

Nov. 13, 1934.

K. F. TANDEL

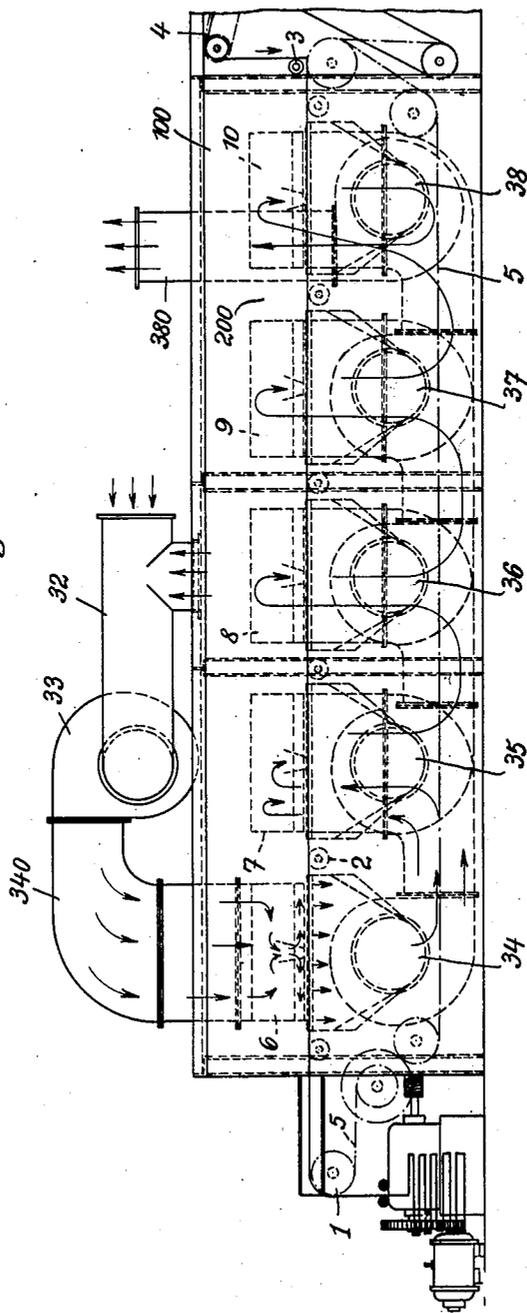
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DRYING OF FABRICS

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4 Sheets-Sheet 1

Fig. 1



INVENTOR

K. F. Tandel
By *Watson, Coit, Morse & Gundlach*
ATTYS.

Nov. 13, 1934.

