

[54] **PLANT FOR STEAMING AND FIXING DYES
AT HIGH OR LOW TEMPERATURE ON
PRINTED OR DYED FABRICS**

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[58] **Field of Search** **226/104-107;
34/157; 68/5 D, 5 E**

[56] **References Cited**

UNITED STATES PATENTS

578,008	3/1897	Gadd.....	68/5 E
1,514,439	11/1924	Colbert et al.....	34/157 X
1,582,457	4/1926	Ford.....	226/107 X
3,326,022	6/1967	Drago.....	68/5 D
3,469,423	9/1969	Fleissner.....	68/5 E
3,609,781	10/1971	Dunderdale.....	68/5 D X

FOREIGN PATENTS OR APPLICATIONS

730,489	1/1943	Germany.....	226/107
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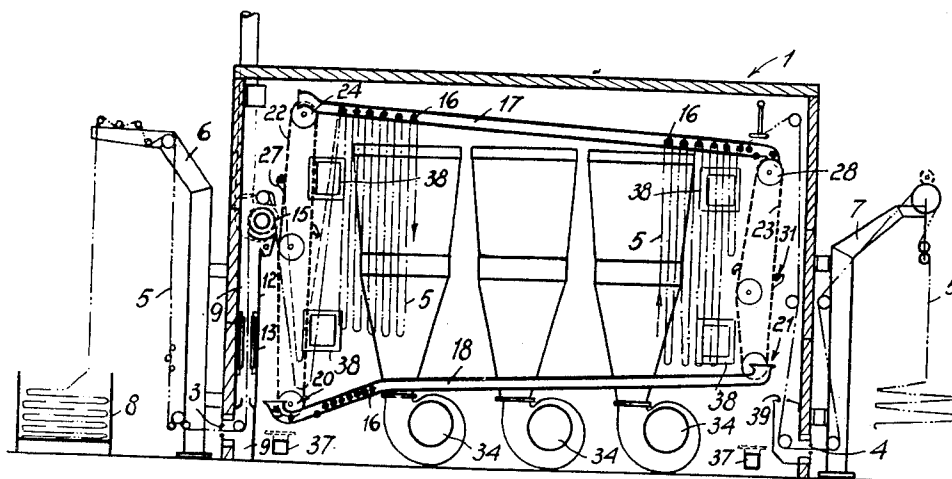
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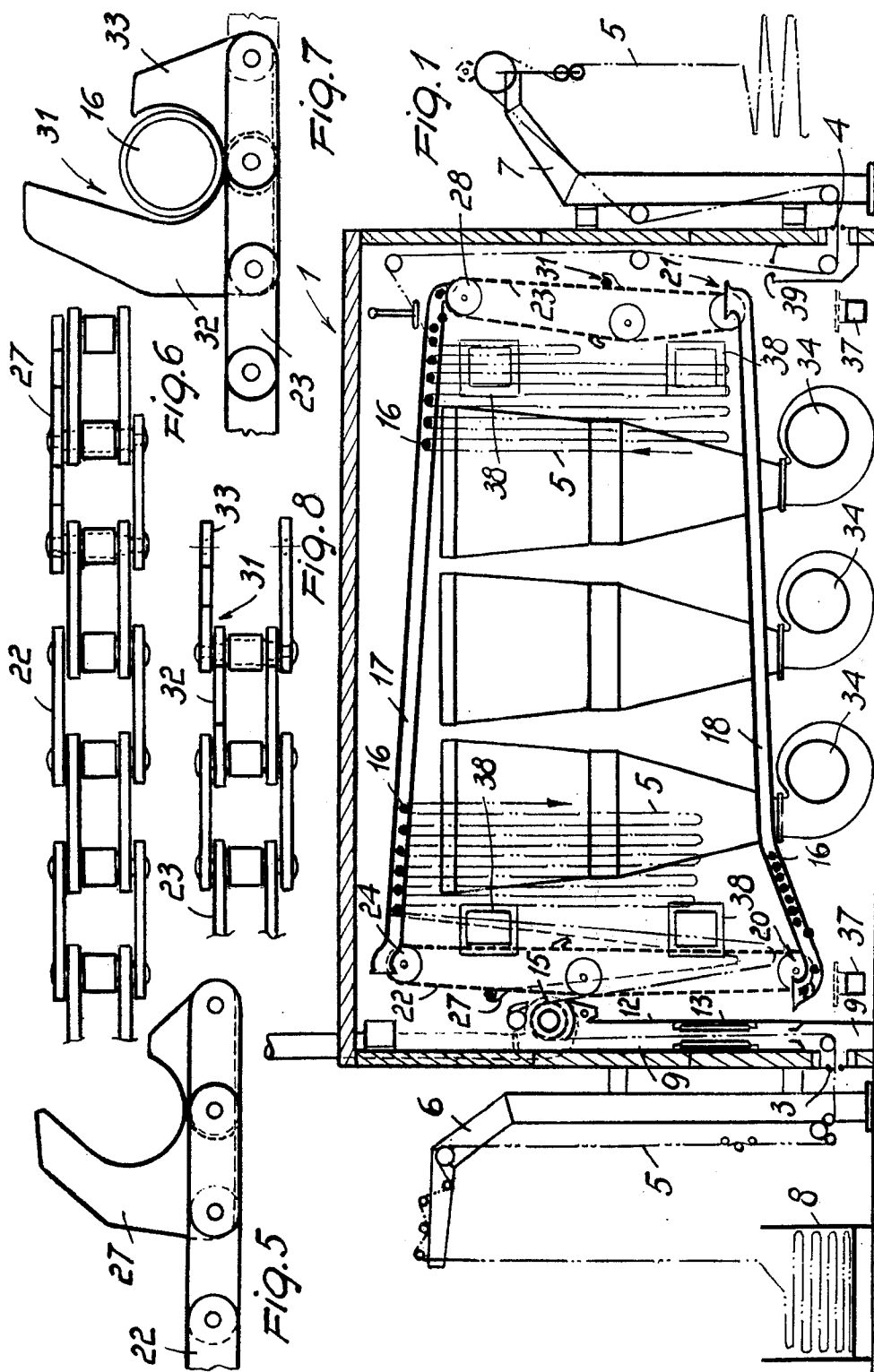
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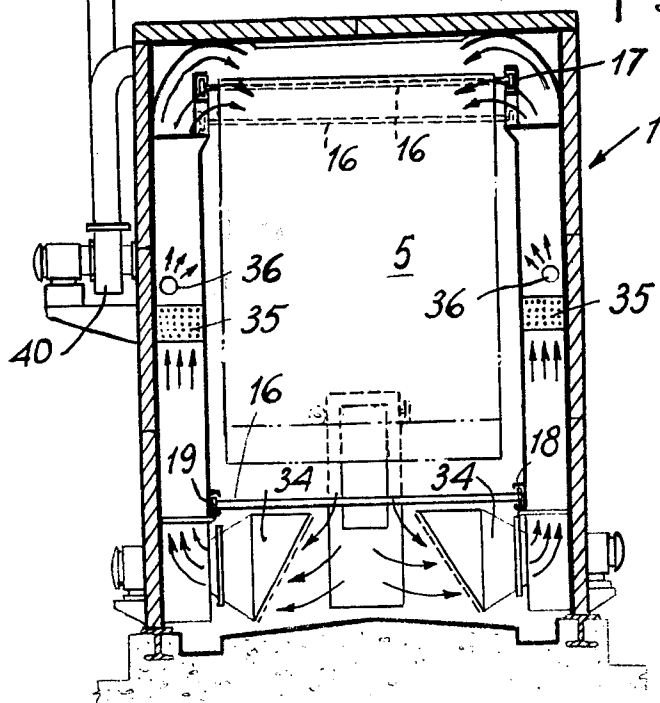
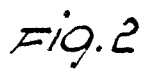
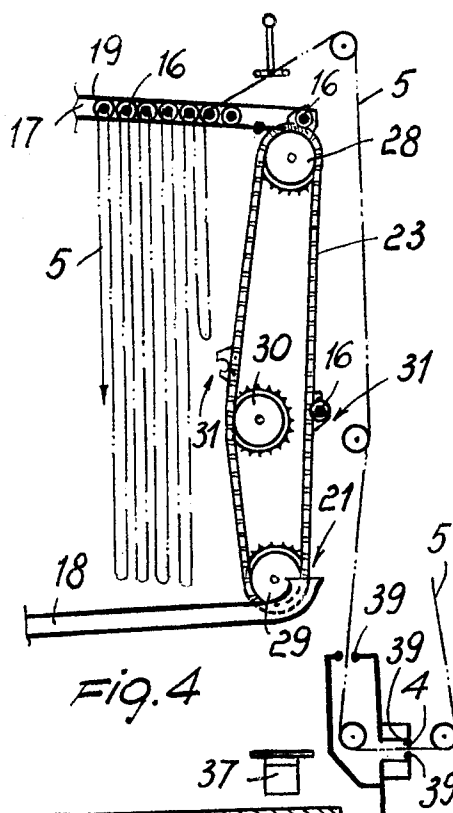
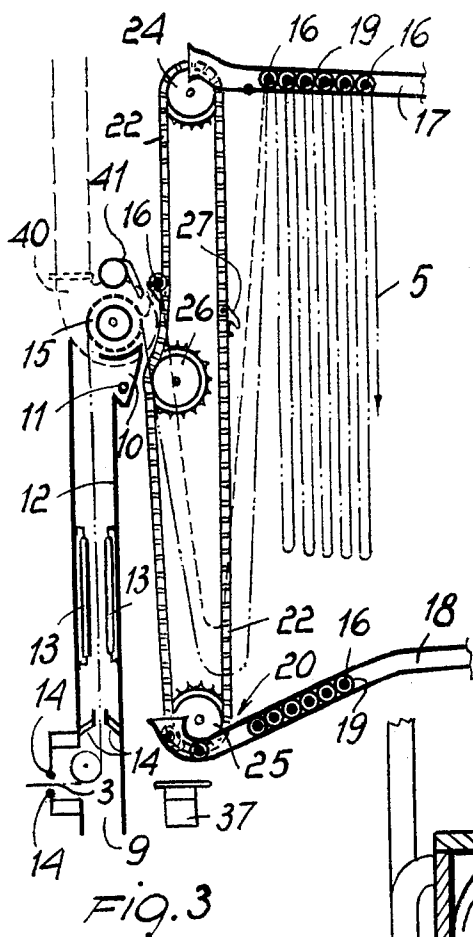
ABSTRACT

