

Aug. 3, 1926

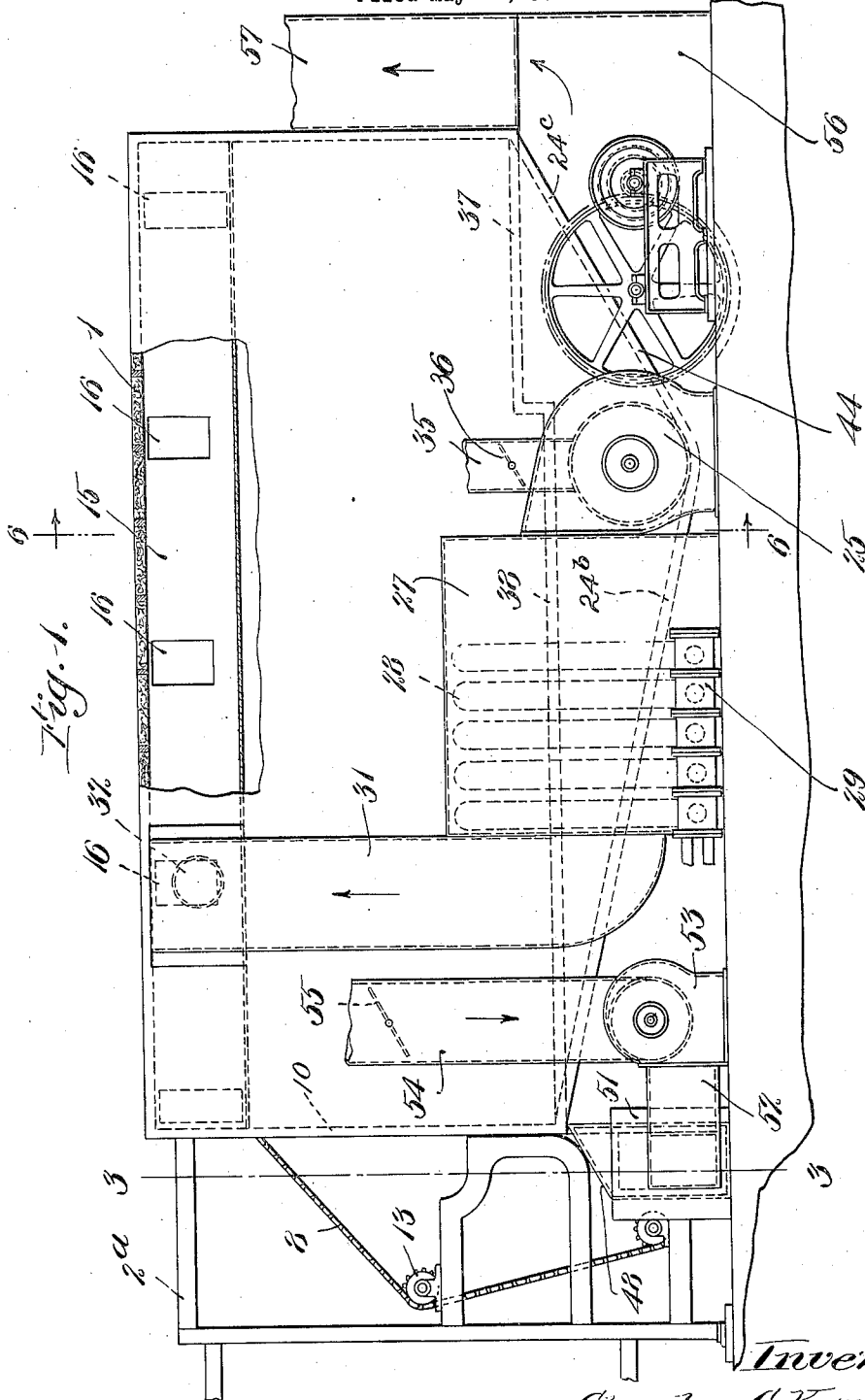
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DRIER

