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PREBOARDING APPARATUS

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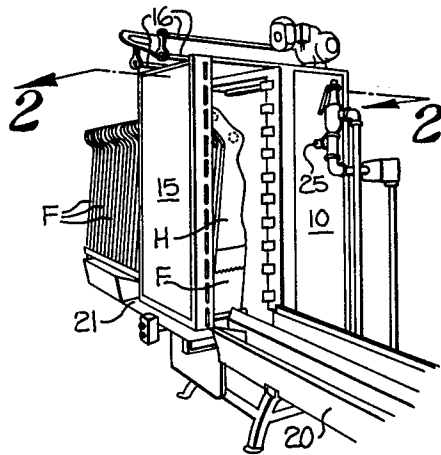


Fig-1

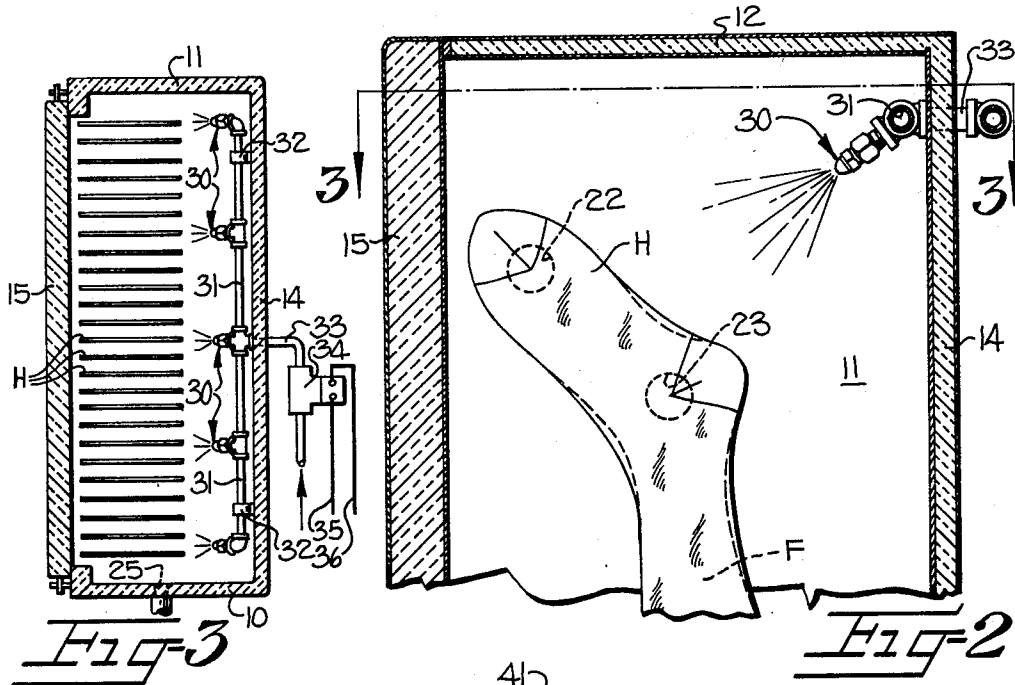


Fig-3

Fig-2

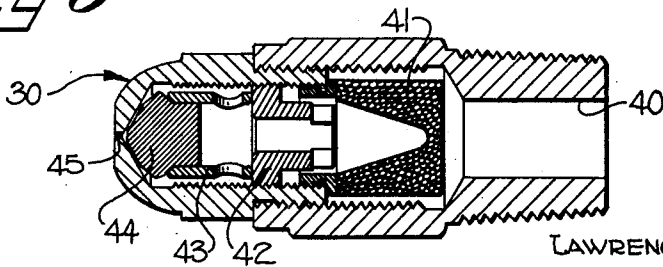


Fig 4

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**PREBOARDING APPARATUS**

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4 Claims. (Cl. 223-76)

The present invention relates generally to an improved apparatus for preboarding or setting textile fabrics and more particularly to an improved apparatus for preboarding hosiery which is knit or heat-settable yarns, such as nylon, while providing uniform affinity for dyestuffs throughout the length of each hose and between groups or lots of hosiery preboarded at different times.

Ladies' nylon hosiery and other textile articles, such as sweaters and the like, are commonly subjected to a so-called preboarding or presetting operation in which the articles are positioned on forms of the required shapes and subjected to heat, such as saturated steam. The steam causes the hosiery to shrink into snug engagement with the form and sets the yarn to cause the hose to retain the shape of the form during subsequent washing and use. The preboarding operation is usually carried out in a closed chamber or retort into which pressure and saturated steam are introduced to maintain a constant temperature, usually within the range of 240° F. to 260° F., for a predetermined period of time, usually from one to two minutes.

