May 2, 1950 M. TROY 2,506,476

LAUNDRY DRYING AND FLUFFING MACHINE

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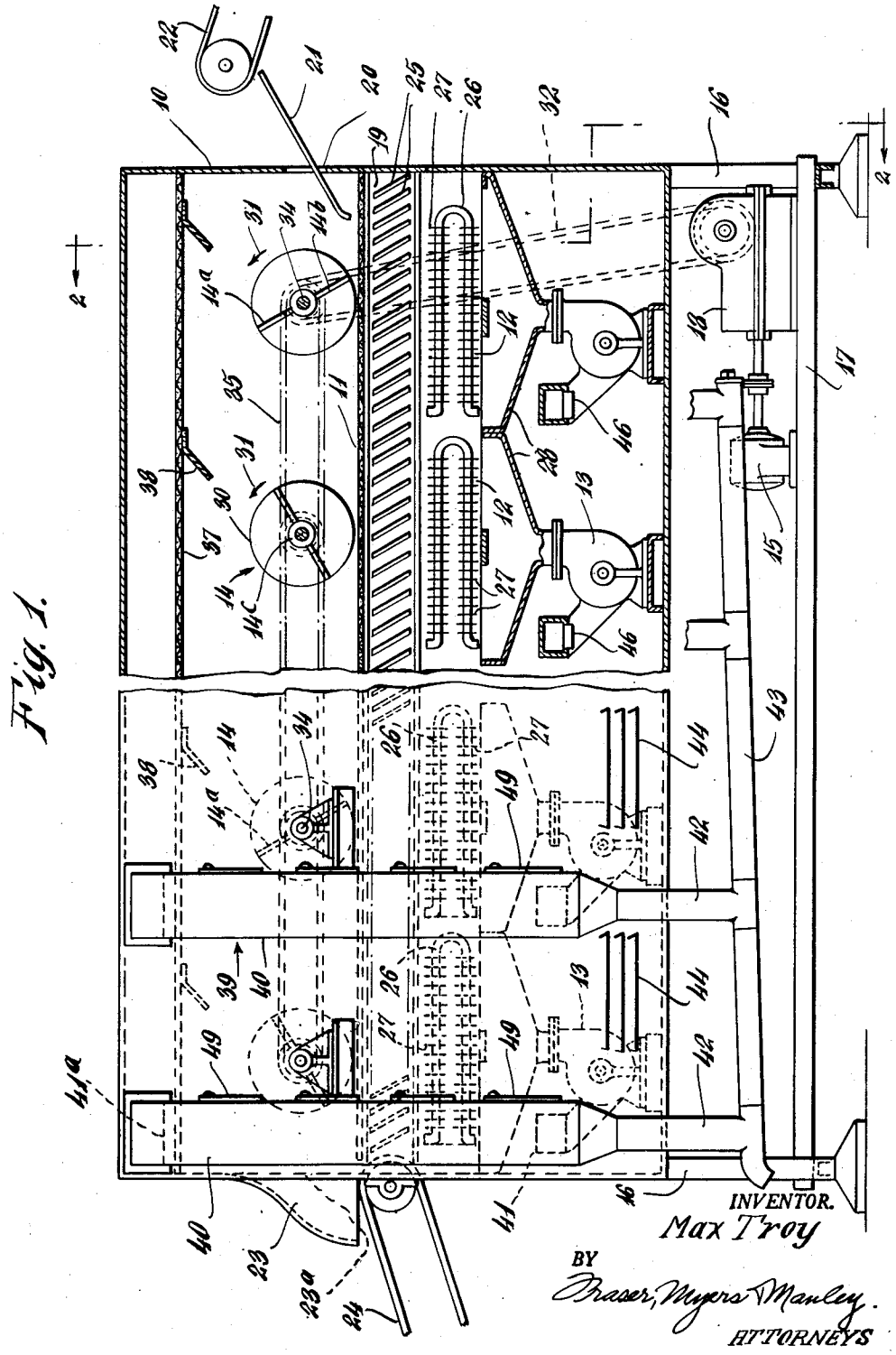


