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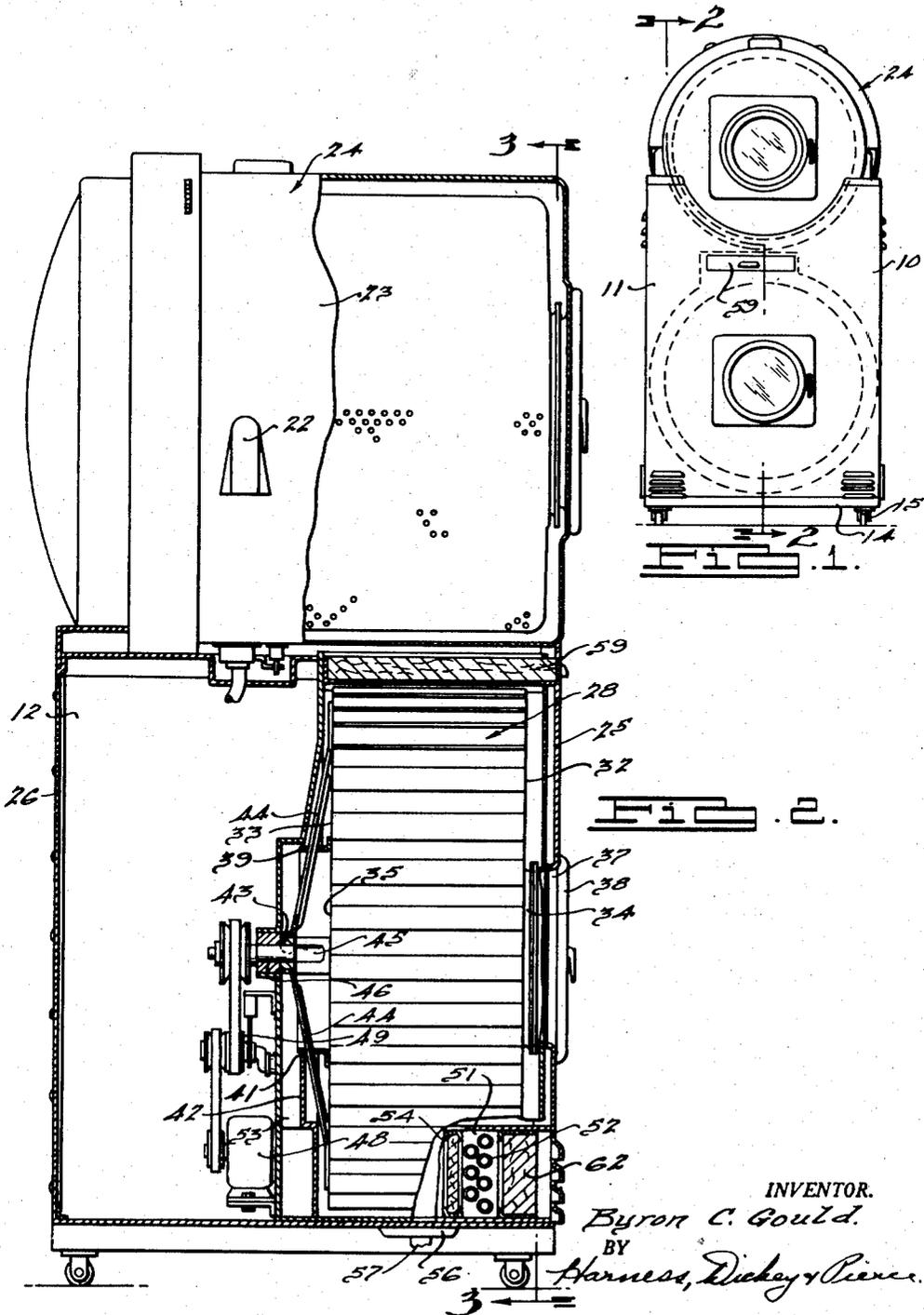
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2,566,488

