

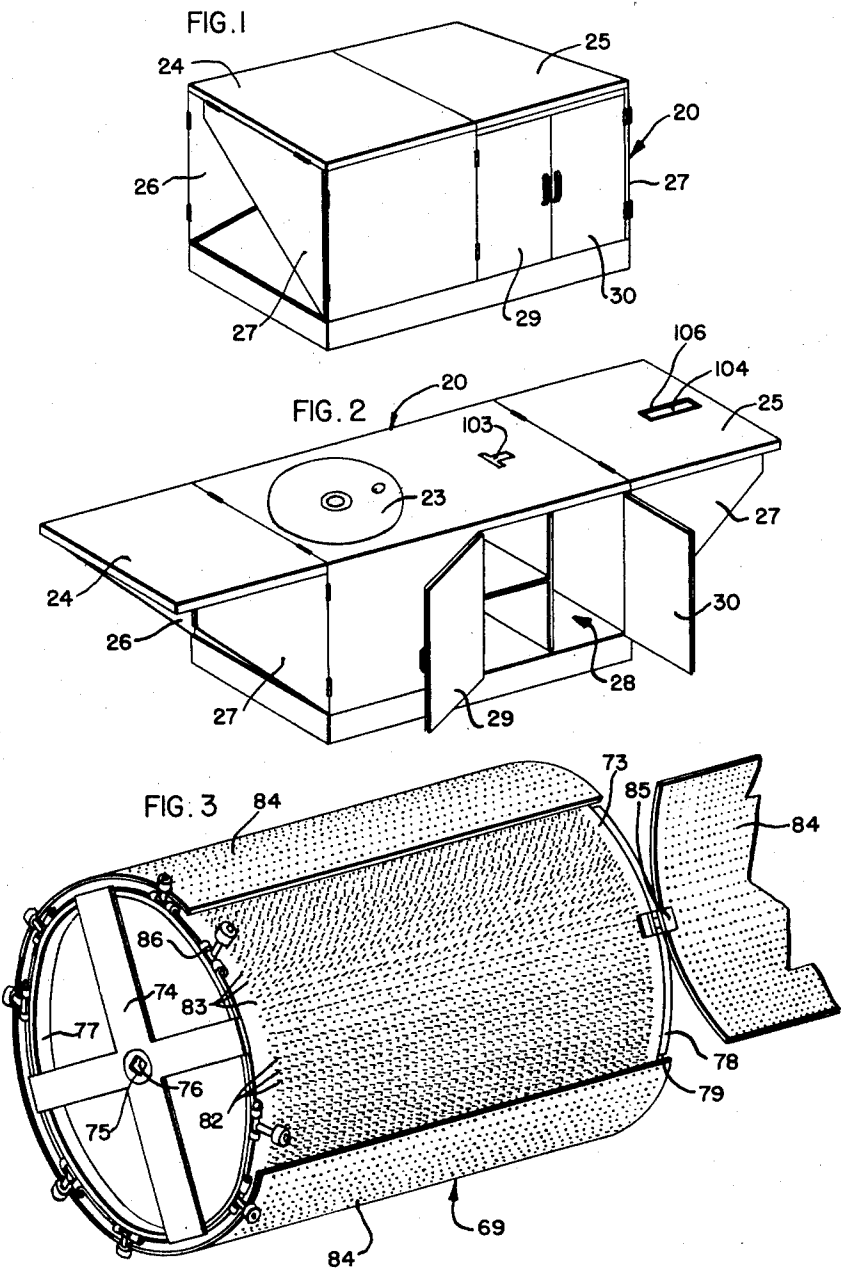
June 5, 1951

E. M. COLLINS
LAUNDERING APPARATUS

2,556,153

Filed Jan. 18, 1947

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

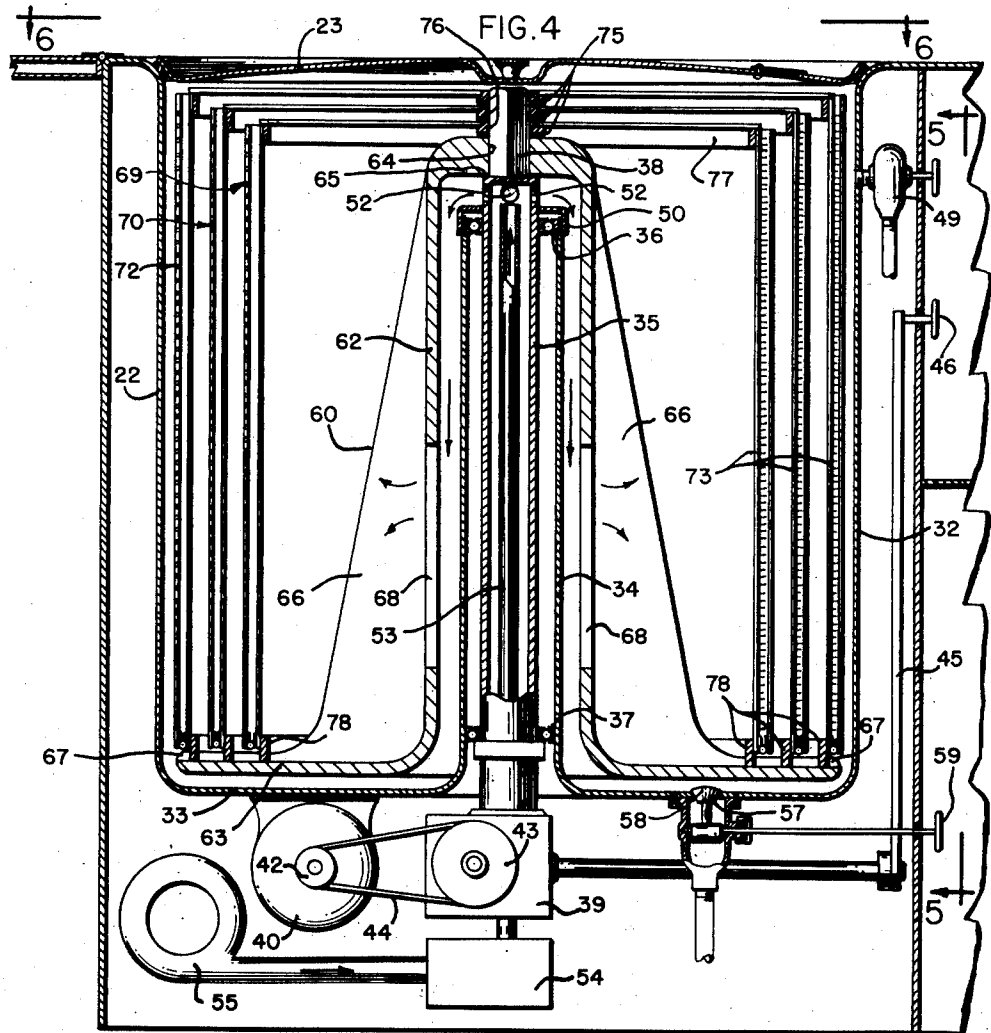