When saturated steam is introduced into the retort, it is distributed to provide uniform humidity throughout the interior of the retort, however, in many instances, all portions of the hose are not subjected to uniform humidity because some portions of the hose do not engage the boarding form while other portions are in snug engagement therewith. Usually, portions of the hose adjacent the foot and ankle do not engage the boarding form as snugly as the leg of the hose and this is particularly true in the case of seamless hose. In those portions of the hose which are not initially in contact with the form, the amount of humidity imparted thereto varies from the amount of humidity imparted to those portions of the hose which are in engagement with the metal boarding form. If all portions of the hose are not subjected to uniform humidity during the preboarding operation, uneven dyeing and spots will result when the hosiery is dyed in another subsequent operation.

It is well known that hosiery knit of synthetic yarns, such as nylon, must be subjected to uniform temperature and humidity to maintain a uniform affinity for dyestuffs and any slight variation will change the affinity of the yarn for dyestuffs. While it is not known exactly what physiochemical variations occur in the yarns due to all portions of the hose failing to uniformly contact the boarding form, it is known that those portions of the hose which are not initially in contact with the boarding form do develop a different affinity for dyestuffs and cause uneven dyeing of the hosiery. It may be that those portions of the hose which are initially in engagement with the boarding form are subjected to more condensation than those portions which do not initially engage the boarding form. Also, it may be that those portions of the hose which initially engage the boarding form are subjected to a slightly different amount of heat than those portions which are not initially in contact with the boarding form. Either of these conditions could change the affinity for dyestuffs of portions of the hose and would therefore prevent even dyeing of the hose.

In most hosiery boarding forms presently being used to preboard seamless hosiery, holes are cut through the metal forms adjacent the heel and toe to assist the operator in properly aligning and positioning the foot portion

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of the hose on the form. Since the portions of the hose adjacent these holes do not contact the boarding form, they are normally subjected to slightly different degrees of heat and humidity than the other portions of the hose which are in contact with the form. In many instances, this variation of treatment causes spots or uneven dyeing of these portions of the hosiery which do not contact the form.

With the foregoing in mind, it is a primary object of the present invention to provide an improved preboarding apparatus in which all portions of the hose are subjected to even or uniform treatment so that uniform affinity for dyestuffs is maintained throughout each hose and between groups or lots of hosiery preboarded at different times.

The principal object of the present invention is attained by subjecting the hosiery to saturated steam while subjecting the portions of the hosiery which are normally out of contact with the boarding form to a supplementary moistening to minimize any normal variations in condensation and level out any steam-humidity variation which might exist between different portions of individual hose.

It is a more specific object of the present invention to provide moisture-applying means in the form of a plurality of spray nozzles which are mounted within the retort and positioned to direct moisture onto selected portions of the hosiery, particularly the foot portions, and control means operable in timed relation to the admission of saturated steam into the retort for actuating the spray nozzles during the preboarding or setting cycle.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a preboarding apparatus, illustrating one group of hose positioned on boarding forms and ready to be moved into the retort to be preboarded;

FIGURE 2 is an enlarged vertical sectional view through the uppermost portion of the preboarding apparatus shown in FIGURE 1, and being taken substantially along the line 2—2 in FIGURE 1, with the door of the retort in closed position and the hosiery and forms in position to be preboarded;

FIGURE 3 is a horizontal sectional view taken substantially along the line 3—3 in FIGURE 2, at a reduced scale;

FIGURE 4 is an enlarged longitudinal sectional view through one of the spray nozzles.

The preboarding apparatus shown in FIGURE 1 is of the type which is known as a Turbo preboarder which is manufactured by the Turbo Machine Company, Lansdale, Pa. The preboarding apparatus includes a steam cabinet or retort having an insulated housing that includes a pair of side wall 10 and 11, a top wall 12, a bottom wall, not shown, a rear wall 14 and a door 15. The door 15 is supported for movement from open to closed position on rods 16 supported on the top wall 12. The door 15 is moved from the open position shown in FIGURE 1 to the closed position shown in FIGURE 2 by a conventional drive mechanism and the retort is automatically sealed as soon as the door is closed.

The preboarding apparatus also includes conveyor tracks 20 and 21 (FIGURE 1) which are positioned on opposite sides of the retort and which support a plurality of hosiery boarding forms F on spider-type conveyors. The forms F are usually divided into two groups and one group is moved into the retort while the forms of the other group are spread out along one of the conveyors 20 or 21 to remove the preboarded hosiery therefrom and then apply hosiery thereto to be preboarded.