Filed May 25, 1923

5 Sheets-Sheet 1



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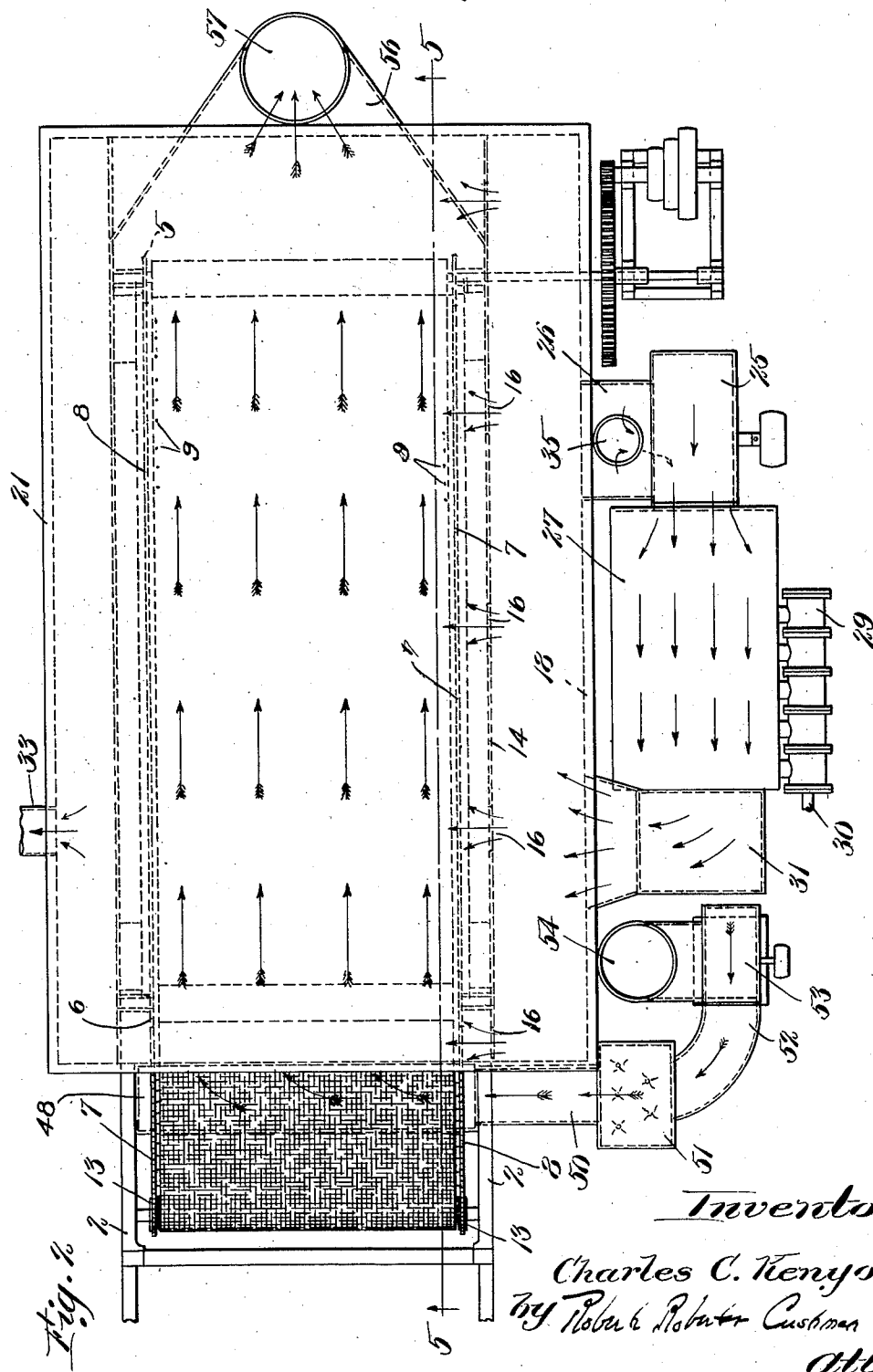
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5 Sheets-Sheet 2



