet to an overflow outlet in the tub which thus doubles as a water inlet for the tub. A third conduit has its inlet connected to the second conduit between the ends thereof and has its outlet lower than its inlet and opening to the outside of the cabinet. The intermediate portion of the third conduit, which joins the inlet and the outlet thereof, extends upwardly from them both but is entirely below the level of the second conduit inlet so that water will pass out through the third conduit before flowing out through the open inlet of the second conduit.

In addition, the relationship of the third conduit to the second conduit causes it to act as a siphon with respect to soap suds passing through it. Consequently, despite the ordinary tendency of soap suds to billow out of all available openings, it is subject in this case to the siphoning effect and is thereby prevented from coming out of the second conduit inlet.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention itself, however, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

In the drawings,

FIG. 1 is a rear elevational view of a domestic laundry machine which incorporates my improved overflow arrangement, with the rear panel removed and with certain surfaces broken away to illustrate details;

FIG. 2 is a side elevational view of the machine along line 2—2 in FIG. 1, partly in section and with certain surfaces broken away to show details; and

FIG. 3 is a side elevational view of the machine along line 3—3 in FIG. 1, partly in section and with certain surfaces broken away to show details.

Referring now to the figures of the drawings, there is shown a combination clothes washing and drying machine of the domestic type where the operating elements of the machine are included within an outer cabinet structure having a central wrap-around section 1. Section 1 is supported on a base and toe board assembly 2 and carries a separate top 3 on which is supported a backsplash panel 4 which may, as shown, be mounted on posts 5. Control panel 4 is generally provided with appropriate control devices 6 for controlling the various types of washing and drying sequences. Access to the interior of the machine is provided by a door 7, formed in section 1, which is mounted on concealed hinges and is opened by suitable means such as knee operated latch control 8.

As best shown in FIG. 3, the machine is of the horizonal axis type, that is, it has a substantially cylindrical clothes basket or receptacle 9 mounted for rotation on a generally horizontal axis within an outer enclosing tub structure 10. Basket 9 comprises a cylindrical shell or wall 11 which is closed at its rear end by means of a suitable wall or plate 12. The basket also includes a front wall 13 which is formed so as to define an access or loading opening 14 in registery with an opening 15 provided in wrap-around section 1 for door 7. The basket is rotatably supported by a shaft 16 which is mounted in an elongated bearing 17 supported from rear wall 18 of tub 10. The tub is also provided with an opening 19 aligned with opening 15 and opening 14 so that clothes may be placed into and removed from the basket when door 7 is

opened. The door seals against a suitable gasket 20 during operation of the machine.

Referring now particularly to FIG. 1 during the operation of the machine the basket 9 is driven from an electric motor 21. The drive from the motor to the basket includes a pulley 22 which is secured to the motor shaft so as to rotate therewith and over which passes a belt 23. Belt 23 drives an adjustable sheave assembly 24 of the type which is well known for use in achieving variable output speeds from a constant input speed source. The adjustable sheave assembly in turn operates belt 25 to cause rotation of pulleys 26 and 27. The rotation of pulley 27 is passed on to a pulley 28, which is rigidly secured on basket shaft 16, through belt 29. In this manner, the motor 21 may be driven at a constant speed, and, through the adjustable sheave assembly 24, the speed imparted to pulley 28 and basket 9 may be varied so as to provide an appropriate range of speed for the basket. For instance, for tumbling purposes during the washing and rinsing operation, and also during the heat drying operation, a speed for approximately 47 r.p.m. may be provided to the basket 9, and a centrifuging speed of several hundred r.p.m. may be provided to the basket for effecting centrifuging extraction of liquid from the clothes prior to either the heat drying operation or removal of clothes from the container.

The operation of the variable speed drive briefly described above does not form any part of the present invention, and is set forth merely to provide a substantially complete description of an operative machine. A complete detailed description of such a drive is provided, for instance, in application Serial No. 731,362 filed on April 28, 1958, now Patent No. 2,950,613 by John Bochan and assigned to the General Electric Company, assignee of the present invention.

