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LAUNDRY DRYING MACHINE

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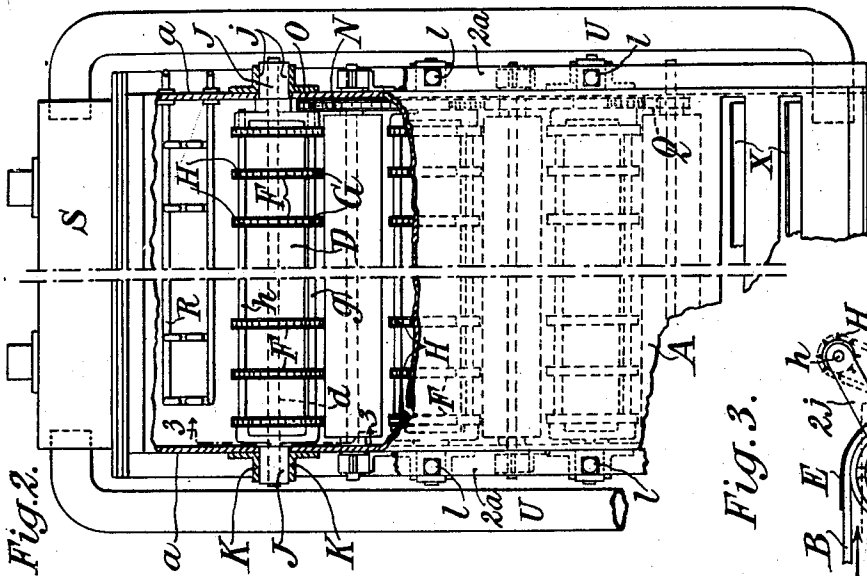
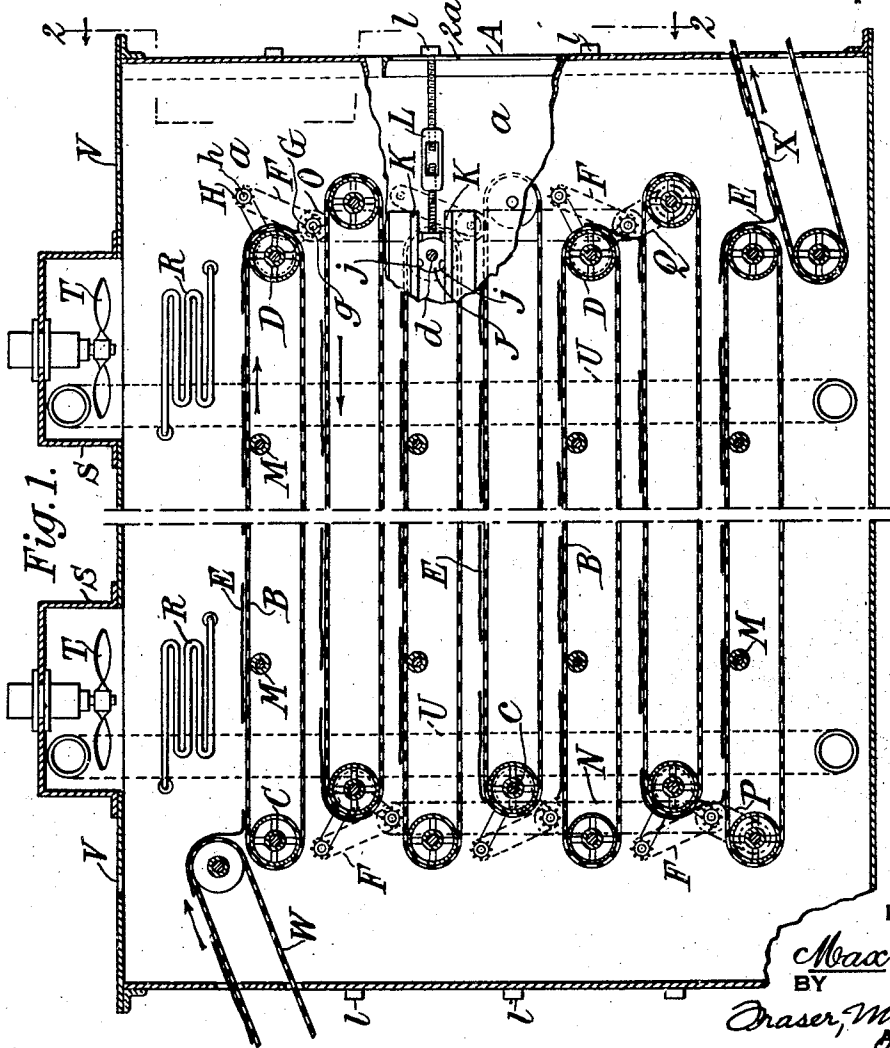
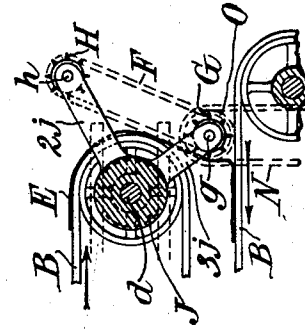


Fig. 3.