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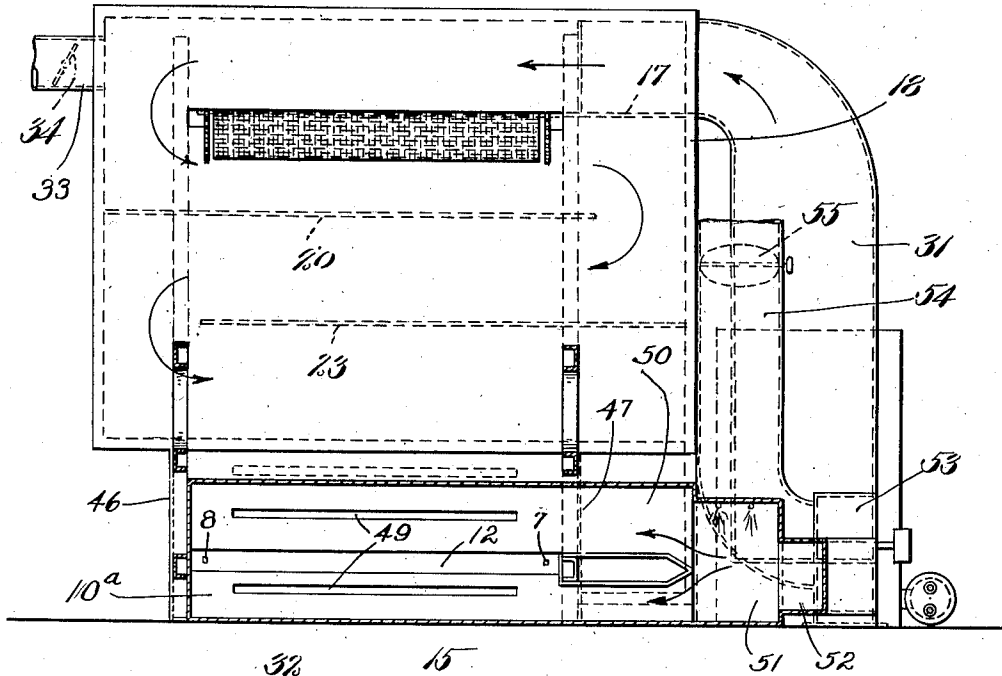
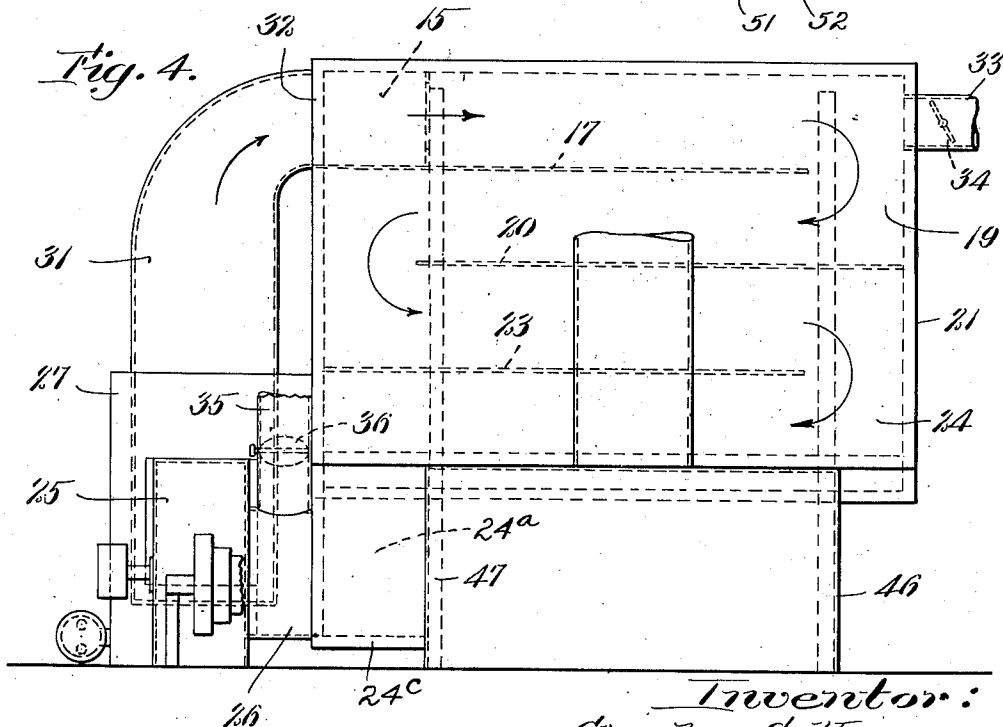
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Fig. 3.