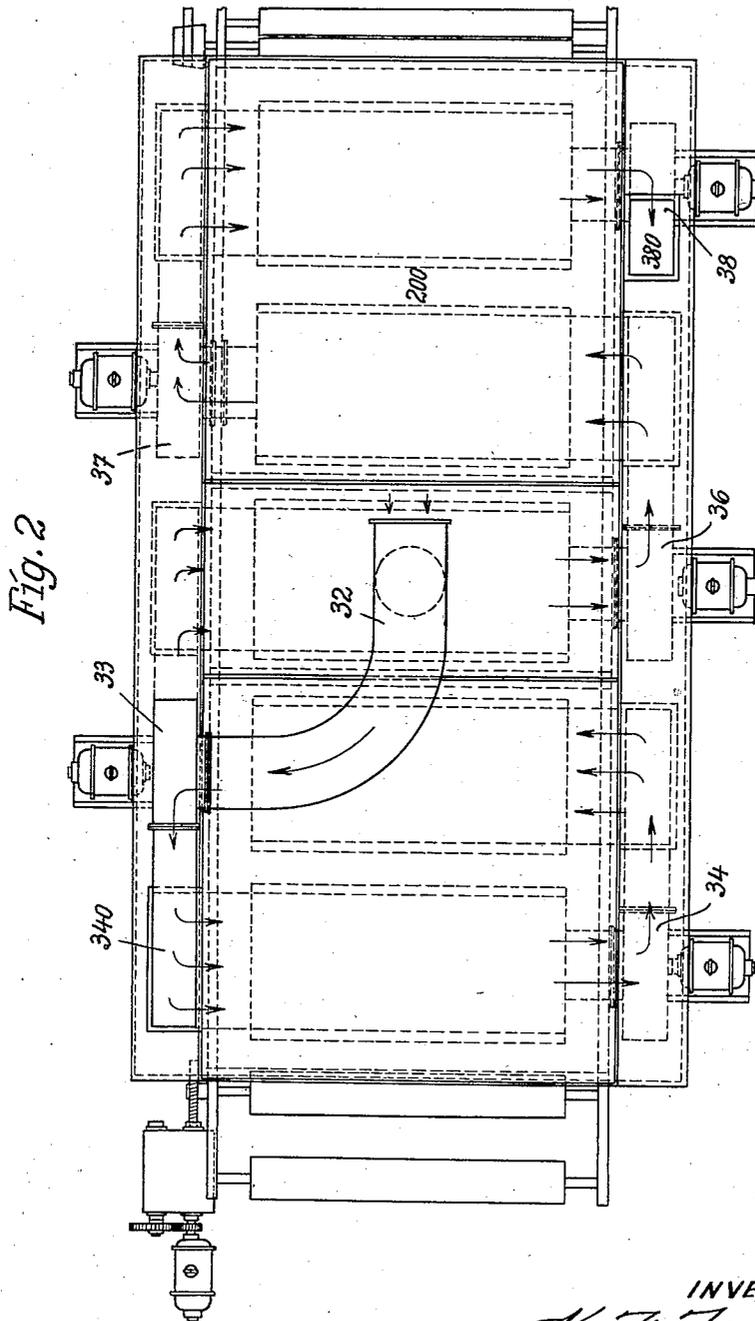
K. F. TANDEL

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INVENTOR
K. F. Tandel
By *Watson, Coit, Morse & Grindle*
ATTYS.

Nov. 13, 1934.

K. F. TANDEL

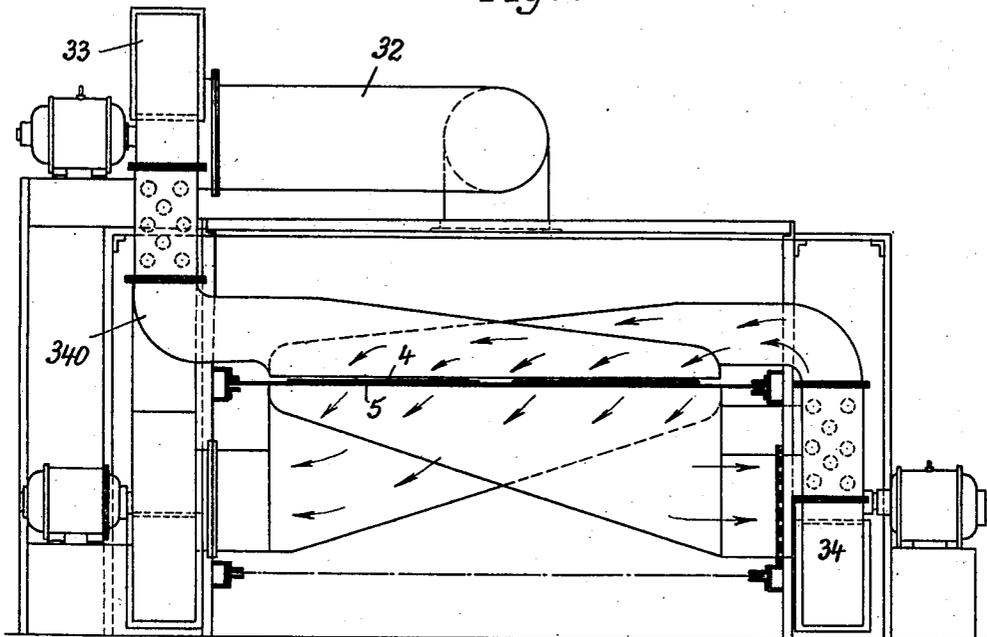
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Fig. 3



INVENTOR

K. F. Tandel

By Watson, Coit, Morse & Grindle
ATTYS.

Nov. 13, 1934.

K. F. TANDEL

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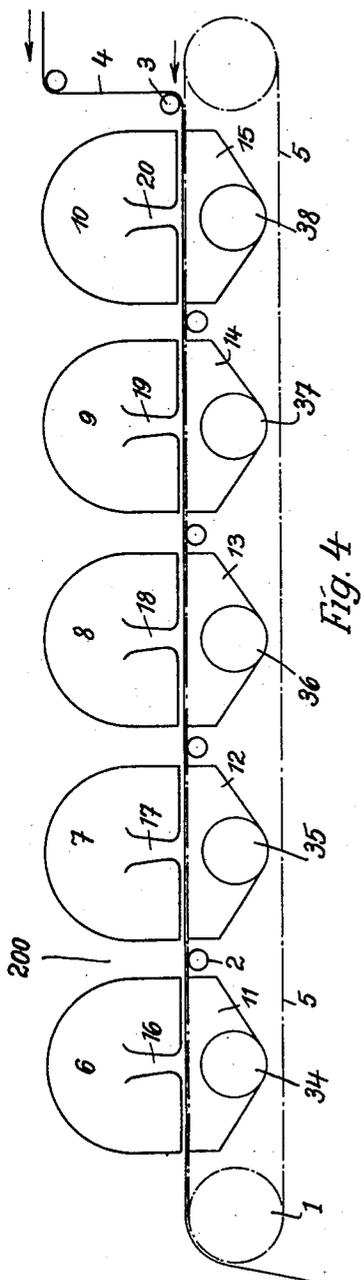