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LAUNDRY DRYING MACHINE

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3 Claims. (Cl. 34-12)

My present invention relates to a machine for laundering fabric articles and aims to provide certain improvements therein. More particularly it relates to a device for flat drying knitted, netted or woven fabric articles with or without napped surfaces, such as towels, woolen and knitted underwear, and the like, which should have a soft laundered finish.

The primary objects of my invention are to provide a machine of the character described which will simultaneously dry articles of the character described after being washed and the excess of moisture removed therefrom, and give to them the same degree of softness and fluffiness upon drying as when new, and which will accomplish this in a simple, expeditious and efficient manner without causing the slightest injury or wear to the fabrics or to the napped surfaces thereof. A further object is to provide a laundry drying machine which is adapted for continuous operation and wherein the damp or moist articles may be fed to the machine at one point and delivered from the machine at another point in a soft, fresh, flat condition ready for folding and packaging. A further object is to provide a machine of the character described which will facilitate and reduce to a minimum the cost of handling family laundry where each customer has a limited quantity or but a few pieces requiring this special type of drying.

According to current practice in laundering articles of the types described, several methods of procedure are in vogue at the present time. These may be briefly described as follows: (1) The wet or damp fabrics, such as turkish towels, underwear and the like, are run through a plurality of mangles or pressing rolls in succession; (2) the articles are "tumbled" in large drums in an atmosphere of superheated steam or hot air; or (3) the articles are passed through a heated chamber in suspended condition either upon rods or by pins. Each of the foregoing current practices has its drawbacks or objections. For example, the articles dried according to practice (1) outlined above results in the nap of the fabric being compressed and flattened, and the article as a whole having a hard, stiff finish. The articles, when dried according to practice (2) outlined above, will have a much softer finish than those resulting from practice (1), but will be accompanied by a rapid wearing away of the nap on the fabrics due to the rubbing friction to which said articles are subjected, and furthermore the "tumbled" articles are delivered from the drums in a ruffled or "balled" condition which necessi-

tates the expenditure of considerable time in the flattening out thereof in preparing them for folding and packaging. Where family laundry is subjected to this second practice it is necessary to place each customer's articles in a separate net bag or the like, which net retards the drying operation and also increases the labor cost in the handling of the articles. The articles, when dried in accordance with practice (3) outlined above, require a careful checkup on the individual customer's articles, for example, by applying pin markers thereto, which practice, as well as the mounting of the articles upon rods or by pins, are both time and labor-consuming.

According to my present invention, the articles, after being washed and centrifuged in compartment drums in a manner well-known to the industry, are removed from said compartments and maintained in separate groupings in any conventional way and are then fed in a damp or moist condition to conveyor means which delivers them to a dryer, which, in its preferred form, comprises a chamber having a plurality of endless screens or aprons arranged in substantially horizontal superposed relation in such manner that the towels are successively conveyed forwardly and backwardly through the chamber from the point of feed to the point of discharge thereof, in the course of which transit superheated air is blown or drawn through the chamber and through the endless screens so as to impinge upon or pass through the articles being dried thereon. In delivering the articles from one screen to the next below it they are caused to turn over so as to lie on the receiving screen on their faces opposite to those upon which they first lay, and means are provided for preventing the ends of said articles from doubling back upon themselves while passing from one screen to the next. The articles, in passing through the dryer in the manner aforesaid, are thoroughly and rapidly dried in a flattened condition and are delivered at the discharge end of the dryer in a soft, fluffy condition ready for folding and packaging. Any suitable marker may be placed upon the carrier aprons at either the beginning or end of a group of articles of any one customer so as to apprise the operator at the discharge end of the machine of each separate customer's articles in order to insure proper separation and packaging thereof. The invention also embodies other features of novelty which will be hereinafter more fully described and better understood from the detailed description which follows, when considered in conjunction with the accompany-

ing drawing showing a preferred embodiment of my invention, and wherein:

Figure 1 is a vertical longitudinal section through a dryer embodying my invention, certain parts thereof being shown in elevation.

Fig. 2 is a transverse section taken substantially along the planes of the broken line 2—2 of Fig. 1.

Fig. 3 is a detail of the invention on an enlarged scale taken substantially along the plane of the line 3—3 of Fig. 1.