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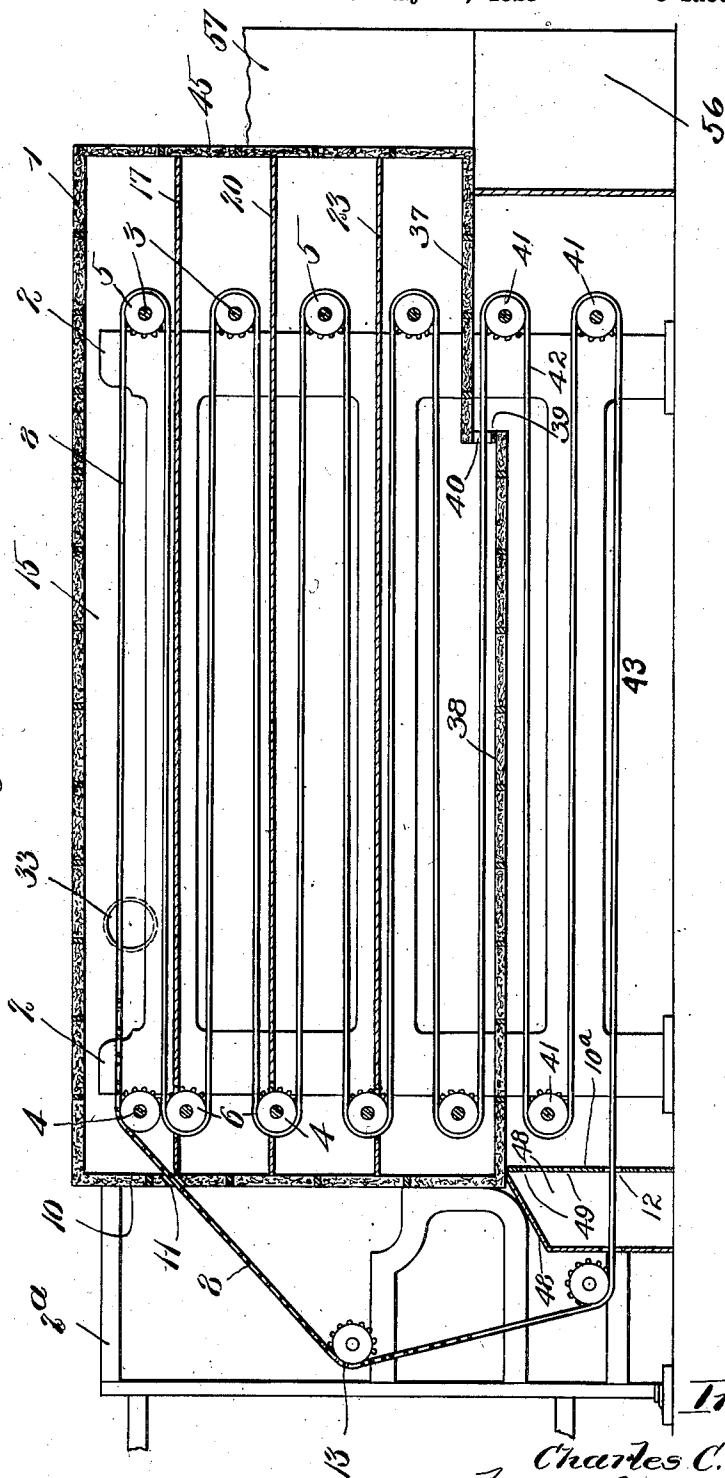
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Fig. 5.