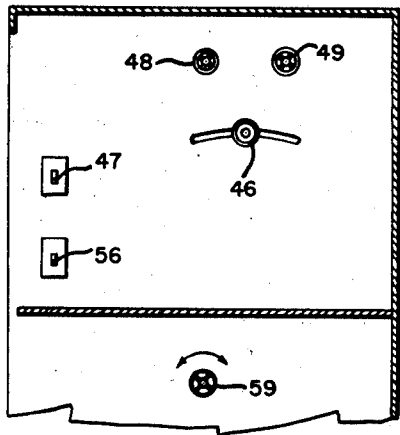


FIG. 5



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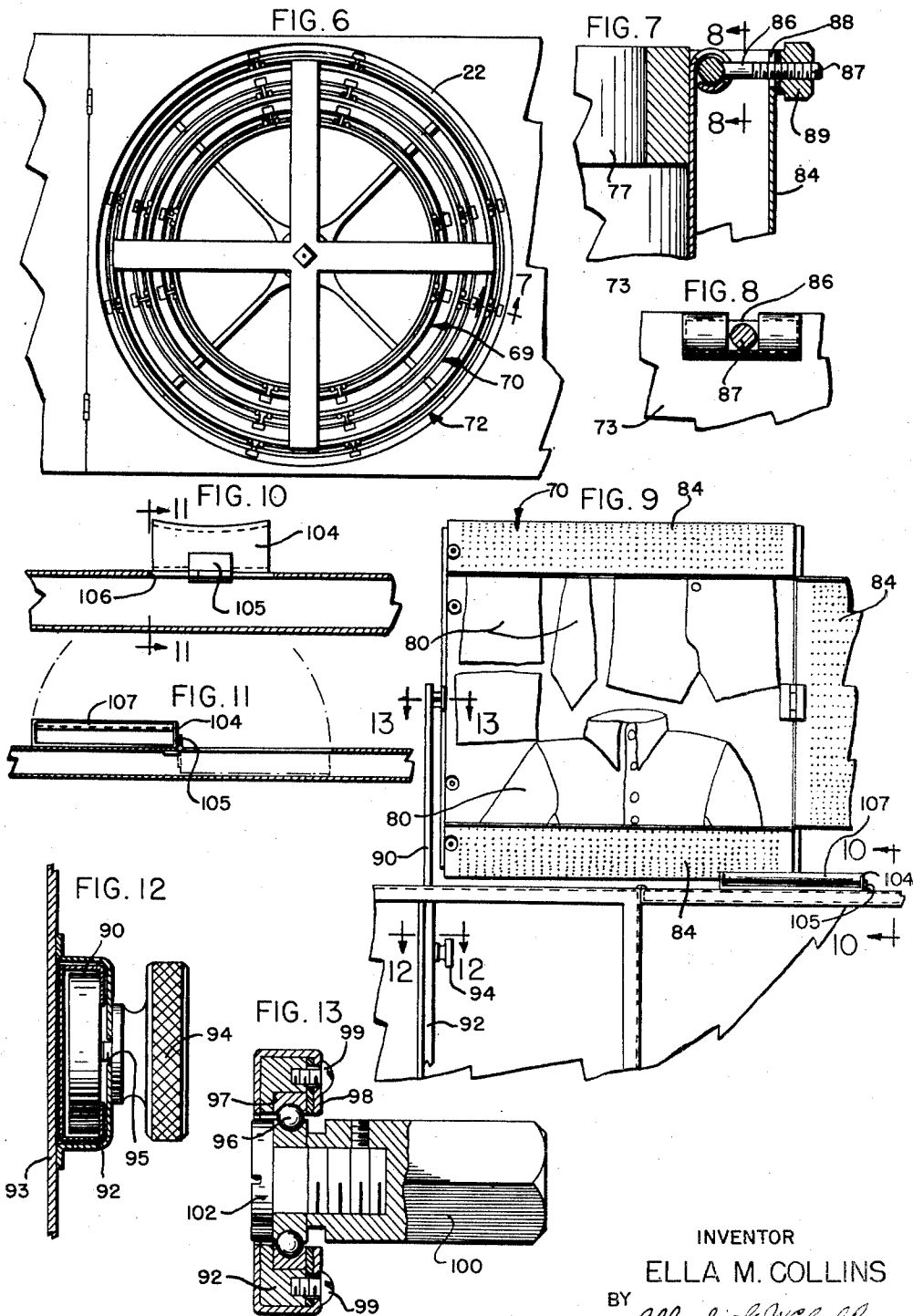
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