Plant for steaming and fixing dyes on printed or dyed fabrics, at variable temperatures, comprising a storage chamber wherein the steaming occurs. Within the storage chamber these are provided rod-like means which dispose the fabric in the form of suspended folds and ensure the forward moving of the folds, from inlet towards outlet of the storage chamber. Guide means, defining a closed loop path, allow the rod-like means to take-up the fabric at the inlet and to discharge it at the outlet of the storage chamber, with the axis of the rod-like means remaining horizontal and orthogonal to the direction of movement of the fabric. Before the storage chamber there is provided a pre-heating chamber for preheating and humidifying the fabric. Heating elements and water atomising nozzles are located within the storage chamber for maintaining its atmosphere at controlled humidity and temperature conditions.

2 Claims, 8 Drawing Figures







PLANT FOR STEAMING AND FIXING DYES AT HIGH OR LOW TEMPERATURE ON PRINTED OR DYED FABRICS

BACKGROUND OF THE INVENTION

This invention relates to a plant for steaming and fixing dyes at high or low temperature on printed or dyed fabrics.

SUMMARY OF THE INVENTION

The main object of this invention is to provide a steaming and fixing plant which enables the printed or dyed fabric to be maintained in an environment the atmosphere of which contains saturated or superheated steam at a temperature and for a residence time which are variable according to requirements.

A further object is that said plant enables a large area of fabric to be treated in relation to the total overall volume occupied, without the printed face of the fabric ever coming into contact with surfaces or parts of the plant itself.

A further object is that said plant enables the fabric to be preheated and uniformly humidified simultaneously.

A further object is that the fabric is uniformly treated in every part independently of the fact that there are variations in ambient conditions in the various zones of the plant.