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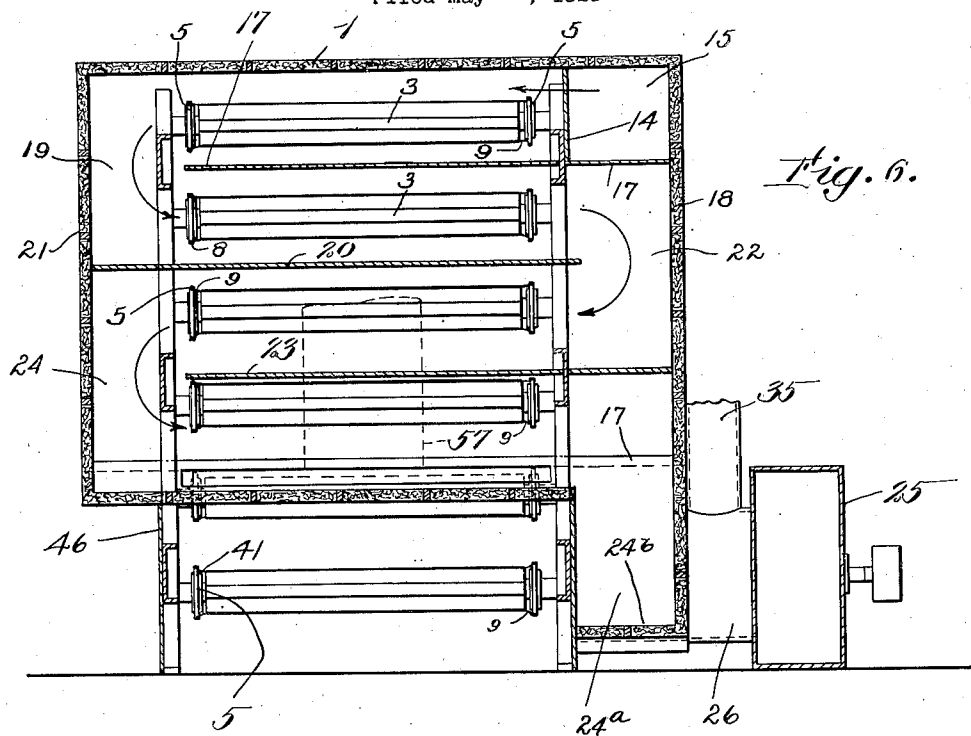
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE.

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DRIER.

Application filed May 25, 1923. Serial No. 641,410.

This invention pertains to textile manufacture and relates more particularly to a process of drying and conditioning textile fabrics and to apparatus useful in performing such process.

Under modern manufacturing methods it is usual, and from practical considerations, substantially necessary, to dry the finished fabric by the use of artificial heat. In order to insure drying so as to avoid any possibility of mildew during storage, the cloth is usually subjected to so high a degree of heat and for so prolonged a period that every vestige of moisture is driven out, leaving it bone dry. In this unnatural state the fibers are rendered harsh to the touch and are very greedy for moisture and readily absorb it from the atmosphere when exposed. It is customary, however, after drying, to fold and pile the cloth so that only its edges and the top and bottom layers are exposed to the air. If left in this condition for any length of time, the top layers and exposed edges absorb atmospheric moisture which travels irregularly inward to varying distances, but usually not to the central parts of the fabric.

Many of the dye-stuffs employed in the coloring of cloth vary in tint under the action of moisture in the fibers, and when the edge and top portions only of the cloth contain the normal or natural amount of moisture, these edge and top portions exhibit a different shade from the central parts of the width or end of material. This different coloration once established remains substantially unchanged during the life of the fabric and while in many cases this difference of color is slight, it is nevertheless sufficient to detract from the commercial value of the goods.

The principal object of the present invention is accordingly to provide an improved process of drying and conditioning textile fabric, together with apparatus useful in performing the process, by the employment of which discoloration and harshness of the fabric due to the overheating and unequal absorption of moisture is substantially prevented.

Briefly stated the invention consists in stretching cloth, while subjecting it to the action of heated and dry air, thereby re-

ducing the material to a substantially bone dry or nearly bone dry condition, and thereafter passing cool air having a predetermined moisture content over the cloth while continuing the stretching action, after which the cloth is folded and piled in usual manner.

In the accompanying drawings, a preferred form of apparatus suitable for practicing the improved process is illustrated by way of example and in such drawings:

Fig. 1 is a side elevation, partly in section and partly broken away, showing the present invention as devised for application to a tentering or stretching machine of well known type;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is an end elevation of the apparatus shown in Fig. 1, partly in section on the line 3-3 of Fig. 1;

Fig. 4 is an end elevation from the right hand side of Fig. 1;

Fig. 5 is a vertical section on the line 5-5 of Fig. 2; and

Fig. 6 is a vertical section on the line 6-6 of Fig. 1.

In accordance with the present invention a casing or housing 1 is provided for enclosing all or a portion of the stretching machine, indicated generally by the numeral 2. This casing or housing is preferably constructed of some heat insulating material such for example as asbestos, wood or the like.

The stretching machine herein disclosed is of a type commonly employed in the cloth finishing trade and comprises series of shafts 3, 4 respectively, provided with sprocket wheels 5, 6 about which two endless chains 7, 8 are trained. These chains are parallel with each other and in passing over the several sprocket wheels 5, 6 provide a plurality of substantially parallel runs disposed one above the other. The chains are furnished with cloth engaging hooks 9 which hook into the marginal portions of the length of cloth to be treated and which hold it in stretched condition during the process.