Fig. 4

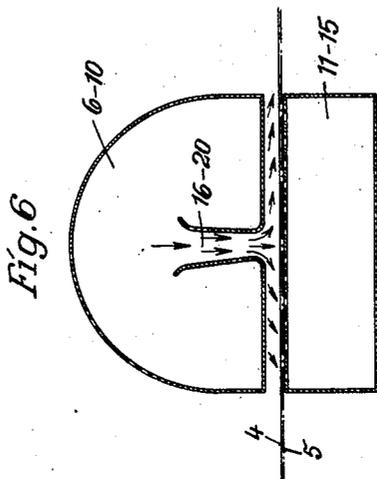


Fig. 6

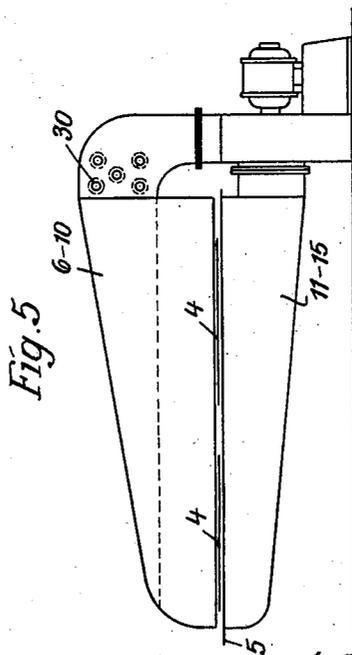


Fig. 5

INVENTOR
K. F. Tandel
BY *Watson, Coit, Morse & Grindelli*
ATTYS.

UNITED STATES PATENT OFFICE

1,980,558

DRYING OF FABRICS

Karl Fritz Tandel, Chemnitz, Germany, assignor
to C. G. Haubold A.-G., Chemnitz, Germany, a
joint-stock company of Germany

Application January 6, 1934, Serial No. 705,592
In Germany September 13, 1932

2 Claims. (Cl. 34—48)

In order to dry fabric in such manner that it is thereby de-tensioned and shrunk as much as possible, it has been laid upon pervious conveyor bands and conveyed upon the latter through the drying apparatus. Since air which penetrates the fabric acts materially more effectively than air which sweeps thereover, air was drawn through the material whilst it was being conveyed upon the conveyor band. This method had the drawback that although the fabric could draw in or shrink lengthwise, as it was laid loosely upon the conveyor band, this was not possible widthwise, as the fabric was held firmly upon the conveyor band by the air-suction.

If, however, in accordance with the present invention the fabric, lying upon a pervious conveyor band, is led through a series of aeration units arranged at intervals one from another, then de-tensioning and shrinkage of the fabric is possible whilst it is being dried by means of air drawn therethrough, this moreover without wrinkling being caused. The air, advantageously conducted in counter-current to the movement of the fabric, is brought into contact with said fabric in stages by means of the individual aeration units for each of which a separate air-heating device may be provided. Such stage-drying, which is made possible by the use of a completely enclosed path for the air, then permits of the material being treated, upon its entry, with relatively high temperatures in per se known manner and, before its emergence, with very low temperatures. In this fashion, a high drying capacity is obtained and at the same time a very short drying-path suffices. The advantages of air drawn through the fabric, particularly energetic drying, are combined with that of free shrinkage both lengthwise and widthwise of the fabric, since the latter, between the aeration units, travels free from restraining influences.

Within the aeration units, the air preferably passes from above downwardly through the travelling fabric-web, which is thus pressed upon the conveyor band. In contra-distinction to the case with the known manner of conducting the air from below upwardly, the fabric cannot become distorted and no wrinkles appear. In each aeration unit, the air emerges from an upper pressure-box, above the middle of a grid covering a suction-box, through a nozzle-like blast-slot extending over the whole width of the fabric. The provision of grids for air-distribution purposes is known. In the present case, however, the grid co-operates with the slot-like pressure

outlet, so that the air from the latter sweeps out to both sides in the aeration unit over the fabric-web as well as passing therethrough.

A stage-dryer, by which the invention may be carried into effect, is illustrated by way of example in the accompanying drawings, in which Figure 1 is a side elevation, Figure 2 a plan view and Figure 3 an end elevation of the dryer; Figure 4 illustrates the course of the material through the separate drying stages and Figures 5 and 6 one drying stage in side elevation and vertical cross-section respectively.

