

April 21, 1925.

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W. G. R. BRAEMER ET AL

DRYING MACHINE FOR TEXTILE MATERIALS

Filed Oct. 23, 1924

2 Sheets-Sheet 1

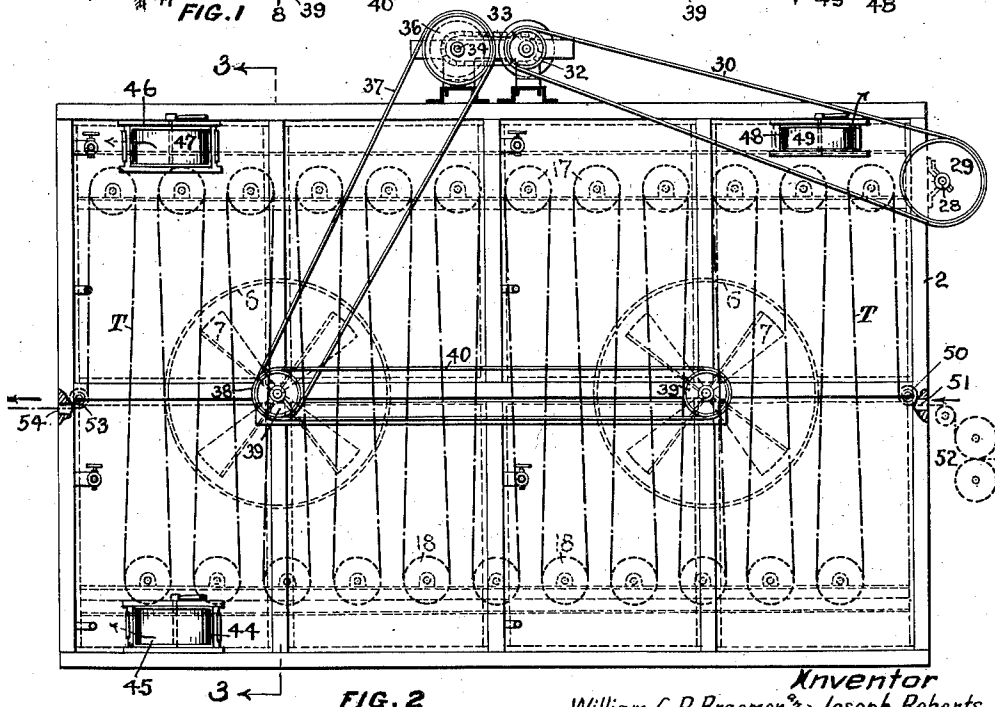
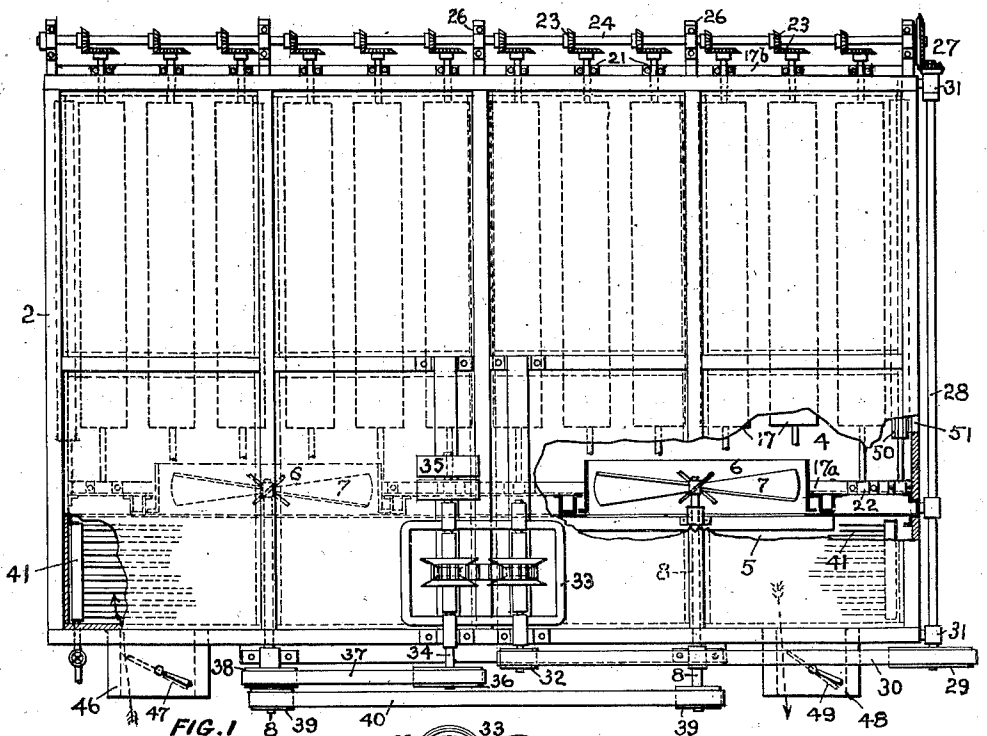