Fig. 1

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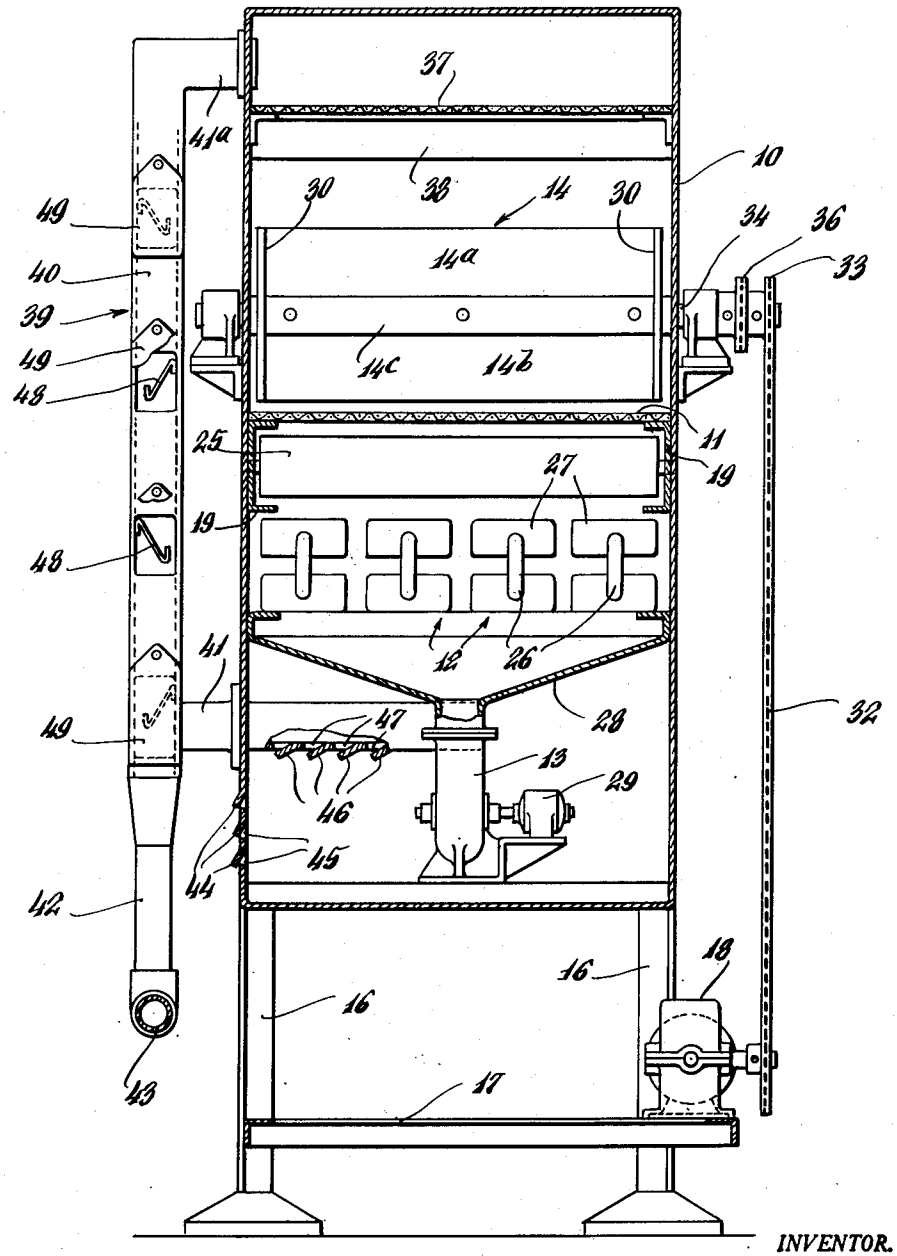
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Fig. 2.



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LAUNDRY DRYING AND FLUFFING MACHINE

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5 Claims. (Cl. 34—57)

1

My present invention relates to a machine for drying and fluffing pre-conditioned laundry, preferably flat work such as diapers, hand towels, dish towels, Turkish towels and the like, and delivering them to a station in condition ready for folding and packaging.

The primary object of my invention is to provide a laundry machine for treating flat work laundry after such flat work has been washed and pre-conditioned to remove the excessive water and the major folds therefrom and giving to such flat work a softness and fluffiness equal or superior to that obtainable by subjecting such articles to pre-drying and pressing operations heretofore employed in commercial laundry practice. A further object is to provide a machine of the character described, which is adapted for continuous operation and wherein pre-conditioned damp articles may be fed to the machine in a continuous manner at one end and delivered from the machine at its other end in a fresh, dry, soft, creaseless condition ready for folding and packaging. A further object is to accomplish the drying and fluffing operation in considerably less time and with the expenditure of less manual labor than was heretofore required. A still further object is to provide a machine of the character described, with means for collecting and removing from the re-circulated heated air, lint and moisture which are by-products of the machine operation.