These and further objects which will be more evident hereinafter are attained by a steaming and fixing plant according to the invention comprising a storage chamber having an inlet zone and outlet zone for the fabric, means for disposing the fabric inside said chamber in the form of suspended folds side by side and for moving said folds from said inlet zone to said outlet zone, means for maintaining the atmosphere inside said chamber at controlled humidity and temperature conditions, and means for preheating and humidifying the fabric before its introduction into the zone of controlled atmospheric conditions.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will be more evident from the description of a preferred but not exclusive embodiment of a plant for steaming and fixing printed or dyed fabrics at high or low temperature, illustrated by way of non-limiting example in the accompanying drawing in which:

FIG. 1 is a longitudinal section through a steaming and fixing plant according to the invention;

FIG. 2 is a cross-section through the plant;

FIGS. 3 and 4 are enlarged views of chain device shown in FIG. 1;

FIGS. 5 and 6 are enlarged elevational and plan views respectively of details of FIG. 3;

FIGS. 7 and 8 are enlarged elevational and plan views respectively of details of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures, the plant for steaming and fixing printed or dyed fabric comprises a chamber 1 having an inlet aperture 3 and an outlet aperture 4 for the fabric 5.

Known devices 6 and 7, located upstream and downstream of the chamber 1, enable the fabric to be taken from a storage zone 8 and to be guided to the inlet 3,

and to be then taken at the outlet 4 in order to be disposed in a collection zone.

Immediately downstream of the aperture 3 inside the steaming and fixing chamber there is a preheating chamber 9.

At its summit there is a basin 10 from which overflows water fed into it by way of a duct 11. The water which overflows forms a fluid film on the underlying wall 12.

Heating elements 13 enable said fluid film to be evaporated.

At the inlet of the chamber 1 there are heated lips 14 arranged to avoid thermal dispersion and the entry of cold air.

In the top part of the chamber 9 there is a drive roller 15 with a plurality of holes on its surface connected to an exhaust fan 40. The exhausted fluid is partially fed through a nozzle 41 in a direction tangential to the roller 15 and downstream of it so as to favour the formation of the fabric folds.

The members designed to form and support the folds of fabric consist of rod elements 16 the length of which is greater than the width of the cloth to be treated in the plant.

The rod elements 16 are mobile along a closed perimetral path and are kept always in a horizontal position, transversal to the direction of motion of the fabric.

The upper and lower portions of this perimetral path consist of rails or guides 17 and 18 extending longitudinally, on which roll the ends 19 of the elements 16, in the form of wheels rigid with said elements.

The guides 17 and 18 are inclined downwards in the direction of forward movement of the fabric and in the opposite direction, respectively.

The closed path of the elements 16 is completed in the end portions of vertical movement by two devices 20 and 21, each of which consists of a pair of chains 22 and 23.

The chains 22 pass in the form of closed loops about gearwheels 24 and 25 located in proximity of the corresponding ends of the guides 17 and 18. Each chain 22 also runs about a gearwheel 26 located approximately halfway between the axes of the wheels 24 and 25 so as to give a prominent arched configuration to the middle ascending portion of the chain 22 which is immediately downstream of, and below, the roller 15.

The chains 22 carry hook elements 27 spaced equidistantly along their development, arranged to simultaneously grip the ends of a rod element 16. In a like manner the chains 23 wind around the wheels 28, 29 and 30 and each comprises hook elements 31 spaced equidistantly apart. Each hook element 31 consists, as shown in FIGS. 7 and 8, of two pincer grips 32 and 33, each connected to a different adjacent portion of chain, so that in those portions in which the chain 23 describes a curved trajectory, the grips 32 and 33 withdraw one from the other so as to enable the elements 16 to be engaged or disengaged. The chamber 1 is provided with fans 34 which create a forced circulation of the atmosphere in the direction of circulation indicated in FIG. 2 by arrows.

Heating elements 35 and water atomising nozzles 36 are located within the compulsory paths for the atmosphere and enable its conditions to be regulated.

Exhausters 37 are provided for renewing the atmosphere, and inspection doors 38 are also provided. At

the outlet aperture 4 heated lips 39 are provided analogous to those at the inlet.

From the foregoing description the operations of the plant according to the invention is obvious.

The fabric enters the preheating chamber 9 through the aperture 3.

The water film which runs down the wall 12 is evaporated by the heating elements 13. The fabric, which is at the external ambient temperature, causes the steam which comes into contact with it to condense. The fabric consequently becomes heated and humidified, which favours the fixing of the printed or dyed colours.