COMBINED FABRIC WASHING AND DRYING UNIT

Filed April 28, 1945

3 Sheets-Sheet 1



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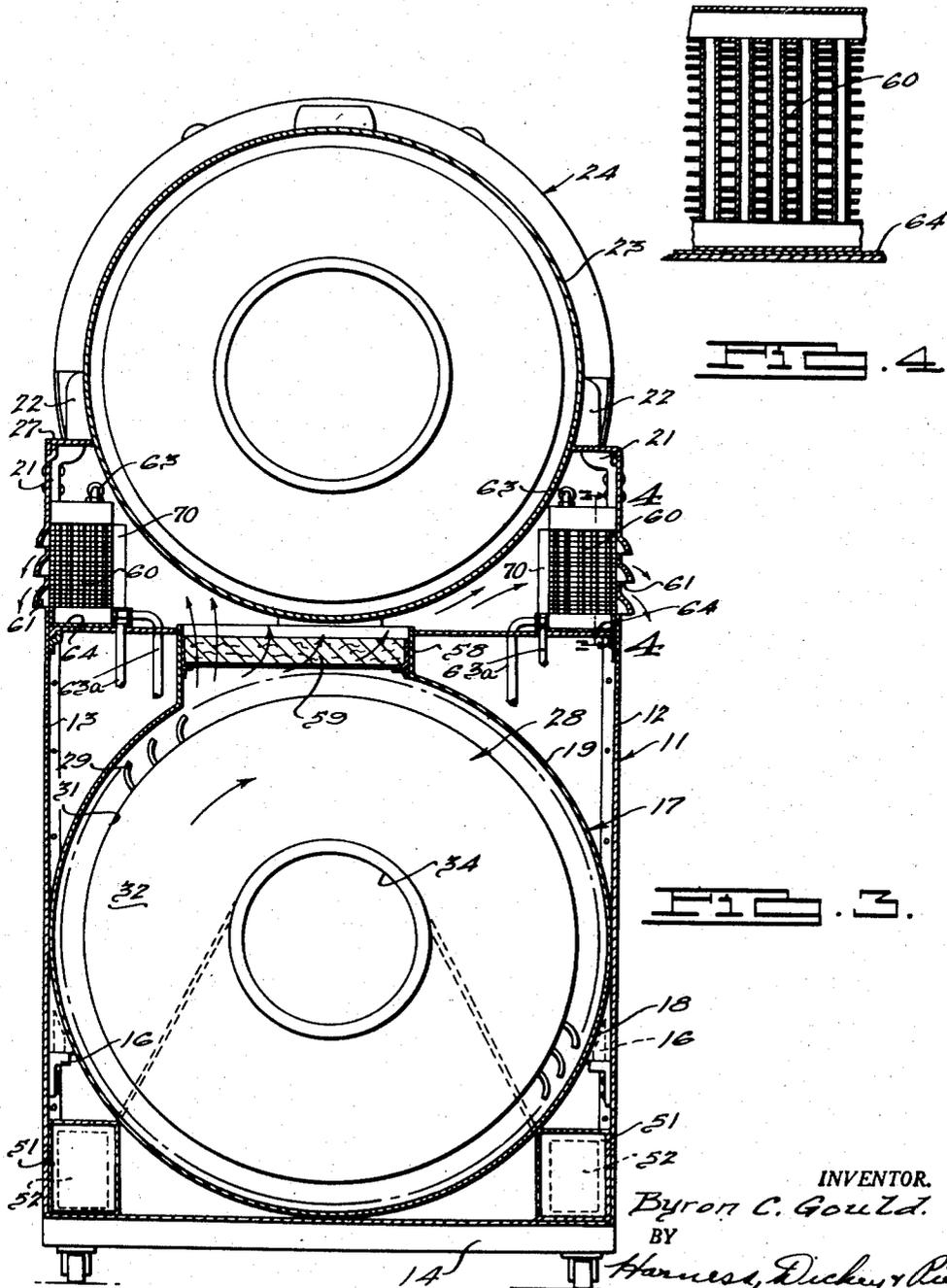
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COMBINED FABRIC WASHING AND DRYING UNIT