FIG. 2

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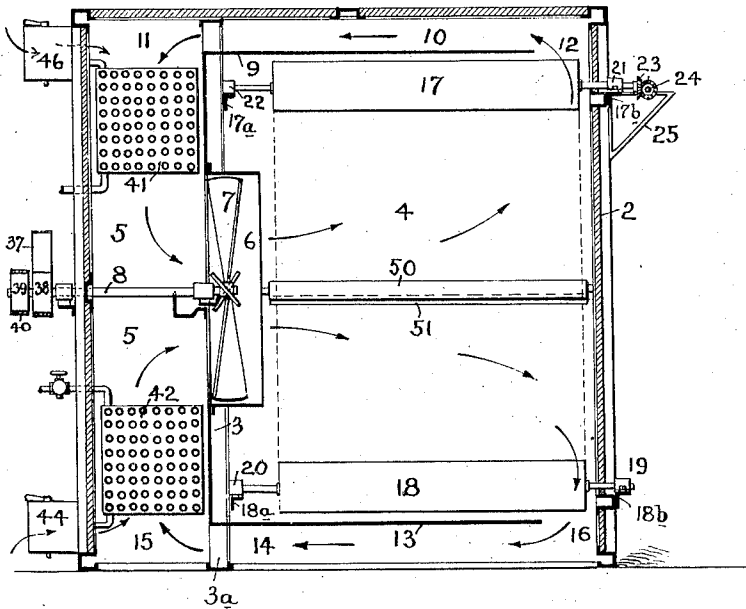


FIG. 3

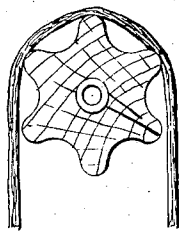


FIG. 4

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UNITED STATES PATENT OFFICE.

WILLIAM G. R. BRAEMER, OF HADDONFIELD, NEW JERSEY, AND JOSEPH ROBERTS, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS TO GENERAL FIRE EXTINGUISHER COMPANY, A CORPORATION OF NEW YORK.

DRYING MACHINE FOR TEXTILE MATERIALS.

Application filed October 23, 1924. Serial No. 745,293.

To all whom it may concern:

Be it known that we, WILLIAM G. R. BRAEMER and JOSEPH ROBERTS, both citizens of the United States, and residents of Haddonfield, county of Camden, State of New Jersey, and Providence, county of Providence, State of Rhode Island, respectively, have invented an Improvement in Drying Machines for Textile Materials, of which the following is a specification.

The object of our invention is to provide a simple and efficient construction of a drying machine especially adapted for drying warps received from a slasher but which may also be adapted for drying other goods, including woven fabrics in the open.