FIG. 14

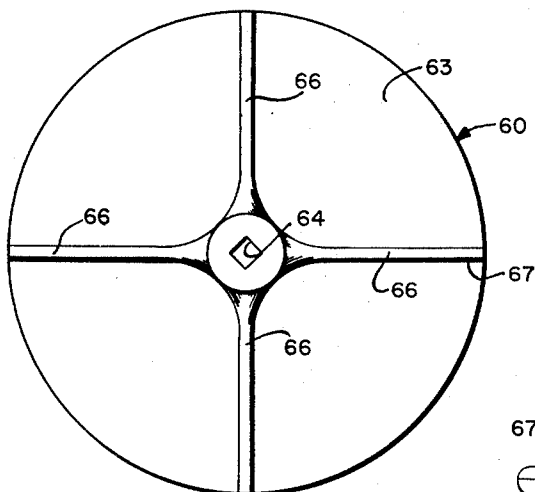


FIG. 15

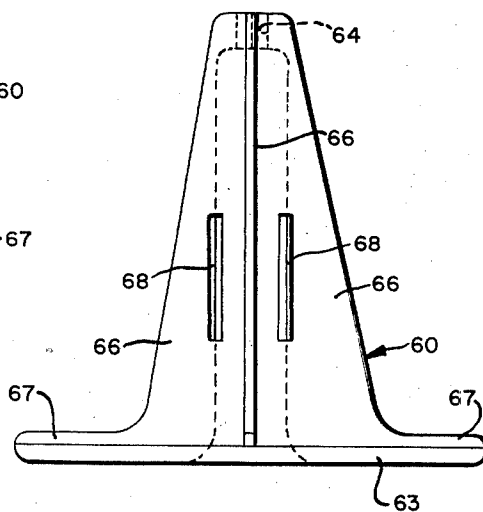


FIG. 16

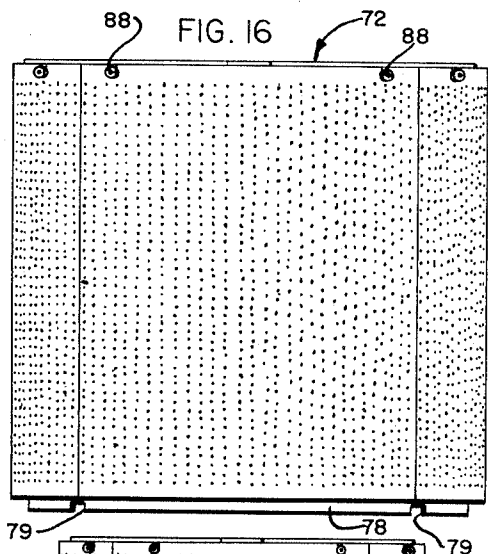


FIG. 17

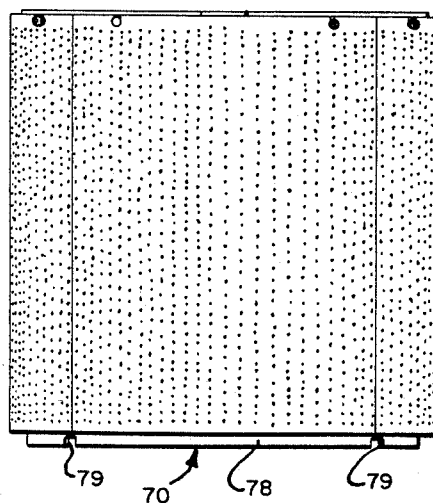
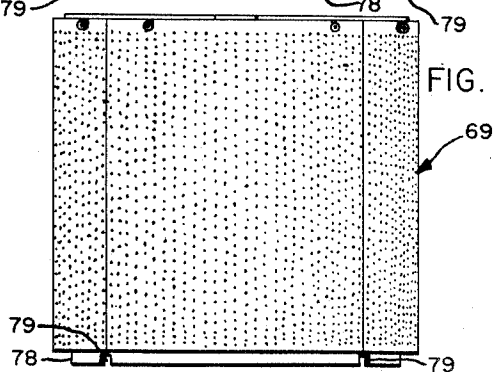


FIG. 18



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LAUNDERING APPARATUS

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Application January 18, 1947, Serial No. 722,922

9 Claims. (Cl. 68—20)

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My present invention relates to laundering apparatus, and more particularly to such an apparatus suited to domestic or commercial use including dry cleaning and the like.

One of the objects of my invention is to provide a laundering apparatus by which articles to be cleaned are held in shape during the washing and drying operations.

Another object of the invention is to provide a laundering apparatus wherein shrinking or stretching of the washed articles is minimized.

It is a further object of this invention to provide a laundering apparatus in which articles of different colors may be washed at the same time, but kept separated so as to prevent fading from one to another.

My invention also has for an object the provision of an apparatus for laundering articles in such a way that the washing and drying are successively accomplished in a single machine and the necessity of separately ironing the articles is eliminated.

As another object, the invention comprehends the provision of an apparatus for laundering articles without breaking buttons or tearing them off, as often happens in the usual processes and apparatus for laundering.

The invention has for another object the provision of laundering apparatus of the character described which may be constructed as a unitary assembly having a neat appearance.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which similar characters of reference indicate similar parts throughout the several views.

In the four sheets of drawings:

Fig. 1 is a perspective view of one form of cabinet adapted to house my preferred laundering apparatus, shown with the parts in their closed position;