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3 Sheets-Sheet 2



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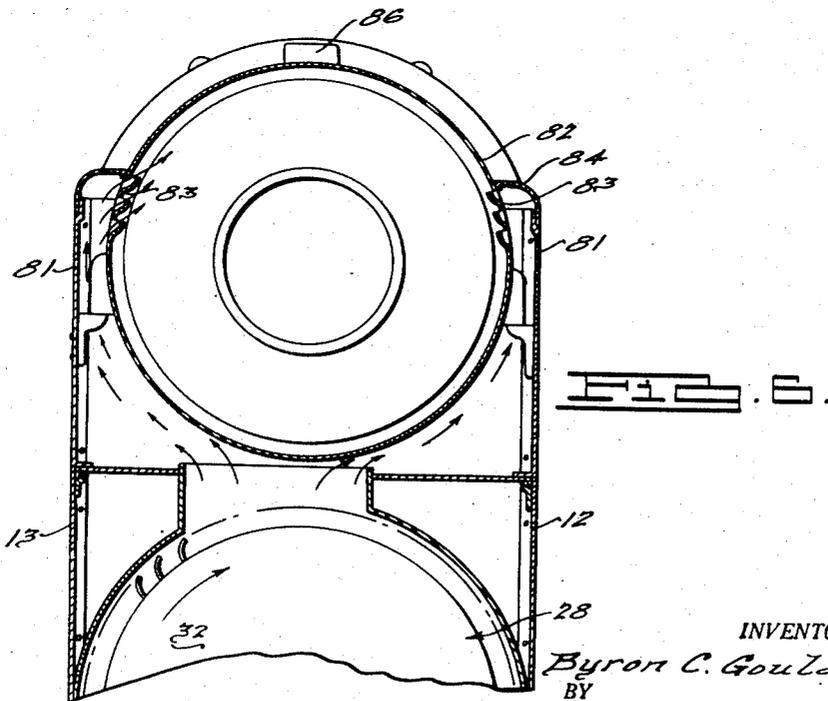
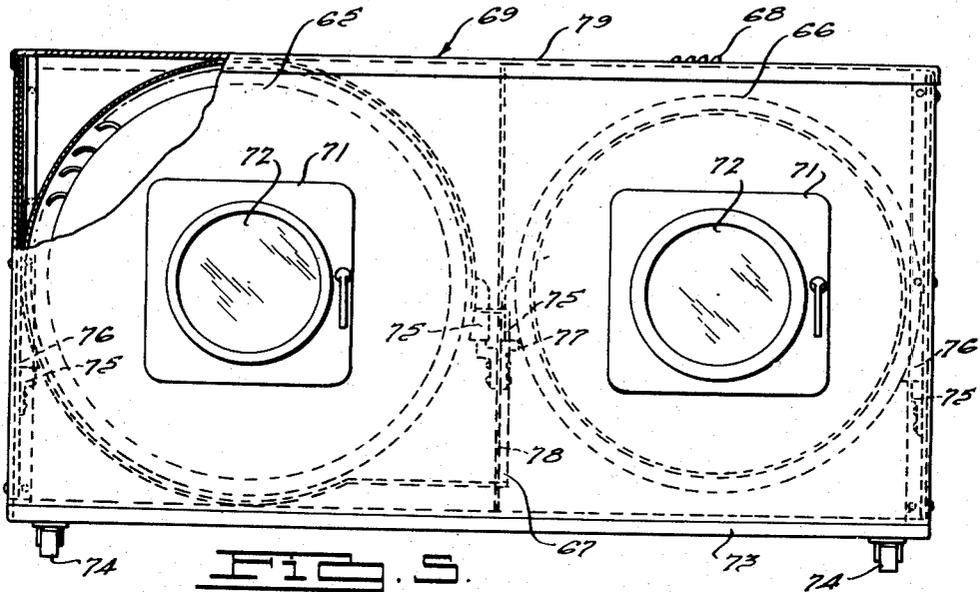
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COMBINED FABRIC WASHING AND DRYING UNIT

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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COMBINED FABRIC WASHING AND DRYING UNIT

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8 Claims. (Cl. 68—20)

1

This invention relates to fabric processing devices and particularly to a laundry unit embodying a combination fabric washing and drying machine of new and novel construction.

Advantage is taken in the present invention of the heated air employed in the drying of fabrics after a washing operation for heating the washing unit with the expelled air from the drying unit. A casing is provided in which the drying unit is mounted, having means thereon for supporting a washing unit thereabove or in side-by-side relationship. The drying unit embodies a Sirocco type of fan having a perforated wall on the rotor for drawing air into the rotor and expelling it through the clothes distributed by centrifugal force over the perforated wall and out through the wall to be directed against the tube of the washing machine.

The tub may be mounted above the drying unit or in side-by-side relationship thereto and, depending upon the position of the tub, the outlet for the exhausted air from the drier is directed upwardly or sidewardly from the drying unit. The air impinges upon the outer peripheral wall of the tub to heat the tub and the water contained therein. The air is preferably deflected from the tub to be divided in two paths so as to encompass the lower portion of the tub from which it is conducted through suitable filter and/or condenser elements exteriorly of the unit.