In commercial laundry practice several methods of procedure are in vogue at the present time with respect to drying articles of the types described. These methods, briefly, are as follows: (1) The damp flat work laundry such as diapers, hand towels, dish towels, etc., are manually fed through a plurality of mangles or pressing rolls in succession; (2) the wet or damp articles are "tumbled" in large drums in an atmosphere of hot air; and (3) the damp articles are passed through a heated chamber in suspended condition either upon rods or by pins or clips. Each of the foregoing practices has its drawbacks and objections. For example, the articles when dried according to practice (1) outlined above have a hard or stiff finish. The articles when dried according to practice (2) outlined above will have a much softer finish than those dried according to practice (1), but the tumbled articles, when delivered from the drums, are in so ruffled or balled condition as to necessitate the expenditure of considerable manual labor and time in the flattening out thereof in preparaing them for folding and packaging. The articles when dried in

2

accordance with practice (3) outlined above still contain many wrinkles and are not fluffy. Moreover, all of the aforementioned methods consume considerable time and labor and hence make the methods costly in operation.

According to my present invention the articles, after being washed and centrifuged, are subjected to a preconditioning treatment to unball or remove the major folds therefrom, in an apparatus such as described in my prior patent No. 2,320,488, from which they are charged directly into, or, after discharge from the pre-conditioner, are conveyed to a foraminated apron mounted in an elongated drying chamber in which a drying current of heated air is caused to pass transversely upwardly through said apron and over which apron are mounted a plurality of rotatable vane units disposed transversely of the chamber at spaced distances apart, which subject the laundry articles to a whirling, beating and conveying action and which, in the heated atmosphere of the chamber, operates to dry and fluff them. After treatment in the drying chamber the articles are delivered therefrom directly to a conveyor in a condition ready for folding and packaging. 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 connection with the accompanying drawings, wherein:

Figure 1 is a side elevation partly in longitudinal section, of a laundry machine embodying my invention.

Fig. 2 is a section taken substantially along the plane of the line 2—2 of Fig. 1.

Referring to the drawings, the laundry machine may be said to comprise a stationary elongate drying chamber 10 within which is mounted a substantially horizontally disposed foraminated apron 11 extending the entire length of the chamber, a plurality of heating units 12, blower units 13 for creating and directing a current of heated air to pass transversely upwardly through the apron, a plurality of rotatable vane units 14 disposed at longitudinally spaced distances apart and extending transversely of the chamber above the apron, and an electric motor 15 or other power supplying means for driving the rotatable vane units.

The drying chamber 10 is preferably formed of metal and may have its walls insulated, if desired, and may range in length from forty to sixty feet or more and be of a width from twenty-four to forty inches or more. The chamber may be

supported upon suitable standards 16, which, in turn, may be provided with a supporting platform 17 upon which the motor 15 and a speed reducer 18 are mounted.

The foraminated apron 11 may be formed of any open mesh screen material and extends the full length and width of the chamber and may be suitably supported in any preferred manner, for example, upon channel members 19. At the right hand end of the chamber as shown in Fig. 1, the end wall is formed with a transverse opening 20 through which extends an inclined slide 21, which may be supported in any desired manner, and onto which slide the laundry articles to be treated in the machine may be charged, preferably automatically and continuously, from a conveyor belt 22. At the opposite end of the chamber the end wall may be deflected outwardly as shown at 23 to provide an opening 23a through which extends the end of a conveyor belt 24 upon which the laundry articles, after having passed through the drying chamber, are deposited and carried away to a station whereat operatives will remove, fold and stack the dried laundry articles.

Directly below the apron 11 there are disposed a plurality of movable vanes or louvres 25 mounted within the channel members 19 and adapted to be shifted by any desired means (not shown) for controlling their angularity relative to apron 11 and the drying chamber above said apron. Mounted below the louvres 25 are the plurality of heating units 12 which may be of any desired form and construction, and are herein shown as comprising U-shaped tubes 26 adapted to have superheated steam circulated therethrough, said tubes being provided with fins 27 for promoting radiation of the heat from said tubes. The heating units are each mounted above a funnel-shaped member 28, the lower end of which is connected to a blower 13 which may be of any approved type, and herein diagrammatically shown as being driven by an independent motor 29.