Fig. 2 is a perspective view of the cabinet shown in Fig. 1 wherein the parts are opened for use in laundering;

Fig. 3 is a perspective view of a preferred form of one of the parts of my laundering apparatus;

Fig. 4 is a vertical front sectional view of laundering apparatus embodying a preferred form of my invention;

Fig. 5 is an end sectional view of my laundering apparatus wherein the section is taken substantially on a line 5—5 of Fig. 4 and in the direction indicated by the arrows;

Fig. 6 is a fragmentary top plan view, with the cover removed, of a portion of my laundering ap-

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paratus viewed substantially as indicated by a line 6—6 in Fig. 4 and the accompanying arrows;

Fig. 7 is a fragmentary sectional view drawn to an enlarged scale of a portion of the apparatus with the section taken substantially on a line 7—7 of Fig. 6;

Fig. 8 is a fragmentary sectional view of the portion of the apparatus shown in Fig. 7 and wherein the section is taken substantially on a line 8—8 of Fig. 7;

Fig. 9 is a fragmentary front elevational view of a portion of the cabinet with a part of the laundering apparatus mounted thereon in position for placement or removal of articles;

Fig. 10 is a fragmentary sectional view drawn to an enlarged scale of a portion of the apparatus shown in Fig. 9 with the section taken substantially on a line 10—10 of Fig. 9;

Fig. 11 is a side sectional view of the portion of the apparatus shown in Fig. 10 and wherein the section is taken substantially on a line 11—11 of Fig. 10;

Fig. 12 is a top sectional view drawn to an enlarged scale of a portion of the apparatus shown in Fig. 9 with the section taken substantially on a line 12—12 of Fig. 9;

Fig. 13 is a top view, partially in section, of a portion of the apparatus and wherein the section is taken substantially on a line 13—13 of Fig. 9;

Figs. 14 and 15 are, respectively, top, plan and side elevational views of a preferred form of one part of the laundering apparatus shown in Figs. 4 and 6; and

Figs. 16, 17 and 18 are side elevational views of three complementary sizes of parts of the laundering apparatus like that shown in Fig. 3.