Accordingly, the main objects of the invention are: to provide a unit washing and drying device; to mount a washing unit upon a drying unit and conduct the heat expelled from the latter adjacent to the former to maintain the tub and contents warm during washing and drying operations; to provide a cabinet having supporting elements on the wall on which the fabric drying device and the fabric washing device are supported; and in general to provide a unit device in which the fabrics are washed and dried which is simple in construction, positive in operation, and economical of manufacture.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a view in elevation of a washing and drying unit embodying features of this invention;

Fig. 2 is a broken sectional view of the structure illustrated in Fig. 1, taken on the line 2—2 thereof;

2

Fig. 3 is a sectional view of the structure illustrated in Fig. 2, taken on the line 3—3 thereof;

Fig. 4 is an enlarged sectional view of the structure illustrated in Fig. 3, taken on the line 4—4 thereof;

Fig. 5 is a view of structure, similar to that illustrated in Fig. 2, showing a further form of the invention, and

Fig. 6 is a broken sectional view of structure, similar to that illustrated in Fig. 3, showing a further form which the invention may assume.

Referring to Figs. 1 to 4, a washing and drying unit 10 is illustrated, embodying a supporting casing 11 comprising side walls 12 and 13 mounted on a base 14 which may rest directly upon a floor or which may be supported thereon by casters 15. The side walls 12 and 13 are provided with supporting brackets 16 on which the entire drying unit 17 is supported by the stirruplike elements 18 on the housing 19 of the unit. Near the top of the side walls 12 and 13, additional brackets 21 are mounted having projecting ends which extend within stirruplike elements 22 on the wall 23 of the tub of the clothes washing unit 24.

The washing and drying units are supported upon the walls 12 and 13 in juxtaposed position, with the washing unit mounted directly above the drying unit. The front and rear panels 25 and 26, respectively, and the top panel portion 27, are removably attached to the side panels 12 and 13. It is to be understood that the side panels support the units upon the base 14 so that when the front, back and top panel portions are removed the mechanisms of the devices are exposed and the devices themselves may be removed as a unit from the brackets 16 and 21.

The drying unit 17 is constructed in a similar manner to the drying unit illustrated, described and claimed in the copending application of A. H. Haberstump, Serial No. 587,063, filed April 7, 1945, now Patent No. 2,521,578 issued Sept. 5, 1950, and assigned to the assignee of the present invention. The unit embodies a Sirocco fan type of blower made up of a rotor 28 disposed within the housing 19. The rotor is provided with a plurality of blades 29 across its peripheral edge adjacent to the perforated peripheral wall 31. Side walls 32 and 33 have central openings 34 and 35 therein, the former of which is aligned with an opening 37 in the front panel 25 which is closed by a door 38 after the fabrics have been placed within the rotor. The opening 35 is surrounded by a collar 39 disposed adjacent to an opening 41 in the inner wall 42 of

3

the housing 17. The rotor is mounted on a hub 43 having arms or spiders 44 extending therefrom and attached to the wall 32 of the rotor for bracing and supporting the rotor on the hub. The hub is mounted on a shaft 45 which is supported on a bearing 46 mounted on the wall 42 of the housing. A motor 48 drives through a change speed pulley unit 49 for operating the rotor at a slow, then a higher speed, for first tumbling the fabrics and thereafter distributing the fabrics uniformly over the peripheral wall against which they are maintained by the centrifugal force produced by the rotor operation and by the passage of the air from the interior of the rotor out through the peripheral wall thereof. Air passageways 51 are provided at the lower corners of the casing 11 which have heating elements 52 therein which may be electric units or which may be heat interchangers of an oil or gas-fired unit for heating air drawn into the rotor. The element 52 may be a moisture absorbing unit containing silica gel, calcium lime, and the like, for dehydrating the air and thereby lowering its relative humidity. The same lowering of the relative humidity occurs to the air as it is heated. The passageways 51 are connected to a common passageway 53 which communicates with the collar 39 for directing the air through the central opening 35 into the rotor interior. It is to be understood that the air passageways 51 pass through the wall portion 52 when communicating with the passageway 53. Any moisture which may be drawn off from the fabrics due to the rotation of the rotor 28 within the housing 19 is drained from the wall of the housing into the sump 56 in the bottom of the housing from which it may flow through the conduit 57 into a receptacle or a drain outlet connected thereto. It will be noted that the driving mechanism is mounted on the wall 42 of the drying device and that all of the wiring and control mechanism is in unit relation therewith so that the device is an entirely self-contained unit removably supported on the projection 16.