Referring to the drawing, let A indicate a drying cabinet having mounted therein a plurality of superimposed endless screens or aprons B, which may be of any desired construction such as metal screening, corded netting or other foraminous material. The aprons B are each trained over a pair of pulleys C and D, said pairs of pulleys being disposed in substantially horizontal planes with the respective end pulleys disposed in staggered relation, so that one end of each apron will alternately extend beyond the end of the apron next above it so that textile fabric webs or other articles, such as towels E, in passing over the pulley end of the apron will be received upon the apron next below it. Each apron is adapted to move in a direction opposite to the apron next above it so that when an article is received upon one of the aprons it will be carried in a direction opposite to that in which it is moved on the preceding apron, and in view of the manner of transfer of the articles from one apron to the apron next below it the articles are caused to lie on the receiving apron on their faces opposite to those upon which they lay on the preceding apron. Obviously the length, width and number of aprons within the chamber A can be proportioned in accordance with the desired capacity of the dryer.

In order to insure the proper transfer of the fabric webs from one apron to the apron next below it in a manner such as will preclude the ends of the web doubling or folding back upon themselves, I have provided adjacent to the transfer ends of the aprons, means for accomplishing this. As herein shown, these means consist of flexible movable endless carriers F which are trained and positively driven over sprocket wheels or equivalent driving means G and H mounted upon suitable shafts *g* and *h*, respectively. The shafts *g* and *h* are disposed transversely to the direction of movement of the aprons and parallel to the axes of the pulleys C and D, the shaft *g* being disposed between adjacent ends of the aprons slightly above the ends of the aprons which extend beyond the aprons next above them and substantially in a vertical plane which is tangent to the pulleys at the respective ends of the dryer. The shafts *h* are each disposed somewhat above the discharge ends of the aprons and farther outwardly therefrom with respect to the shafts *g*, so that the flexible carrier F will be disposed in inclined relation to the planes of the aprons and preferably in tangential relation to the transfer ends of the aprons slightly below the axes of the pulleys over which said transfer ends are trained.

The flexible carriers F, as herein shown, are in the form of spaced chains disposed longitudinally of the shafts *g* and *h*, but it will be understood that any other form of flexible carrier having the substantial tangential relation hereinbefore described, may be employed.

The endless screens or aprons B are subject to stretching in use and expansion under the heat

generated within the chamber, and to take up the slack thus provided the pulley shafts *c* and *d* are mounted in terminal bearings J, which, as herein shown, extend through the side walls *a* of the chamber and are formed with parallel faces *j* adapted for sliding engagement between tracks K mounted on the outer walls of the chamber. To move these bearings so as to compensate for elongation of the aprons, the bearings have connected thereto turnbuckles L, the outer screw-threaded element of which is formed with a head *l* adapted to bear against reinforcing elements *2a* at the end walls of the chamber, as best shown in Fig. 1. It will be appreciated that it is necessary to maintain the tangential relation between the carriers F and the ends of the aprons trained around the pulleys at all times, hence, in order that this relationship will not be disturbed for any adjustment of the bearings J, the shafts *g* and *h* are mounted in bearings which are carried by arms *2j* and *3j* which are preferably made integral with the bearings J, so that in making any adjustment of the pulley shafts *c* and *d*, the shafts *g* and *h* will be correspondingly adjusted.

Of course any suitable means (not shown) may be provided for driving the pulleys C and D so that the aprons will move in the desired directions, and in view of the considerable weight and length of the aprons, especially when loaded down with damp articles, suitable supporting means such as transverse rollers M, may be disposed at spaced points directly below the upper part of the endless aprons. The carriers F may likewise be positively driven by any desired mechanism, and as herein shown, this is accomplished by a chain N trained over sprocket wheels O mounted at one end of the shafts *g*, said chains N being suitably driven from any one of the pulleys C and D, respectively, through a secondary chain drive P and Q, respectively, such latter drives being obtained from the proper pulleys to give to the carriers F the desired directional movement. It is also desired and preferable that the linear speed of the carriers F be substantially equal to the linear speed of the aprons B so that the carriers, in transferring the webs or other articles from the discharge end of an apron to the receiving end of the apron next below it, will progressively receive the web as it leaves the discharge end of the apron and progressively deposit it upon the receiving apron.