In general, our improved machine comprises a drying chamber having upper and lower sets of rolls (one set being positively driven) about which upper and lower rolls the warps or materials to be dried pass alternately so as to move in a vertical zigzag manner, and wherein a heating chamber is provided along one side of the drying chamber and having communication therewith adjacent to the opposite side thereof and said drying chamber provided with heating coils and a plurality of blowers at an elevation intermediate of the upper and lower rolls of the drying chamber whereby the heated air is forced transversely between the oppositely moving vertical portions of textile material and returned to the heating chamber from the upper and lower portions of the drying chamber in such a manner that a minimum resistance is insured with a maximum circulation to provide capacity for rapid movement of the air or drying medium.

Our invention embodies other details of construction which, together with the features above stated, are fully described hereinafter and pointed out in the claims.

Referring to the drawings: Fig. 1 is a plan view of a drying machine embodying our invention; Fig. 2 is a side elevation of the same; Fig. 3 is a transverse vertical section of the same taken on line 3—3 of Fig. 2; and Fig. 4 is a cross section of one of the guide rollers employed in the machine.

2 represents a general outer casing usually formed of a metallic open work structure with removable panels constituting wall

and roof closures. The compartment thus provided is longitudinally divided by a partition 3 secured to vertical posts 3^a arranged at intervals and nearer to one side than the other, so as to provide a relatively wide drying chamber 4 and a narrow longitudinal heating chamber 5. The division wall 3 terminates at a distance from the roof of the chamber 2 and is extended in a horizontal baffle plate 9 to provide a horizontal passage 10. Similarly, the lower part of the division wall 3 terminates at a short distance from the floor and is extended in a horizontal baffle plate 13 to provide a horizontal passage 14. These passages 10 and 14 preferably extend the full length of the drying chamber and communicate respectively with the upper part 11 and lower part 15 of the heating chamber 5, and at the other side with the upper and lower parts of the drying chamber. Along the middle part of the division wall 3 and intermediate of the posts thereof, we provide tubular openings between the drying chamber 4 and the heating chamber 5 and arranged in these tubular openings we provide fans or blowers 7 which are driven by a shaft 8 and suitable belts and pulleys to be hereinafter described.

In the drying chamber 4 are arranged a series of upper rolls 17 located immediately below the baffle plate 9 and journaled in bearings 21 and 22, the shaft of said rolls extending beyond the bearings 21 and driven by suitable gearing. The bearings 22 are supported upon a longitudinal angle iron 17^a secured to the vertical posts 3^a. Similarly the bearings 21 are secured to longitudinal angle irons 17^b secured to the general framing at the outside of the casing. Arranged within the drying chamber 4, near its lower part and immediately above the baffle plate 13, is a series of guide rollers 18 whose shafts are journaled in bearings 19 and 20. The bearings 19 are secured to a longitudinal angle iron 18^b secured to the general framing at the outside of the casing, and the bearings 20 are carried by a longitudinal angle iron 18^a secured to the vertical posts 3^a. The rollers 18 are idlers whereas the rollers 17 are positively driven.

The means for driving the rollers 17 comprise the following instrumentalities: 24 is

a longitudinal shaft running lengthwise of the machine and adjacent to the ends of the outwardly extending shafts of the rollers 17. Shaft 24 is supported in bearings 26 on brackets 25 which are secured to the general framing at the outside of the casing, as shown in Figs. 1 and 3. The shaft 24 is geared to the roller shafts by bevel gearing 23. The shaft 24 is driven from a shaft 28 arranged transversely at one end of the casing in bearings 31, and geared to shaft 24 by bevel gearing 27, as shown in Fig. 1. Shaft 28 is provided with a belt wheel 29 and is driven by a belt 30 from a driven shaft 32 of a variator or speed controlling means 33. The driving shaft 34 of the variator is driven by any suitable power, sometimes by belts and sometimes by an electric motor. By way of illustration, belt wheels 35 are shown as the source of power.