The washing machine 24 mounted above the heating unit may be of any form, but is preferably similar to that illustrated and described in the copending application of A. H. Haberstump, Serial No. 501,919, filed September 11, 1943, and assigned to the assignee of the present invention, now abandoned. The tub 23 of the washing machine is disposed adjacent to an outlet opening 58 of the housing 19 in the direct path of the air being expelled from the housing which impinges upon the tub as it is directed upwardly along both of its sides. The air passes through a removable filter unit 59 disposed in the outlet opening 58 of the housing.

The relative humidity of the air impinging on the tub has been raised when passing through the damp fabrics in the rotor of the drying device. If nine pounds of fabrics taken from the washing machine contain a pound of water per pound of fabrics, the air passing from the machine will have absorbed nine pounds or approximately nine pints of water in the cycle of drying of approximately thirty minutes. The air in the room in which the machine is operating will in time approach its saturation point and water will condense therefrom on the cool walls and objects in the room and produce dampness. To avoid this depositing of the water outside of the device, condensers 60 are mounted ahead of the louvers 61 in the casing of the machine through

4

which the air passes before it is expelled through the louvers. The condensers may be of any form and are herein illustrated as containing a hollow core such as that employed in the radiator of an automobile, through which cold water is passed during the machine operation. The solenoid valve (not shown) controlling the flow of water to the inlet conductors 63 of the condensers is preferably connected in the control circuit of the machine to be open during the time the machine is operating. A trough 64 is provided beneath each of the condensers 60 to collect the water removed from the air as it passes over the cooled surfaces of the condensers. The water from the condensers and troughs passes to drain through conduits 63a connected thereto and to the drain 57 at the bottom of the machine.

The washing machine is of the automatic type which operates through a washing, rinsing and damp-drying cycle during a predetermined time interval. At the beginning of the damp-drying cycle of the washing machine, the drying unit is automatically operated to produce a flow of heated air about the tub to heat the tub and the contents thereof during the initial damp-drying cycle of operation. This was found to materially increase the drying capacity of the washing machine so as to have a maximum amount of moisture removed from the fabrics at the end of the operation of the washing machine, at which time the operation of both of the machines is interrupted.

The fabrics are then removed from the washing machine and inserted into the drying machine and additional fabrics are placed within the washing machine, after which both of the machines are again operated. During this cycle of operation of the washing machine, the treated air passing through the rotor 28 of the drying machine impinges on the tub of the washing machine so that the tub is heated through the entire cycle. It is within the purview of the present invention to employ filter elements 62 adjacent to the front of the passageways 51 of the drying machine for filtering the air which is drawn into the rotor and passed through the fabrics during the drying operation. It is well known that the outer fibres of fabrics are quickly dried by the passage of air thereover during the drying operation. It was found, however, that the central fibres of the fabrics are reluctant to give up moisture and for this reason the drying cycle is substantially extended. The passage of the air directly through the fabrics, as occurs in the drying device herein illustrated, eliminates this difficulty as the drying of the central fibres is substantially accelerated.

The air being expelled from about the walls of the washing machine may be filtered by the elements 70 to remove the lint which is collected from the fabrics and is thereby prevented from being distributed to the air outside of the washing and drying unit. The heated air will be passed over the tub during the entire washing operation on groups of fabrics washed thereafter. This will maintain the temperature of the washing and rinsing waters and will assist, as pointed out above, in the damp-drying operation. It is of course within the purview of the invention to operate the drying device at the beginning of the initial washing operation so as to provide heated air on the wall of the tub during the entire time that the washing machine is operating.

In Fig. 5 another form of the invention is illustrated, that wherein the clothes drying unit 65

5

is mounted in side-by-side relationship to a washing unit 66. An outlet 67 for the heated air expelled from the drying unit 65 is disposed in the space between the units so that the air will be directed against the tub of the washing unit in a manner to pass therearound and be expelled from the louvers 68 at the top of a casing 69 which encloses both of the units. The casing 69 is provided with openings closed by doors 71 through which the fabrics are inserted and removed from the rotor thereof. The doors are preferably provided with a transparent window 72 to permit the operator to view the fabrics as they are operated on within the rotors. The casing 69 is mounted upon a suitable base 73 which may rest upon the floor or be supported thereon by casters 74.

The units 65 and 66 are preferably self-contained and are supported on the casing 69 by suitable brackets 75 attached to the side walls thereof which engage downwardly presenting sockets 76 on the housing and tub of the units. Similar sockets 76 are provided on the adjacent sides of the housing and tub which are supported thereby upon brackets 77 mounted at the center of the casing upon an upright 78 from the base 73. The casing is enclosed by a removable cover element 79 which, when removed, permits the removal of the back panel and the self-contained units independently of each other from the casing.