The rotatable vane units 14 are preferably mounted, one above each heating unit 12, and each rotatable vane unit preferably consists of diametrically aligned radial blades 14a and 14b carried by a sleeve 14c, to the ends of which blades and sleeve are connected circular discs 30, the said vane units being all rotatable in the same direction as indicated by the arrows 31, at a relatively high rate of speed. The rotatable vane units may be driven in any suitable manner, and as herein shown, the first said units, that is, the one nearest the charging end of the chamber, is driven from the speed reducer 18 by a sprocket chain 32 trained over a sprocket wheel 33 mounted on a shaft 34, to which the sleeve 14c is also fixed. If desired, all of the rotatable vane units may be simultaneously driven by a sprocket chain 35 trained over sprocket wheels 36 carried by each of the shafts 34. The mounting of each of the rotatable vane units 14 within the chamber 10 is preferably such that the blades on adjacent vane units are disposed in plane substantially at right angles to each other. It is also preferable that the sweep of the longitudinal edges of the vanes 14a and 14b be but slightly above the apron 11 and spaced many times said distance from the ceiling of the chamber. This ceiling may be either the top of the chamber 10 or a false ceiling 37 extending parallel to the top of the chamber and spaced therefrom. The false ceiling 37 is formed of foraminated or open mesh material and is preferably provided with angular deflectors 38 extending transversely of the chamber, the lower end of each deflector being above the sweep of the rotatable vanes and substantially in the vertical plane passing through an edge of a vane when in horizontal position.

The use and operation of the laundry machine hereinbefore described is substantially as follows: Pre-conditioned laundry, such as diapers, hand towels, dish towels and the like, which have been washed and have had the excess water and the major folds therein removed therefrom in any preferred manner, such, for example, by treatment in a machine as disclosed in my Patent No. 2,330,488, are either directly charged onto the inclined slide 21 overlying the apron 11 or are deposited onto said slide from the conveyor belt 22. The pre-conditioned laundry articles, on being progressively deposited on the apron 11, will be subjected to the upward current of heated air being blown through the louvres 25 by the blowers 13. It will be noted that the current of heated air is directed to move obliquely upwardly in a direction toward the discharge end of the chamber, and the velocity and volume of said air is preferably sufficiently great to raise the laundry articles on the apron, at least in part, above the apron and slowly advance the articles in the chamber. It will be appreciated that in this manner the laundry will be brought into proximity of the extreme right hand rotatable unit 14 and will be intercepted by the rapidly rotating vanes thereof and whirled thereby in a tangential and longitudinal direction. The spacing of the rotatable units is such that the laundry articles will be successively engaged by the vanes or blades of one unit and whirled and violently thrown toward and onto a succeeding rotating vane whereby said articles will be subjected to a substantially continuous beating and conveying action through the chamber. Of course, all of the laundry articles being engaged and whirled by a rotatable vane will not be thrown onto the next succeeding vane but may strike the ceiling 37 or a deflector 38, depending therefrom, and thence be engaged by the next succeeding rotatable vane either directly or as the slight forward movement of the articles upon the screen 11 takes place due to the strong oblique upward pressure of the air passing therethrough. The number of rotatable units and the temperature and pressure of the drying air will be so chosen or controlled that when the laundry articles being treated have passed completely through the chamber they will have been thoroughly dried and the creases and folds originally present therein will have been beaten out of them, so that when said articles are discharged onto the conveyor belt 24 they will be in a thoroughly dry, soft and creaseless condition which will enable the operatives stationed along the conveyor belt 24 to quickly fold and stack the articles for packing.