Within a drying chamber 100, which has slots in its end-walls for the entry and exit of the material 4, there are several aeration units each consisting of an upper blast-box 6, 7, 8, 9 or 10 and a lower suction box 11, 12, 13, 14 or 15 and each constituting a drying stage. As illustrated in Figures 1 and 4, five such drying stages are employed. The two parts of each stage, i. e. the upper pressure-box 6—10 and the lower suction-box 11—15, lie comparatively close one above the other and between them travels an endless net-like conveyor band 5. In the spaces 200 between the separate drying stages, the upper run of this band is supported upon rollers 2. The web of material 4 passes under a roller 3 at the right hand end into the drying chamber 100 and travels, within the latter, upon the endless conveyor band 5. The dried material passes out of the drying chamber 100 over a guide roller 1 at the left hand end and is deposited.

There is a heating device 30 (Figure 5), for example steam pipes, in front of each of the blast-boxes 6—10 and a fan 34, 35, 36, 37, 38 (Figure 1) beyond each of the suction-boxes 11—15. Each suction-box is furnished, in per se known manner, with slots or holes in its upper surface (Figure 6) to form a grid. This grid may be of metal or a non-rusting material. The air emerges from each of the upper blast-boxes 6—10 by way of a nozzle device 16—20 (Figure 6). There may be a series of separate nozzles arranged one behind another or a similarly shaped slot extending over the length of the box (i. e. the width of the fabric). Alternatively, however, a single central nozzle only may be provided. In any case, the sweeping emergence of the air upon the material (Figure 6), results from the close superimposition of the pressure- and suction-boxes and the arrangement of the nozzle on the vertical centre-line of said boxes. The air is caused to sweep over the material as well as being drawn therethrough, this giving an excellent drying effect.

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100

105

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Above the drying chamber 100, fresh air enters by a suction conduit 32 and passes to a fan 33 which forces it through a pressure conduit 340 into the pressure-box 6 (Figures 1 and 4). This pressure box is located at that end of the drying chamber 100 through which the material emerges from said chamber. The air forced down upon the material 4 is drawn into the corresponding suction box 11 by the fan 34 which then conducts the air onwards to the next drying stage, i. e. into the pressure-box 7 whence it penetrates the material and is drawn into the suction-box 12 by the fan 35. In this fashion, the air-course is repeated in alternate horizontal (Figure 3) and vertical (Figure 1) zig-zag paths until the air is drawn by the fan 38 from the last suction-box 15 close to the right hand wall of the drying chamber 100 where the material 4 enters, said fan 38 delivering into the open through a conduit 380. The heating devices 30 between the suction-box of a drying stage and the pressure-box of the next drying stage are devised to produce a temperature rise between the individual drying stages, e. g. said heating devices become larger from the exit-end of the drying chamber towards the entry-end thereof. This is the most advantageous arrangement. It is also possible, however, to produce the temperature-rise with heating devices of the same size by individually throttling the steam supplied thereto in order to give the required temperature.

As is evident from Figures 1, 2 and 4, the drying stages, each composed of blast- and suction-boxes, are not arranged directly adjacent to one another, but an intermediate space 200 is left in which the web 5 conveying the fabric 4 runs upon the rollers 2. Consequently a certain time is occupied by the travel of the fabric from one stage to the next and within this time the fabric 4 becomes loose

and contracts, so that it can draw in not only lengthwise but also widthwise. The size of the spaces 200 is so selected that this effect is completed in the most favourable fashion.

I claim:—

1. Apparatus of the character described including, in combination, a fabric supporting pervious conveyor belt, a series of spaced air chambers disposed above the belt with their lower walls adjacent the belt and each formed with means to discharge a narrow stream of air onto the top of the fabric from edge to edge, means for directing the air thus discharged in a direction parallel to the surface of the fabric, and a series of spaced suction boxes, each disposed below an air chamber and its air directing means and under the belt, the upper wall of each box being formed to withdraw the air supplied by its corresponding chamber along a much greater distance lengthwise of the belt than the width of the air stream from the chamber.

2. Apparatus of the character described including, in combination, a fabric supporting longitudinally moving pervious belt, a series of drying units spaced longitudinally of the belt, each consisting of an air supply chamber above the belt, and a suction box under the belt and vertically below said chamber, the lower wall of the chamber extending substantially parallel to and a considerable distance longitudinally of the belt and having a central relatively narrow slot extending transversely of the belt, said wall on each side of the slot serving to deflect some of the air issuing therefrom longitudinally of the belt, and the upper wall of the box being perforated substantially throughout its area, and being substantially equal in length to the said lower wall.

KARL FRITZ TANDEL.

5	80
10	85
15	90
20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150