In the exemplary embodiment of my laundering apparatus disclosed in the accompanying drawings, I have shown its adaptation to a cabinet 20 as depicted in Figs. 1 and 2. In this cabinet a laundering tub 22 (Fig. 4) is mounted near one end and closed by a cover 23. Although optional, I have provided folding top leaves 24 and 25 which fold inwardly against the top of the cabinet, as shown in Fig. 1, when the apparatus is not in use for laundering, and extend outwardly at the ends of the cabinet to provide bench space during the laundering operation. For supporting the leaves when extended, folding brackets 26 and 27 are provided at each end of the cabinet and are hinged to fold against the end of the cabinet when the apparatus is not in use and project outwardly from the cabinet ends to support the leaves, as shown in Fig. 2.

By preference, compartments 28 are provided within the cabinet for the storage of laundering material and the like, which compartments are normally closed by doors 29 and 30.

In the disclosed embodiment of my invention, the laundering tub 22 has a substantially cylindrical side wall 32 and a substantially flat bottom 33. At the mid-portion of the bottom 33 of the tub, a hollow spindle housing 34 extends upwardly within the tub to a position above the normal liquid level in the tub. The spindle housing is tubular and open at both ends. Within the housing 34 a hollow spindle 35 is journaled for rotational movement by bearings 36 and 37 disposed near the opposite ends of the housing. At its upper end the spindle 35 has a polygonal driving portion 38 which projects axially therefrom; while at its lower end the spindle extends outwardly from the housing and is drivingly connected to a driving mechanism comprising a gear box 39.

For driving the spindle, gears which may be of a conventional type enclosed within the gear box 39 are driven by a prime mover such as a motor 40 through driving instrumentalities which, in the present instance, are indicated as pulleys 42 and 43 and a belt 44 which encompasses the pulleys. By preference, the gears within the gear box 39 are so constructed and arranged that the operation of the spindle may be controlled by the manual actuation of a shift lever 45 having a handle 46 exposed within the cabinet, as shown in Figs. 4 and 5. Preferably, the handle 46 has three operating positions; an "off" position in which the spindle is stationary although the motor is operating; a "wash" position in which the spindle is driven with an oscillatory movement, traveling part of a revolution in each direction; and a "spin" position in which the spindle is rotated at a speed sufficient to throw washing fluid from the washed articles by centrifugal force.

The operation of the motor 40 is controlled by a switch 47 mounted within the compartment 28 of the cabinet. When the laundering apparatus is permanently installed in a particular location, hot and cold water are piped to the tub and controlled by valves, such as 48 and 49, within the cabinet, as depicted in Figs. 4 and 5.

At its upper end the spindle housing 34 is provided with a cap 50 which surrounds the extending end of the spindle 35 and closes the upper end of the spindle housing. At the upper end of the spindle and above the cap 50, a plurality of air passages 52 are drilled radially through the side wall of the hollow spindle in circumferentially displaced positions. An air pipe 53 extends upwardly through the gear box 39 and to a position within the hollow spindle which is desirably above the normal liquid level in the tub. The air pipe 53 communicates with a heater 54 and a blower 55 so that when the blower and heater are turned on, heated air is forced upwardly through the pipe 53 and outwardly through the air passages 52 at the top of the spindle. A switch 56 is conveniently disposed within the cabinet, as shown in Fig. 5, for controlling the operation of the heater and blower.

At one side of the spindle housing in the bottom of the tub a drain opening 57 is provided and is controlled by a drain plug 58 actuated by a manually operable control knob 59 within the compartment 28 of the cabinet.

A gyrator 60 has a hollow cylindrical portion 62, the internal diameter of which is larger than

the external diameter of the spindle housing. At its lower end the gyrator has an outwardly extending base flange 63, the external diameter of which is somewhat smaller than the internal diameter of the tub. The upper end of the hollow cylindrical portion 62 of the gyrator is closed except for a central polygonal opening 64 which fits onto the polygonal driving portion 38 of the spindle and rests against a shoulder 65 on the spindle to support the gyrator with its base flange 63 spaced from the bottom of the tub. A plurality of circumferentially spaced fins 66 project outwardly in a radial direction from the cylindrical portion of the gyrator at circumferentially spaced positions. By preference, the fins 66 are substantially flush with the top of the cylindrical portion of the gyrator and taper outwardly toward the bottom, with relatively thin rib portions 67 at their lower ends which extend outwardly to the outer edge of the base flange 63.

Between the fins 66 slots 68 are provided in the cylindrical portion 62 for the passage of air when the blower is in operation. The shoulder 65, upon which the gyrator rests, being above the air passages 52 in the spindle and the internal diameter of the hollow spindle portion 62 of the gyrator being larger than the spindle, heated air from the pipe 53 passes through the passages 52 into the space between the gyrator and spindle housing and flows outwardly through the slots 68 and beneath the gyrator for drying purposes after the laundering has been completed and the tub drained.

Rather than to throw the articles promiscuously into the tub for laundering in the usual manner so that they are crumpled and wrinkled during the laundering process, it is one of the features of my laundering method and apparatus that the articles are held in a smooth state during the entire laundering process. By thus holding the articles smooth and in their finished state during the laundering and until they are thoroughly dried, they are not only subject to thorough cleaning but the necessity of ironing all or a large number of the usual articles of household laundry is eliminated.