As herein disclosed the housing or casing encloses only that portion of the stretching machine which supports the shafts 3 and 4,

the driving mechanism being outside the casing. The end wall 10 of the casing is provided with an opening at 11 for the entrance of the supporting chains 7 and 8 with the run of cloth attached thereto, while the lower part 10^a of said wall is furnished with an opening 12 for the egress of the chains. Outside the casing the chains may pass over guiding sprocket wheels such as 10 13. The means (not shown) for attaching the cloth to the chains and disengaging it therefrom are also located outside the housing.

A vertical partition 14 extends longitudinally of the casing at one side of the frame of the stretching machine, thus setting off a plenum chamber 15 which communicates with the main portion of the drying chamber by means of windows or passages 16 20 through the partition 14.

A baffle plate 17 projects from the side wall 18 of the housing horizontally toward the opposite side wall thereof leaving a space 19 at its end for the passage of air. 25 This baffle plate also forms the bottom of the chamber 15. Below the plate 17 a second baffle plate 20 is arranged which extends horizontally from the wall 21 of the housing toward the opposite side leaving a space 22 at its end for the passage of air. 30 Below the baffle plate 20 a third plate 23 is arranged which projects from the wall 18 toward the opposite side of the casing leaving a space 24 at its end for the passage of air. 35 The air from the space below the baffle 23 is free to enter a receiving chamber 24^a at one side of the housing. This chamber has downwardly converging bottom walls 24^b, 24^c respectively.

40 A fan 25 is disposed outside the casing and communicates with the lower part of the receiving chamber by means of a conduit 26. This fan delivers into a heating chamber 27 outside the casing provided 45 with heating coils 28 connected to a header 29. The latter is supplied with steam or other heating medium through a pipe 30 from any suitable source.

50 The heating chamber 27 communicates with an uptake conduit 31 delivering through an opening 32 into the chamber 15. If desired an exhaust flue 33 may be arranged to open into the drying chamber at a suitable point in the side wall 21 of the latter, 55 and this flue is furnished with a damper 34 by which the flow of air may be controlled. Preferably a fresh air conduit 35 leads from any suitable point to the intake 26 of the fan casing 25, and this conduit is furnished with a controlling damper 36. 60

The bottom of the drying chamber proper consists of the floor members 37 and 38 lying in different horizontal planes and which are connected by the vertical wall 39. 65 The latter wall is furnished with an open-

ing at 40 through which the cloth stretching chains pass. After passing through this opening the chains engage guide sprockets 41, the lower runs of the chains passing 70 backwardly and forwardly beneath the floor member 38 and out through the opening 12 in the end wall 10^a of the casing.

The space below the floor members 37, 38 constitutes a conditioning chamber 75 which is somewhat narrower than the drying chamber, its sides being defined by the walls 46 and 47 respectively.

At the left hand end of the housing, as viewed in Fig. 1, a compartment 48 is provided which communicates with the conditioning chamber by means of slots 49, 80 formed in the end wall member 10^a. This compartment 48 also communicates by means of a conduit 50 with an air moistening chamber 51 supplied with any suitable 85 air moistening apparatus, such for example as spray nozzles. The air moistening chamber 51 is connected by means of a pipe 52 with the delivery end of a fan 53. This fan is provided with an intake conduit 54 90 controlled by a damper 55.

At the opposite end of the housing a compartment 56 is provided which communicates with the conditioning chamber 43. 95 This compartment 56 leads to the lower end of an air discharge flue 57.

The operation of the device is substantially as follows it being understood that a length of cloth has been secured to the chains 7, 8 so as to be stretched between 100 them and the chains have been set into motion.

The end of the web of cloth enters the drying chamber through the opening 11 and as it moves with the upper two runs 105 of the chain it is subjected to the action of the transversely directed blasts of heated air entering above the baffle plate 17 through the openings 16. After traversing the length of the casing and back the cloth 110 then passes about the upper sprocket wheel 6, and then in horizontal runs between the baffle plates 17 and 20. The air also circulates between these plates thus further drying the fabric. Likewise as the fabric traverses the space between the plates 20 and 23 it is subjected to the action of the heated air. 115

The air travels in the path indicated by the plain arrows in the drawings being impelled by the fan 25. It first moves through 120 the heater 27 where it is heated, then up through the plenum chamber and out into the drying chamber; passes successively over the baffle plates in a zigzag course, 125 and is then discharged from the lower part of the casing into the fan intake. The same air may thus be continuously circulated, greatly economizing in the use of heat and enabling the cloth to be dried in a much 130

more uniform manner than is usually the case. By manipulating the dampers 34 and 36 any desired admixture of fresh air with the circulating air may be obtained.