To heat the clothes during the heat drying portion of the cycle, there is provided in the machine a suitable heater assembly including two heaters 30 and 31. When the heaters are energized during the drying cycle they operate to heat the basket 9 which, through its rotation, then contacts the clothes to transfer its heat to the clothes. In addition, since the outer cylindrical wall of the basket is perforated by a great many small spaced openings 32 the heating elements also heat the clothes directly by ratiation. The heat thus transferred to the clothes causes vapor migration out of the clothes so as to effect drying thereof.

Means whereby water is admitted to and discharged from tub 10 during operation of the machine is particularly shown in FIGS. 1 and 2. The water supply means includes connections 33 and 34 through which hot and cold water is supplied from a suitable source to the machine for the washing operation. A valve controlled by a solenoid 35 admits hot water to the machine and a valve controlled by an opposed solenoid 36 admits cold water to the machine. The hot and cold water valves under the control of the solenoids 35 and 36 discharge through a common conduit 37 which has a downwardly opening outlet 38 discharging through a suitable air gap into a funnel 39 positioned therebeneath. Funnel 39 forms the inlet of a downwardly extending conduit 40 which is turn extends into communication with an opening 41 formed in the side of tub 10. Opening 41 is at a level above that normally reached by the liquid in the tub during operation of the machine (about seven inches in the particular machine shown). The air gap provided by the funnel 39 makes it impossible for the water to be siphoned from the machine and to contaminate the source. A pressure actuated sensing device or water level control 42 controls both solenoids 35 and 36 to provide the proper water level in the machine during the washing operation. Sensing device 42 is connected to the interior of tub 10 by a suitable line 43 which connects with the tub almost at the bottom thereof at 44 as shown. In addition to the water level control device shown, the machine may be provided with other safety devices for preventing overflow conditions from occurring. However, such mechanisms do not form any part of the present invention and are not shown or further discussed herein.

The illustrated machine is of the type which uses cold water during the drying cycle for condensing the moisture extracted from the clothes. The condenser water is admitted to the machine through an additional solenoid actuated valve controlled by a solenoid 45 which is energized during the drying operation so that the valve passes water at a slow rate sufficient to condense from the air the moisture vaporized from the clothes. As shown, the condenser water valve discharges into a conduit 46 terminating in a downwardly extending outlet 47 from which the water flows down through an appropriate air gap into funnel 39 and down through conduit 40 and opening 41 into tub 10. When the water is introduced into the tub thus, in relatively small quantities, it flows in a thin sheet down the lower left wall 48 of the tub so as to cool a substantial portion of the area of the side wall and provide a large cool surface for condensing the moisture extracted from the clothes. As shown, wall 48 may have an inverted V-shaped bead 49 formed therein in order to assist in spreading the water out in a thin sheet.

The wash and rinse water used during the washing portion of the operation, and the condenser water and the moisture extracted from the clothes during the heat drying operation, are discharged from the machine through a sump 50 formed at the bottom of tub 10. A suitable discharge hose 61 leads from the sump to a pump 52 which may, as shown in FIG. 2, be driven directly from motor 21 and which discharges through a conduit 53 to a drain valve 54 controlled by a solenoid 55. When solenoid 55 is energized it pulls down a level member 56 pivoted at point 57 to close the valve 54; when solenoid 55 is de-energized valve 54 is opened permitting the continually operating pump 52 to pass liquid through conduit 53 and valve 54 to drain conduit 58.

Still referring to FIG. 2, suitable overflow means are provided for the machine. A conduit, generally indicated at 60, has an inlet 61 which connects with conduit 40 intermediate the two ends thereof. In the preferred arrangement, the inlet 61 of conduit 60 is relatively close to the inlet end of conduit 40, and may preferably be arranged to extend into the funnel 39 as shown. Conduit 60 has a first intermediate portion 62. Portion 62 extends upwardly from the inlet opening 61 and connects with a second intermediate portion in the form of a long downwardly extending leg 63 leading to an outlet 64 which opens to the outside of the cabinet substantially below the level of inlet 61 of the conduit.