For the purpose of holding the articles of laundry in a smooth state during the laundering operation, and in the presently disclosed form of my invention, I have provided a plurality of cylindrical drums 69, 70 and 72, as shown in Figs. 3, 4, 6, 9, 16, 17 and 18, which are of sizes adapting them to nest together in concentric and spaced relationship within the tub 22. Except for their dimensions, the structure and relationship of parts of each of the drums are similar to the others so that a description of one will suffice for all, with the understanding that like reference numerals refer to the similar parts of the various drums. The main supporting structure of each drum comprises a cylindrical side wall 73 of perforated sheet material such as metal, plastic, screen or the like, open at one end, as shown in Fig. 4, and having secured to its other end a cross type of supporting web 74, at the center of which is a spacing insert 75 having a central opening 76 adapted drivingly to fit upon the polygonal driving portion 38 of the spindle.

At the supporting end and inside of the cylindrical side wall, each drum is provided with a reinforcing ring 77. Also, at the open end a reinforcing ring 78 is secured to the inner surface of the side wall and extends axially beyond the end of the side wall. The ring 78 is notched

at circumferentially spaced positions corresponding to the spacing of the fins 66, as shown in Figs. 16, 17 and 18; the notches being of a size to fit over the rib portions 67 of the fins. When the spacing inserts 75 of the drums are placed upon the driving portion 38 of the spindle in their proper position according to the sizes of the drums, the reinforcing rings 78 engage the base flange 63 of the gyrator to provide additional support for the drums, and the engagement between the rib portions 67 and the notches 79 of the reinforcing rings 78 provide additional driving connections between the gyrator and the drums.

Thus, when the spindle and gyrator are driven with either the gyratory or circular motion during the washing or spinning operations, the drums are driven therewith. The articles to be laundered are placed smoothly over the outer surfaces of the cylindrical side walls 73 of the drums. In order to aid in placing and securing the articles 80 which are to be laundered, upon the surface of each drum, as indicated in Fig. 9, I have provided in my disclosed embodiment of the invention a multiplicity of relatively fine short pins 82 which project outwardly from the outer surface of the cylindrical side wall and are intermingled with perforations 83, and upon which pins the articles of various sizes and shapes will be held.

In addition to the pins for holding the articles in place upon the drum during the laundering operation, I have provided a plurality of segments 84 of perforated sheet metal, plastic or the like which conform to the curvature of the outer surface of the drum and are circumferentially spaced substantially to cover the outer cylindrical drum surface with axially extending divisions between the segments. Each segment is secured to the lower edge of the drum by a hinge 85, which hinges allow movement of the segments from a position contiguous to the drum surface to a position axial to the drum at one end thereof, as shown in Figs. 3 and 9. In the open position in which the segments extend axially from the open end of the drum, the cylindrical outer surface thereof is exposed for the placement or removal of articles.

When articles are placed upon a drum for laundering, they are stretched smoothly over the drum surface with the pins 82 projecting into or through the cloth. If an article is larger than the drum in an axial direction, it is folded to fit the drum in length. Circumferentially, the articles are wrapped around the drum. If an article is too long to be accommodated by the drum in a single turn, it may be wrapped so as to overlap.

It may be readily understood that with the disclosed structure, the smaller articles may be so placed as to be held separately and in spaced relationship to one another. After placement upon the drums, the segments are folded to their closed position in which they overlie the outer surface of the drum and the articles thereon. This additionally secures the articles in place and holds them in a smooth state during the laundering operation. Manually operable clips 86, which, in the present instance, are indicated as swingably supported studs 87, fit into slots 88 at the ends of the segments 84. They are provided with cooperating nuts 89 which are tightened to secure the segments in their closed positions, as shown in Figs. 3, 7 and 8.

Any number of drums, up to the machine capacity of the particular laundering apparatus,

may be used at any one time to hold the articles to be laundered. In the disclosed embodiment of my invention, the capacity of the apparatus is three drums. As shown in Figs. 4 and 6, these drums are spaced radially of the gyrator and tub. When the washing operation is in progress, the gyrator and the drums are both moved with an oscillatory motion, which motion together with the action of the gyrator fins upon the washing liquid, forces the washing fluid through the perforations of the drum side walls and segments and through the articles which are carried thereby. The cleaning of the articles is thereby effected. After washing, the cleaning liquid is drained from the tub and the drums are spun to force the cleaning fluid therefrom by centrifugal force. With a large part of the cleaning fluid thus removed and either while the drums are being spun or while they are stationary, the blower and heater are turned on to force heated air through the perforations in the drums and the articles until they are completely dried. Being cleaned and dried while they are held in a smooth state, the necessity of ironing many or all of the articles is eliminated or, at least, the labor of ironing is very materially reduced by the initial smoothness of the articles.