It will be appreciated that considerable moisture will have to be taken up by the heated air in the course of the movement of the laundry articles through the chamber. However, since said air is initially heated, it is highly desirable to re-use the same, wherefore the machine may be provided with reflux conduits 39 disposed at spaced intervals along the length of the chamber and extending from points adjacent the top of the chamber and preferably between the top and the false ceiling, to the blowers 13. The conduits 39 each has a substantially vertical component 40 and horizontal components 41 and 41a, the component 41a connecting with the top of

the chamber and the component 41 with the blower unit. In the re-circulation of the heated air it will be apparent that said air was enriched with fresh air, that the re-circulated air would, in due course, become saturated with moisture. To avoid this condition arising, not all of the air is re-circulated but only a part thereof, thence the vertical component 40 of the conduits 39 has a portion 42 extending downwardly below the horizontal component 41 and connects with a conduit or pipe 43 leading to the atmosphere. For supplying fresh air to the re-circulating air stream, the side wall of the chamber 10 below horizontal duct components 41 may be provided with struck-out portions to provide vane 44 and openings 45; and the underside of the horizontal duct component 41 may likewise be formed with struck-up portions to provide vanes 46 and openings 47.

To promote the condensation and separation of entrained moisture in the re-circulated air, the vertical duct components 40a may be provided with internal baffles 48 disposed in spaced reverse relation, as shown in Fig. 2. Moisture condensing on the baffles may drain down from the uppermost to the lowermost and thence into duct component 42 and into the pipe 43.

In view of the continuous whirling and beating action to which the flat work laundry articles are subjected when treated in the laundry machine herein described, it will be appreciated that a certain amount of lint will be formed. This lint being very light, will be carried by the upwardly moving air stream through the foraminated ceiling 37 and down into the reflux conduits 39. Of course it is desirable to remove this lint from the circulating air and this may be also accomplished by the baffles 48 aforementioned. In fact, if the upwardly facing surfaces of the baffles are roughened or formed as a fine perforated grating, tendency to hold the lint will be greatly increased. The accumulation of lint on the baffles 48 may be periodically removed by providing the conduits 39 with movable door sections adjacent the baffles, such as a pivoted door 49 shown in Fig. 1.

From the foregoing detailed description it will be seen that I have provided a simple machine in which laundry articles of the character described can be dried and fluffed in a continuous manner, equal or superior to processes heretofore employed, but without the employment of manual labor in the handling of the laundry articles for the particular treatment.

While I have shown and described a preferred embodiment of my invention it is to be understood that I do not wish to be limited to the details of construction and dimension of parts as described and illustrated, since these may be varied within the range of engineering skill without departing from the spirit of my invention as defined in the appended claims.

What I claim is:

1. A laundry machine comprising an elongate horizontally disposed chamber having a ceiling, a substantially horizontally disposed stationary fixed foraminated apron extending substantially the entire length of the chamber, means at one end of the chamber for charging the laundry articles onto the apron, an opening at the other end of the chamber for the discharge of said laundry articles therefrom, means for creating and directing a current of heated air upwardly through the apron with sufficient velocity to raise laundry articles on the apron at least in part above the apron, and means for subjecting the laundry articles received on the apron to a continuous beating and conveying action through the chamber.

2. A laundry machine according to claim 1 wherein the means for subjecting the laundry articles received on the apron to a continuous beating and conveying action comprises a plurality of rotatable vanes disposed at longitudinally spaced distances apart in said chamber and extending transversely thereof above the apron, the spacing of the rotatable vanes being such that upon rapid rotation of the vanes the laundry articles will be successively engaged by one vane, whirled thereby and thrown toward and onto a succeeding vane.

3. A laundry machine according to claim 2 wherein the sweep of the longitudinal edges of the rotatable vanes is but slightly above the apron and below the ceiling of the chamber, said ceiling being spaced at a much greater distance from said vanes than the apron, and wherein baffles extend downwardly from the ceiling, the lower end of each baffle being above the sweep of the vanes and substantially in the vertical plane passing through an edge of a vane when in horizontal position.

4. A laundry machine according to claim 2 wherein the rotatable vanes are mounted to be synchronously driven with adjacent vanes disposed in planes substantially at right angles to each other.

5. A laundry machine comprising an elongate horizontally disposed chamber having a ceiling, a substantially horizontally disposed foraminated apron extending substantially the entire length of the chamber, means at one end of the chamber for charging laundry articles onto the apron, an opening at the other end of the chamber for the discharge of said laundry articles therefrom, heating means below the apron, means for creating a strong air current past the heaters and through the apron, louvers disposed below the apron for directing the heated air current obliquely upwardly in a direction toward the discharge end of the chamber and means for subjecting the laundry articles received on the apron to a continuous beating and conveying action through the chamber.

MAX TROY.

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