Although the intermediate section 62 of conduit 60 extends upwardly both from the inlet 61 and from the outlet 64, it will be observed that the uppermost point of it is still below the level of the inlet to conduit 40. In this manner, if the safety devices normally provided on the machine should fail to work and water should start to fill the tub 10, as the level of the water rises it will pass out through opening 41 and up through conduit 40. Then, before it can spill out of the inlet of conduit 40 and start to fill the machine itself with water thereby damaging the parts without indicating immediately to the operator that something is amiss, the water will pass out through inlet 61 into conduit 60 and from the outlet 54 of the conduit to the exterior of the machine. The fact that conduit 60 is provided in its entirety below the level of the inlet of conduit 40 means that the water will never flow from the inlet into the machine itself but will always be directed to the exterior of the machine. It will be observed that the upwardly extending portion 62 precludes water supplied from conduits 37 and 46 from passing through conduit 60 inasmuch as the water is no longer pressurized after having passed through the air gap.

The overflow arrangement provided protects not only against excessive amounts of water in the machine, but also against the more commonly encountered situation where the operator is using a high sudsing soap or detergent and has put an excessive amount in the machine. In such a case the suds will fill the tub **10** and will billow out into conduit **40** from opening **41**.

When they reach the inlet **61** of conduit **60** they will pass up portion **52** and start to drop down the relatively long leg **53**. This action of the suds dropping in leg **63** of conduit **60** has a siphoning action. Without the conduit **60**, the suds would, of course, continue to billow upwardly and would come out of the funnel **39** and pass into the interior of the machine thereby wetting many of the components of the machine and causing possible harm to the machine. However, the siphoning effect within leg **63** of conduit **60** causes suction to be applied to the suds coming up through conduit **40** so that there is a positive force preventing them from billowing up out of the funnel **39**.

It will thus be seen that this invention provides an improved overflow arrangement whereby, if all the devices intended to prevent excessive water level in the machine fail, the water will be directed to the outside of the machine before any of it can escape inside the machine to cause possible harm. Also, the same arrangement doubles in function to effect a positive prevention of soap suds billowing inside the machine by virtue of the siphoning action of the overflow means.

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

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

1. A domestic laundry machine comprising an enclosing cabinet; a substantially closed tub within said cabinet; water supply means for said tub comprising a first conduit adapted to be connected to a source of supply and having an outlet within said cabinet, a second conduit in said cabinet having an inlet separated from the outlet of said first conduit by an air gap and positioned to receive the flow from said first conduit, and means forming an overflow outlet from said tub positioned in the wall of said tub substantially above the maximum liquid level reached in said tub during proper operation of the machine, said second conduit extending downwardly from said inlet thereof and having its lower end connected to said tub overflow outlet; and a third conduit in said cabinet having an inlet connected to said second conduit intermediate the ends thereof and having an outlet opening outside said cabinet below the level of said third conduit inlet, said third conduit having a first intermediate portion extending upwardly from said third conduit inlet and a second intermediate portion of substantially greater length extending downwardly to said third conduit outlet, said intermediate portions being entirely below the level of said second conduit inlet whereby overflow from said tub flows through said third conduit.

2. The apparatus of claim 1 wherein the outlet of said first conduit extends in a generally downward direction and the inlet of said second conduit comprises a funnel positioned directly below said first conduit outlet.

3. A domestic combination washing and drying machine comprising an enclosing cabinet; a substantially closed tub within said cabinet; a clothes basket rotatably mounted within said tub; means for heating clothes in said basket to effect drying of the clothes after a washing operation; water supply means for said tub comprising a first conduit adapted to be connected to a source of supply to provide water to said tub at a relatively high rate for washing and rinsing purposes and having an outlet within said cabinet, a second conduit adapted to be connected to said source of supply to provide water to said tub at a relatively low rate to condense moisture from the air during operation of said heating means and having an outlet within said cabinet, a third conduit in said cabinet having an inlet separated from said outlets of said first and second conduits by an air gap and positioned to receive the flow from said first and second conduits, and means forming an overflow outlet from said tub positioned above the maximum liquid level reached within said basket and tub during operation of the machine, said third conduit extending downwardly from said inlet thereof and having its lower end connected to said tub overflow outlet; and a fourth conduit in said cabinet having an inlet connected to said third conduit intermediate the ends thereof and having an outlet opening outside said cabinet below the level of said fourth conduit inlet, said fourth conduit having an intermediate portion extending upwardly from said inlet and outlet thereof, said intermediate portion being entirely below the level of said third conduit inlet whereby overflow from said tub passes out through said fourth conduit.

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