The fabric is pulled out of the preheating chamber by the roller 15 to which it adheres because of the suction created by the exhaust fan 40. Thus a fold is created downstream of the roller 15, which becomes elongated downwards until a rod element 16 taken up by the hooks 27 at the end of the guide 18 comes into contact, during its upward motion, with the lower face of the fabric. The fabric is thus raised by the rod element which is released from the hooks 27 when its ends 19 have entered the beginning of the guides 17.

Nearly the entire length of the guide 17 is occupied by a set of rod elements lying side by side, which can roll towards the outlet as soon as the last element of the set, released from the fabric, is taken up by the hooks 31 of the chain 23.

During the rolling motion of each element 16 on the guide 17, the fabric is dragged by friction by the elements 16 in such a manner that the forward movement of the folds is accompanied by a partial sliding in the vertical direction of the fabric constituting each fold, which thus passes through any thermal and humidity gradients existing in the chamber.

The element 16 is transferred by the hook 31 to the highest end of the guide 18, and can thus return to the beginning of its path by rolling on it.

It is evident that so as not to create accumulations or shortages of elements 16, the speeds of the chains 22 and 23 must be suitably synchronised. The time of residence of the fabric inside the chamber and hence its speed of forward movement depends on the temperature used, which in its turn is determined by the type of fabric and type of dye used for printing or dyeing it. As an indication, the temperatures reached lie between 100° and 200°C. A slight overpressure is maintained inside the chamber 1 with respect to the outside atmosphere, in order to prevent air infiltration.

The temperature level and degree of humidity are obviously constantly controlled by the usual instruments.

Any reduction in the degree of humidity of the atmosphere is compensated, as seen, by the introduction of atomised water through the nozzles 36.

The exhausters 37, provided with balanced calibration valves, enable the atmosphere to be renewed and the reaction products to be therefore eliminated.

The steaming and fixing plant according to the invention thus provides an adequate development and fixing treatment for the previously printed or dyed fabric, in

that each part of it is uniformly treated for the required time at the prechosen temperature and humidity.

The invention so conceived is susceptible to numerous modifications all of which enter within the scope of the inventive idea. Furthermore all details may be replaced by other technically equivalent elements. In practice the materials used and the dimensions may be chosen at will according to requirements.

I claim:

1. A plant for steaming and fixing dyes at high or low temperature on printed or dyed fabrics, comprising a storage chamber having an inlet zone and outlet zone for the fabric, means for disposing the fabric inside said chamber in the form of suspended folds side by side and for moving said folds from said inlet zone to said outlet zone, means for maintaining the atmosphere inside said chamber at controlled humidity and temperature conditions, and means for preheating and humidifying the fabric before its introduction into the zone of controlled atmospheric conditions and wherein said means for disposing the fabric in the form of folds and for moving said folds comprise a plurality of rod elements mobile along a perimetral closed loop path maintaining the longitudinal axis of said rod elements substantially horizontal and orthogonal to the direction of forward movement of the fabric, each of said rod elements being arranged to support a fold of fabric through the upper portion of said path between said inlet zone and said outlet zone, guides for supporting said rod elements disposed in the lower and upper portions of said path and extending in the direction of forward movement of the fabric, and a pair of devices comprising members mobile in a substantially vertical direction disposed in said inlet and outlet zones between the corresponding ends of said upper and lower guides, and arranged to successively take a single rod element at the terminal ends of the upper and lower portions of said path and to deposit it at the initial ends of said upper and lower portions and wherein said upper and lower guides are inclined downwards in the direction of forward movement of the fabric and in the opposite direction, respectively.

2. A plant as claimed in claim 1, in which each of said devices comprises a pair of chains or similar elements, equal and symmetrical about a longitudinal sectional plane and closed in the form of a loop, hook elements rigid with each of said chains and disposed equidistantly along their development, a pair of said hook elements being arranged to grip said rod element at its ends, and pulleys rotating about substantially horizontal axes on which said chains wind and wherein each of said chains situated in the proximity of said inlet zone slides over at least one pulley disposed in such a manner as to give said chain a prominent arched configuration in the central portion of its ascending branch immediately below the zone in which each rod element begins to come into contact with the fabric.

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