The degree of heat employed is preferably so calculated that as the cloth emerges from the drying chamber through the opening 40 it is in a substantially bone dry condition, or nearly so. That is to say, at this point, the moisture content of the cloth is substantially negligible.

As the cloth passes through the conditioning chamber 43 it is subjected to the action of the cool and moist air entering through the slots 49. This air is first drawn in by the fan 53 through the intake 54, and in passing through the chamber 51 is moistened to any desired degree. After passing through the conditioning chamber the air is discharged up the flue 57.

The air may be moistened to the point of saturation if desired, so that it readily gives up moisture when brought into contact with the dry fabric. As the moisture content of such air may be accurately determined by manipulation of the damper 55 and of the spray device, and as the period during which the cloth is subjected to the action of such air is a known quantity, it is possible very accurately to moisten the cloth to any desired degree, and as the cloth is stretched during the application of moisture, the absorption of moisture is substantially uniform so that no noticeable discoloration of the cloth occurs.

While the apparatus herein disclosed is particularly well adapted for carrying out the process, it is to be understood that in its broader aspects the process is not dependent upon the particular apparatus which may be employed but is capable of performance in other ways provided the determinate quantity of moisture can be imparted to the cloth after drying and while the cloth is transversely stretched.

I claim:

1. Apparatus for treating fabric comprising a drying chamber having heat insulated walls, substantially horizontal baffles in the chamber defining a circuitous path for air, a plenum chamber communicating with the upper part of the drying chamber, and air moving means arranged to withdraw air from the lower part of the drying chamber and deliver it into the plenum chamber.

2. Apparatus for treating fabric comprising a heat insulated housing, partitions within the housing setting off a plenum chamber and a drying chamber, said chambers communicating with one another, a plurality of horizontally disposed baffles in the drying chamber, and a fan outside the housing constructed and arranged to withdraw air from below the lowermost baffle and deliver it into the plenum chamber.

3. Apparatus for treating fabric comprising a heat insulated housing, partitions within the housing setting off a plenum chamber at the top and to one side of the housing, said chamber having openings in its wall, horizontally disposed baffles in the housing defining a circuitous path for air, air heating means, and a fan arranged to draw air from the lower part of the housing and to force it over the heating means and into the plenum chamber.

4. Apparatus for treating fabric comprising a housing, and a floor in the housing setting off a drying chamber and a conditioning chamber, said floor comprising portions arranged in different planes and connected by an apertured wall.

5. Apparatus for treating fabric comprising a housing having a floor consisting of two parts lying in different horizontal planes, and means for guiding fabric in a run extending in a plane between the planes of the two parts of the floor.

6. Apparatus for treating fabric comprising a housing, a floor dividing the housing into a drying chamber and a conditioning chamber, said floor having an opening for the passage of the fabric, means for guiding a run of fabric to pass through said opening from the drying to the conditioning chamber, and means for drying the fabric in the drying chamber and for supplying it with moisture in the conditioning chamber.

7. Apparatus for treating fabric comprising a housing divided into a drying and conditioning chamber, means for holding fabric in stretched condition in both chambers, and means for causing warm air to flow from top to bottom of the drying chamber and for causing cool moist air to move substantially horizontally in the conditioning chamber.

8. Apparatus for treating fabric comprising a housing having a drying chamber and a conditioning chamber, means for supporting fabric in stretched condition in the latter chamber, an air moistening device, and means for forcing air through the moistening device and into the conditioning chamber.

9. Apparatus for treating fabric comprising a heat insulated housing divided into a drying chamber and a conditioning chamber, an air heater, an air moistener, means for continuously circulating air through the heater and drying chamber, and means for moving air through the moistener into the conditioning chamber.

10. Apparatus for treating material comprising a heat insulated housing divided into a drying chamber and a conditioning chamber, means for moving the material to be treated successively through the respective chambers, means for heating air, means

for continuously circulating air through the drying chamber and over the heating means, and means for causing a current of moist air to move through the conditioning chamber.