To promote and expedite the drying of the web articles in passing through the dryer I prefer to force or draw preheated air vertically through the dryer so as to impinge upon or pass through said articles. To accomplish this I have provided within the cabinet A above the uppermost apron B therein at spaced intervals longitudinally of the cabinet, heating coils R through which steam under high pressure circulates, said heating coils being connected either in series or being independently controllable, as desired. Above each heating coil the cabinet is formed with a dome-like portion S within which is mounted a fan or blower T, the blades of which are so pitched as to blow air downwardly past the heating coils and through the chamber and the aprons therein in a substantially vertical direction, or to draw the air from the chamber past said heating coils. In order that preheated air may be used over and over again I provide conduits U which extend from the opposite sides of the cabinet from points below the lowermost apron therein to the opposite sides of the dome portions S above the fan

blades therein. It is intended that the heaters R should have sufficient heat transfer capacity to insure the re-heating of the air being used over and over again to the point at which it will efficiently dry the webs during the interval of their passage through the dryer. Of course, in the drying operation considerable vapor will be created within the cabinet, and suitable vent openings therefor, such as V, may be provided in the top of the cabinet, and openings (not shown) in the bottom of the cabinet from which water of condensation may be drawn off.

In the operation of the device the damp or moist web fabrics or articles E, such as turkish towels, are delivered to the uppermost apron B in any desired manner, for example, by means of a conveyor belt W upon which the articles may be spread in substantially flat condition at a suitable supply station (not shown). The damp towels when passing from the conveyor belt onto the uppermost apron B, will be received thereon in flat condition, and in moving from left to right, as shown in Fig. 1, will carry said towels along in flattened condition over the uppermost pulley D, in the course of which the forward end of the towel, in moving off from the discharge end of the apron, will be progressively received onto the transfer members F, and by it progressively deposited onto the apron next below where it will be received in a manner to lie on its opposite face and be carried from right to left. In this manner of transfer it will be appreciated that both the forward and rear end of the article will be transferred to the receiving end of the apron in an unfolded and unruffled condition. In the absence of transfer means such as the carriers F or equivalent means, the rear end of the web E or other article in passing from one apron to the apron next below it, will drop through a distance of several inches, and whether said article be wet or dry said rear end in most instances will double up upon itself on the receiving apron. This doubling up is repeated at the various transfer ends with the result that if no means are provided for insuring against this action, the article, upon reaching the discharge end of the dryer, will be one mass of folds. The towels or articles E, upon reaching the lowermost of the aprons B, will be delivered onto a conveyor belt X, from which, at a suitable point, they may be taken by an operator, folded and packaged. During the movement of the articles through the dryer it will, of course, be understood that preheated air is continually being circulated through the dryer in the manner previously described, so that the articles, when delivered onto the conveyor belt X, are in a soft, fluffy condition.

From the foregoing detailed description it will be apparent that by my present invention I have provided a device for efficiently flat drying laundered articles, particularly turkish towels and the like, with a soft, fluffy finish, and that in the carrying forward of such method the articles are not subjected to the slightest wear or any deleterious action. It will also be appreciated that where family laundry is being dried on a device of the type described, each customer's

articles can be suitably separated by placing suitable ribbon markers or the like upon the carrier aprons at either the beginning or end of a group of articles so as to apprise the operator at the discharge end of the machine of this fact and thereby insure proper separation and packaging of said articles.

While I have shown and described a certain preferred embodiment of my invention, it is to be understood that I do not wish to be limited to the details of construction disclosed since it will be understood that a worker skilled in the art may vary the details without departing from the spirit of the invention.

What I claim is:

1. A laundering device of the character described, comprising a drying chamber having a plurality of endless aprons having longitudinal and transverse components, arranged one over the other with their ends in staggered relation, adjacent aprons being adapted to move in opposite directions so that one apron will receive from the apron next above it web or flat work material carried thereby when passing over the end of said apron, and movable carriers adjacent the transfer ends of the aprons for progressively receiving the web as it leaves the discharge end of the apron and progressively depositing it upon the receiving apron, said carriers being capable of only substantially a line contact with the aprons.

2. A laundering device of the character described, comprising a drying chamber having a plurality of endless aprons arranged one over the other with their ends in staggered relation, adjacent aprons being adapted to move in opposite directions so that one apron will receive from the apron next above it web or flat work material carried thereby when passing over the end of said apron, positively driven flexible carriers disposed substantially tangentially to the discharge ends of the aprons for progressively receiving the web as it leaves the discharge end of the aprons and progressively depositing it upon the receiving apron, means at the receiving or discharging end of an apron for tensioning the apron and for simultaneously moving the positively driven flexible carriers for maintaining the tangential relation of the carriers with respect to the ends of the aprons.

3. In combination, a plurality of endless aprons arranged in substantially horizontal relation one over the other, rollers over which said aprons are trained, adjacent aprons being adapted to move in opposite directions, the end of one apron extending somewhat beyond the adjacent end of the apron next above it so that said extended end will receive from the apron next above it web or flat work material carried thereby when passing over its end, and a movable carrier disposed substantially tangentially to said transfer end of the apron and extending below it and into close proximity to the receiving apron, said carriers being supported on shafts which are coaxial with the rollers over which the aprons are trained.

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