The drums 69, 70 and 72 are separately insertable and removable from the tub by placing or lifting them in order of size when the cover 23 is removed. For convenience in handling the drums while they are being loaded or unloaded, I have provided a support on the top of the cabinet for holding the drums in a horizontal position, as shown in Fig. 9. In the present embodiment of my invention this support includes a metal strap 90 slidable vertically in a channel 92 secured to a wall 93 of the cabinet and adapted to be secured in an adjusted position by a thumb screw 94 which is threaded into the strap 90 and rides in a longitudinal slot 95 in the channel 92. At its upper end the strap 90 carries an anti-friction bearing 96 having its outer race secured between a shoulder 97 and a retaining ring 98, which ring is held in place by fastening means, such as screws 99. The inner race is secured to an axially projecting polygonal fitting 100 by a screw 102; the polygonal fitting 100 being adapted to fit into the central openings 76 of the retaining rings at one end of a drum. The extended height of the strap in each instance is adjusted to suit the size of the drum. When the strap is not in use for holding one of the drums, it and the polygonal fitting 100 are retractable into an opening 103 (Fig. 2) in the top of the cabinet.

For supporting the other end of any one of the drums while it is being loaded or unloaded, I have provided a channel type bracket 104 which has one end connected to the cabinet by a hinge 105 adjacent an opening 106 in the surface of the folding leaf 25. At spaced positions, the bracket 104 rotatably supports rollers 107 which engage the outer surface of the drum at the end opposite the strap 90, providing a support which permits rotary movement of the drum. When the rollers are not in use, the bracket 104 is folded into the opening 106 in the leaf 25 to an out-of-the-way position in which the exposed surface of the bracket is desirably flush with the surface of the leaf.

From the foregoing description of my laundering method and of the structure and operation of the exemplary type of laundering apparatus which is disclosed herein, it may be readily under-

stood that many advantages grow out of the holding of the articles in a smooth state and in fixed relative positions during the laundering operation. Such articles are not only held in shape during the washing and drying, but shrinking and unintentional stretching of the washed articles are minimized. The washing and drying are successively accomplished in a single machine and without the necessity of passing the articles through a separate wringer or even moving them until they are completely washed and dried. Ironing of many or all of the laundered articles is eliminated. Furthermore, there is nothing about the apparatus or its use which has any tendency to break buttons or tear them from the material to which they are fastened. These many features are provided by laundering apparatus which is adapted to construction as a unitary assembly having neat appearance as well as utility. It is understood and is hereby emphasized that although the disclosed apparatus incorporates a gyrator for effectively circulating the cleaning fluid through the articles during the washing operation, there may be instances in which other structure or arrangements may be utilized while still maintaining the advantages of holding the articles in a smooth state during the laundering. It is also to be noted that by the smooth and compact placement of the articles in prearranged positions on the drums, a large volume of laundry may be handled in any one laundering operation of the apparatus.

While I have illustrated a preferred embodiment 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 desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In laundering apparatus, the combination comprising a tub having a base and including a tubular spindle housing projecting upwardly from the mid-portion of the base to a position above the normal fluid level in the tub, a hollow spindle journaled for rotary movement in the spindle housing and projecting therefrom at both ends of said housing, agitator driving means on the upper end of the spindle, said spindle having holes for the passage of air near the upper end thereof above the normal liquid level in the tub, an air pipe extending upwardly within the hollow spindle, means for forcing heated air through said pipe, an agitator having a central hollow cylindrical mounting portion of a size to fit over said spindle housing with space therein for the flow of air, said mounting portion having air flow openings in the side thereof and radially projecting fins on the outer surface, said agitator also having a base flange and means at the upper end of said cylindrical mounting portion for carrying the agitator relative to said spindle and providing a releasable driving connection for the agitator, means for driving the spindle, a plurality of cylindrical drums having perforated side walls and being of sizes for nesting together in concentric and spaced relationship within the tub, means for supporting the drums in said nested relationship from said agitator driving means and providing a driving connection thereto, means on the lower edges of said perforated side walls for engaging the base flange of the agitator and having notches therein for engaging said fins so that the

drums are driven with the agitator, and means for securing articles to be laundered smoothly over the surfaces of the drums.

2. In laundering apparatus, the combination comprising a tub having a base and including a tubular spindle housing projecting upwardly from the mid-portion of the base to a position above the normal fluid level in the tub, a hollow spindle journaled for rotary movement in the spindle housing and projecting therefrom at the upper end of said housing, agitator driving means on the upper end of the spindle, said spindle having holes for the passage of air near the upper end thereof above the normal liquid level in the tub, an air pipe extending upwardly within the hollow spindle, means for forcing air through said pipe, an agitator having a central hollow cylindrical mounting portion of a size to fit over said spindle housing with space therein for the flow of air, said mounting portion having air flow openings therein and radially projecting fins on the outer surface, said agitator also having a base flange and means at the upper end of said cylindrical mounting portion for carrying the agitator relative to said spindle and providing a releasable driving connection for the agitator, means for driving the spindle, a plurality of cylindrical drums having perforated side walls and being of sizes for nesting together in concentric and spaced relationship within the tub, means for supporting the drums in said nested relationship from said agitator driving means and providing a driving connection thereto, means on the lower edges of said perforated side walls for engaging the base flange of the agitator to provide additional support for the drums, and means for securing articles to be laundered smoothly over the surfaces of the drums.