In Fig. 6, a further form of the invention is illustrated, that wherein the side panels 12 and 13 of the drier unit are projected upwardly at 81 to extend above the center of the washing unit, the tub 82 of which is provided with louvers 83 for permitting the passage of heated air into the tub. The top enclosing element 84 is supported on the top of the wall extension 81 in sealed relation to the tub so as to direct heated air passing upwardly thereabout into the openings through the louvers 83. The louvers 83 at the left-hand side of the tub, as illustrated in Fig. 6, are so disposed as to have the openings therethrough directed upwardly so as to prevent the water carried upwardly by the rotor from being drawn through the space between the rotor and the outside of the tub. The air entering the tub will pass through apertures in the peripheral wall of the rotor onto the fabrics being operated on therein. Louvers 86 are provided on the top of the tub through which the air is expelled. The louvers 86 may also function as a soap dispensing opening through which soap is introduced to the tub interior at the beginning of the washing operation. Otherwise the operation of the unit devices illustrated in Figs. 5 and 6 is the same as that illustrated in Figs. 1 to 4 which has been described hereinabove in detail.

What is claimed is:

1. The combination including a cabinet, of fabric drying and washing units mounted therein in adjacent relation to each other, a rotor in each of said units for tumbling said fabrics, means within the drying unit for heating and moving a quantity of air over the fabrics tumbled therein, and means between the units for directing the air from the drying unit onto the outer surface of the washing unit.

2. The combination with a casing embodying a base, a pair of spaced side panels secured to said base, a self-contained drying unit removably supported on said panels, a self-contained washing unit also removably mounted on said panels with one of said units mounted above the other,

6

and means within each of said units for agitating the fabrics contained therein.

3. The combination with a casing embodying a base, a pair of spaced side panels secured to said base, a self-contained drying unit removably supported on said panels, a self-contained washing unit also removably mounted on said panels with one of said units mounted above the other, a rotor in each of said units for tumbling said fabrics, means within the drying unit for heating and moving a volume of air through said fabrics as they are tumbled, and means for directing the heated air being expelled from the drying unit onto the outer wall of the washing unit as the fabrics are tumbled therein.

4. The combination with a casing embodying a base, a pair of spaced side panels secured to said base, a self-contained drying unit removably supported on said panels, a self-contained washing unit also removably mounted on said panels with one of said units mounted above the other, means within the drying unit for heating and moving a volume of air, means for directing the heated air being expelled from the drying unit onto the outer wall of the washing unit, a rotor in each of said units for tumbling the fabrics therein, and filter means disposed adjacent to said wall of the washing unit in the path of movement of the air thereover at the point at which the air is expelled from the casing.

5. In combination, a self-contained drying unit through which air is circulated, a self-contained washing unit each containing all of the operating and control mechanism therefor, a cabinet in which said units are releasably mounted in adjacent relation to each other, means on the drier unit for lowering the relative humidity of the air which is moved by the unit therethrough, and means for directing the air expelled from the drying unit onto the outer surface of the washing machine.

6. The combination with a self-contained washing unit and a self-contained drying unit through the latter of which air is circulated, of a cabinet having means on the side walls thereof for supporting the adjacent portions of the units when mounted in side-by-side relationship therein, a base for the cabinet, means between said units supported on the base of the cabinet for releasably supporting the inner adjacent portions of the units to have the units readily removable from the cabinet independently of each other, means for heating the air which is drawn within the drying unit during its operation, and means for directing the air exhausted from the drying unit against the wall of the washing unit for providing heat thereto.

7. In a combination fabric washing and drying cabinet, a washing unit, a drying unit, means for circulating air through the drying unit and out therefrom onto the washing unit, means for lowering the relative humidity of the air before circulating it through the drying unit, and means for removing a substantial amount of water from the air before it passes from the cabinet.

8. The combination, including a cabinet, of a fabric drying unit mounted therein, a fabric washing unit also mounted in the cabinet in adjacent relation to the drying unit, means within said washing unit for washing said fabrics, a rotor for tumbling said fabrics within said drying unit, means within said drying unit for heating and moving a quantity of air over the fabrics tumbled within the rotor thereof, and means

7

for directing the air from said drying unit onto the outer surface of said washing unit.
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