11. Apparatus for treating material comprising a conditioning chamber, a drying chamber superposed thereon, means for moving the material to be treated successively through the drying and conditioning chambers, means for removing substantially all moisture from the material during its passage through the drying chamber, and means for supplying a predetermined degree of moisture to the material during its passage through the conditioning chamber.

12. Apparatus for treating material comprising a housing divided by a floor into an upper drying chamber and a lower conditioning chamber, means for moving the material to be treated in horizontal runs successively through said chambers, the floor having an opening for its passage from one to the other, an air heater, an air moistener, and means for causing air to flow from the heater and moistener respectively into the drying and conditioning chambers.

13. Apparatus for treating material comprising a housing having means therein for moving the material in a predetermined path from the upper to the lower part of the housing, air heating and moistening means, and fans for moving air from the heating and moistening means into the upper and lower parts of the housing respectively.

14. Apparatus for treating textile fabric comprising a housing, means for holding the fabric in stretched condition while moving it downwardly through said housing, and means for blowing warm air and cool moist air into the upper and lower parts of the housing respectively.

15. Apparatus for treating textile fabric comprising a housing, means for stretching the fabric to be treated while moving it continuously from the upper to the lower part of the housing, means for delivering warm air into the upper part of the housing, means for delivering moist air into the lower part of the housing, and controllable means permitting air to be discharged from the upper part of the housing.

16. Apparatus for treating textile fabric comprising a housing divided into upper and lower chambers, means for moving the fabric in substantially horizontal runs successively through the respective chambers while holding it in stretched condition, means for delivering warm air in a plurality of streams into the upper part of the upper chamber, said streams being directed

transversely of the width of the fabric, and means for withdrawing air from the lower part of the upper chamber.

17. Apparatus of the class described comprising a housing having a plenum chamber extending along one side thereof near its top, said chamber communicating with the interior of the housing by means of a series of windows in its side wall, and fabric stretching means within the housing arranged to move the material to be dried in a path extending substantially parallel to the length of the plenum chamber.

18. Apparatus of the class described comprising a housing having heat insulated walls, a heat insulated floor dividing the housing into upper and lower chambers, means directing streams of warm air transversely of the width of the housing near the top of the upper chamber, air egress means in the side wall of the housing near the bottom of the upper chamber, and means for admitting and discharging air from the opposite ends respectively of the lower chamber.

19. Apparatus of the class described comprising an elongated housing having walls, a heat insulated floor dividing the housing into upper and lower chambers, means for blowing streams of warm air transversely across the upper chamber near its top and for withdrawing air from the lower part of said chamber, inlet and outlet openings in the end walls respectively of the lower chamber, and means for delivering moist air through said inlet openings.

20. Apparatus of the class described comprising a housing divided into upper and lower chambers, the bottom of the latter chamber comprising downwardly converging walls, said walls having openings therein, a compartment exterior to each of said walls, means for supplying moist air to one of said compartments for entrance to the lower chamber through the openings in the adjacent wall, and a discharge flue communicating with the other compartment.

21. Apparatus of the class described comprising a housing having means therein for moving material in a zig-zag path comprising a plurality of vertically spaced runs, means for delivering blasts of warm air transversely across the upper run of fabric, and means for directing such air in a zig-zag course transversely across the lower runs of the material.

22. Apparatus of the class described comprising a housing having means for moving fabric in a zig-zag path, consisting of a plurality of substantially horizontal runs, while transversely stretching it, means for delivering blasts of warm air transversely across the upper run of fabric, baffle plates disposed between runs of the fabric to provide a zig-zag course for the air, and an

egress opening for the delivery of air near the lower part of the housing.

23. Apparatus of the class described comprising an elongated housing having an opening in its end wall for the admission of a web of fabric, means within the housing for moving the entering fabric in a zig-zag path comprising vertically spaced, substantially horizontal runs extending longitudinally of the housing, means for

delivering blasts of warm air transversely across the upper run of fabric, and a plurality of vertically spaced baffle plates extending alternately from opposite side walls of the housing and between runs of the fabric whereby to provide a zig-zag course for the air.

Signed by me at Somerville this twenty-third day of May, 1923.

CHAS. C. KENYON.