The blowers 6 are belted together by an endless belt 40 passing about pulleys 39 on the ends of the shafts 8 of the blowers, whereby they rotate in unison and preferably at the same speeds. These blowers are driven by means of a belt 37 passing about a pulley 38 on one of the blower shafts and about a pulley 36 on the driving shaft 34 of the variator. In this manner, any desired speed may be given to the blowers to insure a proper circulation of the air and at the same time the speed of rotation of the driving rolls 17 may be adjusted to suit the requirements of the textile material being treated. In this manner, the speed of travel of the materials through the drying chamber and in contact with the circulating drying medium may be adjusted or controlled to suit the requirements. A suitable variator or speed control means is set out in Letters Patent No. 1,377,593, and reference is made thereto as showing an example of a suitable variator.

Referring again to the heating chamber 5, the same is provided with two sets of longitudinally arranged heating coils respectively above and below the level of the blowers, the heating coils 41 being interposed between the middle space of the heating chamber and the upper space 11 thereof which is in communication with the passage 10 above the baffle plate 9. The lower coils 42 are arranged between the middle of the heating chamber and the lower part 15 thereof which is in communication with the passage 14 below the baffle plate 13. By this arrangement, the air or drying medium is circulated by the blowers as indicated by the arrows, that is to say, the air is forced horizontally between the textile material passing through the drying chamber and returns through the passages 10 and 14 to the heating chamber, and thence through the heating coils where it is reheated prior to being delivered to the blower for recircu-

lation. The lower part 15 of the heating chamber is provided with an inlet 44 having a control damper 45 for permitting inflow of fresh dry air which mingles with the circulating air in place of moist air (which is removed) and said mixed air passing in an upward direction to the blowers, whereby the proper quantity of air may be maintained in circulation. Similarly, the upper part 11 of the drying chamber above the inlet 44 is provided with an inlet 46 having a control valve 47 by which additional air may be introduced into the circulation which passes through the passage 10 and in a downward direction to the blowers. These inlets 44 and 46 are preferably arranged at the discharge end of the drying chamber. At the opposite or inlet end of the drying chamber is provided an outlet 48 having a damper 49 which permits escape of moist air and said outlet may be arranged at the upper part and open from the space 11 of the heating chamber, if so desired.

The moist warps treated by the slasher 52 enter the drying chamber through an entrance aperture 51 and thence pass about a guide roller 50, thence upwardly about one of the drive rolls 17, thence downwardly about one of the idler rolls 18, thence upwardly to the next driving roll 17 and so on through the drying chamber, and finally guided about a guide roller 53 and through the discharge aperture 54, all of which will be understood by reference to Figs. 2 and 3. In this manner, the warps or textile materials are caused to pass in a substantially vertical direction while being conveyed through the drying chamber. It will also be seen that the position of the upper rolls 17 in relation to the position of the lower rolls 18 is such that they are out of vertical alinement so that the yarns or textile materials in passing about them take on a sinuous or zigzag form, the positively moving vertical parts thereof forming pockets, as it were, between them which open upwardly and downwardly alternately for the more ready circulation of the drying medium and, at the same time, to offer as little resistance as possible to the free flow of the air so that it may be moved with as high velocity as possible and thereby increasing the efficiency of the drying operation. The arrangement of the escape outlet 48 is such that the inflowing dry air through the inlets 44 and 46 causes the air within the drying chamber to gradually move to the inlet end and thereby crowd out the most moist air from the outlet 48, and in this manner maintain a proper hygrometric condition of the drying medium. In this way, the air is given a transverse circulation by the blowers and at the same time a backward movement with respect to the advance of the warps or textile materials so that the latter

enter where the air is most moist and leave where it is most dry.

The roller 50 may be fluted, as indicated in Fig. 4, so as to present a plurality of lines of contact about its circumference, and the rollers 17 and 18 may be of cylindrical form or fluted or corrugated to a greater or less extent corresponding to Fig. 4, if so desired, but we do not confine ourselves in this respect.