3. In laundering apparatus, the combination comprising a tub having a base and including a tubular spindle housing projecting upwardly from the mid-portion of the base to a position above the normal fluid level in the tub, a spindle journaled for rotary movement in the spindle housing and projecting therefrom at the upper end of said housing, agitator driving means on the upper end of the spindle, an agitator having a central and hollow cylindrical mounting portion of a size to fit over said spindle housing, said mounting portion having radially projecting fins on the outer surface, said agitator also having a base flange and means at the upper end of said cylindrical mounting portion for carrying the agitator relative to said spindle and providing a releasable driving connection for the agitator, means for driving the spindle with an oscillatory motion, a plurality of cylindrical drums having perforated side walls of sizes for nesting together in concentric and spaced relationship within the tub, means for supporting the drums in said nested relationship from said agitator driving means and providing a driving connection thereto, means on the lower edges of said perforated side walls for engaging the base flange of the agitator, and means for securing articles to be laundered smoothly over the surfaces of the drums.

4. In laundering apparatus, the combination comprising a tub having a base and including a tubular spindle housing projecting upwardly from the mid-portion of the base to a position above the normal fluid level in the tub, a spindle journaled for rotary movement in the spindle housing and projecting therefrom at the upper end of said housing, agitator driving means on the upper end of the spindle, an agitator having

a central and hollow cylindrical mounting portion of a size to fit over said spindle housing, said mounting portion having radially projecting fins on the outer surface, said agitator also having a base flange and means at the upper end of said cylindrical mounting portion for carrying the agitator relative to said spindle and providing a releasable driving connection for the agitator, means for driving the spindle, a plurality of drums having perforated side walls and being of sizes for nesting together in concentric and spaced relationship outwardly of the agitator and within the tub, means for supporting the drums in said nested relationship, and means for securing articles to be laundered smoothly over the surfaces of the drums.

5. In laundering apparatus, the combination comprising a tub having bottom and side walls, a spindle, means for supporting the spindle for rotary motion in an upright position in the mid-portion of the tub, the last mentioned means being constructed to retain washing fluid up to a predetermined level in the tub, said spindle having driving means at the upper end thereof, means for draining the washing fluid from the tub, a plurality of drums having perforated side walls, said drums being of successive sizes for nesting together in concentric and spaced relationship, means for securing articles to be laundered smoothly over the surface of each of the drums, means on each of said drums for engaging said driving means at the upper end of the spindle to support said drums within the tub and provide driving connections thereto, whereby said drums may be driven by the spindle, means for forcing washing fluid through the perforations in the drums, and means for forcing air through the perforations in the drums after the washing operation.

6. In laundering apparatus, the combination comprising a tub having bottom and side walls, a spindle, means for supporting the spindle for rotary motion in an upright position in the mid-portion of the tub, a plurality of drums having perforated side walls, said drums being of successive sizes for nesting together in concentric and spaced relationship, means for securing articles to be laundered smoothly over the surfaces of the drums, means for supporting said drums within the tub, means driven by the spindle for forcing washing fluid through the perforations in the drums, and means for forcing air through the perforations in the drums after washing operation.

7. In laundering apparatus, the combination comprising a plurality of cylindrical drums of

similar construction and of sizes such that they nest together in concentric and spaced relationship, each of said drums including a perforated side wall and having an open end and support means at the end opposite the open end, each of said drums also having hingedly connected thereto at one end a plurality of peripherally displaced and perforated cover segments conforming to the contour of the outer surface of said side wall and swingable outwardly to a position exposing the side wall, and releasable holding means at the end of the drum opposite the hinge for holding each of said cover segments in a position contiguous to the side wall.

8. In laundering apparatus, the combination comprising a plurality of cylindrical drums of similar construction and of sizes such that they nest together in concentric and spaced relationship, each of said drum including a perforated side wall and having an open end and support means at the end opposite the open end, each of said drums also having perforated segmental means overlying the outer surface of the side wall and extending longitudinally thereof, and releasable means for holding the segmental means in place relative to the side wall.

9. In laundering apparatus, the combination comprising a plurality of cylindrical drums of similar construction and of sizes such that they nest together in concentric and spaced relationship, each of said drums including a perforated side wall and having an open end and support means at the end opposite the open end, and a multiplicity of relatively short pins projecting outwardly from the side wall surface of each drum.

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