It will now be apparent that we have devised a novel and useful construction which embodies the features of advantage enumerated as desirable, and while we have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that we do not restrict ourselves to the details, as the same are susceptible of modification in various particulars without departing from the spirit or scope of the invention.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a drying apparatus, a casing having a vertical division wall providing a longitudinal drying chamber having inlet and outlet openings and a longitudinal heating and recirculating chamber arranged parallel to the drying chamber and in communication with its upper and lower portions, in combination with a plurality of parallel rollers arranged transversely along the length of the drying chamber at its upper portion, a plurality of parallel rollers arranged along the length of the drying chamber near its lower portion and about which upper and lower rollers the textile material is alternately guided so as to travel largely in a vertical direction, a plurality of blowers arranged in the wall between the drying and heating chambers for causing a circulation of air transversely to the general direction of travel of the textile material through the drying chamber, and means in the heating and recirculating chamber for heating the air during its circulation.

2. The invention according to claim 1, wherein further, the communication between the heating chamber and the upper and lower portions of the drying chamber are formed by transverse baffle plates extending respectively above and below the two sets of rollers and terminating near the distant side of the drying chamber, whereby the air transversely traversing the drying chamber is required to move completely across it in its circulation with respect to the heating chamber.

3. The invention according to claim 1, wherein further, the means for heating the air comprises upper and lower horizontally arranged heaters and wherein said heaters

are respectively positioned between the level of the blowers and the upper and lower levels of communication between the drying chamber and the heating chamber.

4. The invention according to claim 1, wherein further, the casing is provided at its end most distant from the inlet to the drying chamber with a damper controlled inlet for outside air whereby it may be supplied to the recirculating air within the drying and heating chambers.

5. The invention according to claim 1, wherein further, the casing is provided at its end most distant from the inlet to the drying chamber with a damper controlled inlet for outside air whereby it may be supplied to the recirculating air within the drying and heating chambers, and a damper controlled outlet for moist air arranged at the end of the casing adjacent to the inlet for the moist textile material to be dried, whereby the transverse currents of air put in motion by the blowers are caused to gradually travel toward the inlet end of the drying chamber and out by the damper controlled outlet.

6. The invention according to claim 1, wherein further, there is provided an outlet for moist air at the end of the casing adjacent to the inlet for the moist textile material to be dried, and two damper controlled inlets for outside air arranged at the end of the casing most distant from the inlet for the textile material and said air inlets respectively arranged at the upper and lower portions of the heating chamber whereby it is heated with the recirculating air before passing to the blowers.

7. The invention according to claim 1, wherein further, there is provided power means for driving the blowers and for operating the driven rolls and variable speed control means for changing the relative speeds of the blowers and rolls.

8. The invention according to claim 1, wherein further, there is provided power means for driving the blowers at a uniform speed and also for operating the driven rolls and variable speed control means for varying the speed of the rolls whereby the textile material may be fed through the air currents at different speeds.

9. In a drying apparatus, a casing having a division wall providing a longitudinal drying chamber having inlet and outlet openings at opposite ends and a longitudinal heating and recirculating chamber arranged parallel to the drying chamber and in communication with it by openings transversely to its length, in combination with a plurality of parallel rollers arranged transversely along the length of the drying chamber at its upper portion, a plurality of parallel rollers arranged along the length of the drying chamber near its lower portion

and about which upper and lower rollers the textile material is alternately guided so as to travel largely in a vertical direction, a blower arranged in the wall opening between the drying and heating chambers for causing a circulation of air transversely to the general direction of travel of the textile material through the drying chamber, and means in the heating and recirculating chamber for heating the air during its circulation.

10. The invention according to claim 9, wherein the drying chamber is provided with baffle plates for governing the direction of the air currents when circulating in

contact with the textile material being treated.

11. The invention according to claim 9, wherein means are provided for permitting the escape of moist air from the upper part of the apparatus adjacent to the inlet or feed end of the apparatus, and separate means for admitting fresh dry air to the lower part of the apparatus adjacent to the delivery or outlet end of the apparatus.

In testimony of which invention, we hereunto set our hands.

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