As shown in FIGURE 1, one group of forms F with hose H thereon have been moved from the conveyor track 20 to a position adjacent the door 15 and the other group of forms F is spread out along the conveyor track 21.

As the door 15 is closed to seal the retort, the group of boarding forms F is moved into the retort with the foot portions of the hose H in the upper portion of the retort. Then, water in the form of saturated steam is introduced into the cabinet through a steam entrance pipe 25 (FIGURES 1 and 3) which extends through the side wall 10, and the temperature inside of the retort is quickly raised to preboarding temperature by finned steam heating pipes, not shown, which are usually positioned at the top, sides and bottom of the retort. The saturated steam within the cabinet contains substantially uniform amounts of humidity throughout all portions of the cabinet. However, as shown in FIGURE 2, when the boarding forms are first moved into the retort, the foot portions of the hose H do not properly fit the forms. It will be noted that the hose does not engage the form in the angle, at the instep and in the sole portion.

Also, holes, indicated at 22 and 23, are provided in the form F at the toe and heel so that the portions of the hose which cover the holes 22 and 23 are not in contact with the metal surfaces of the boarding form F. The holes 22 and 23 are provided to aid the operator in properly positioning the foot of the hose H on the form F. Although saturated steam is uniformly distributed inside of the retort, all portions of the hosiery are not subjected to uniform amounts of heat and humidity because those portions of the hose which are not initially in contact with the boarding form F are subjected to different amounts of heat and humidity than the portions which are engaging the boarding form. This results in uneven dyeing of the hose and causes lighter and darker dyed areas in the hose.

In accordance with the present invention, the uniform affinity for dyestuffs throughout the complete hose is maintained by providing means for moistening the hose during the preboarding operation. For this purpose, a plurality of spray nozzles, broadly indicated at 30, are provided on the interior of the preboarding chamber or retort. In the present instance, the nozzles 30 are communicatively attached along a branch supply line 31 (FIGURE 3) which extends along the rear wall 14 and in spaced parallel relation to the top wall 12 of the retort (FIGURE 2). The branch pipe 31 is suitably supported on the rear wall 14 by brackets or pipe clamps 32. A main water supply line 33 extends through the rear wall 14 and one end is connected intermediate the ends of the branch pipe 31. The opposite end of the line 33 is connected to any suitable water supply source, not shown.

An electrically operable shut-off valve 34 is interposed in the main supply line 33 and has a pair of electric wires 35 and 36 which may be suitably connected to the conventional electrical control system of the preboarding apparatus, not shown. The control system of the preboarding apparatus automatically actuates the setting cycle and the wires 35 and 36 are connected to the control system in such a manner that the valve 34 is opened to allow a fine mist of moisture to be ejected from the nozzles 30 during the setting or preboarding cycle.

Each of the nozzles 30 (FIGURE 4) is provided with a water inlet opening or bore 40 through which water under pressure is admitted from the branch supply line 31, when the electric valve 34 is in open condition. As water enters the nozzle 30, it passes through a molded porous filter 41, a spacer 42, a distributing sleeve 43 and is directed around the forward end of diverting element 44 before being discharged in a fine spray through an outlet opening 45.

As shown in FIGURES 2 and 3, the nozzles 30 are positioned to direct a finely divided spray of liquid water onto the foot portions of the hose H to provide addi-

tional moisture in the upper portion of the retort. This additional moisture applied to the foot portions of the hose levels out any uneven heat or humidity absorption by different portions of the hosiery, particularly in the foot portion where there are several areas which are not initially in contact with the boarding form. It has been found that when moisture is sprayed onto the hosiery during the time that they are subjected to saturated steam in the retort, the affinity for dyestuffs is uniformly maintained throughout the length of each hose and also between groups of hose which are preboarded at different times.

While the preboarding apparatus illustrated in the drawings maintains the hose and forms in substantially a vertical position during the preboarding operation, it is to be understood that the spraying means of the present invention could also be used with other types of preboarding apparatus in which the boarding forms and hose are maintained in a horizontal position or in which the boarding forms are arranged in circular fashion. Also, the present invention is not limited to the particular type of spray nozzle illustrated since it is apparent that other suitable types of spray nozzles may be utilized.

In the preboarding apparatus disclosed in the present application, a uniform affinity for dyestuffs is maintained throughout all portions of each hose and between groups of hose which are preboarded at different times. By subjecting the hose to a spray of moisture during the setting or preboarding cycle, any variation of steam, humidity or heat which might prevail between various portions of the hosiery is leveled out within the necessity of increasing the time required to preboard the hosiery.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In an apparatus for preboarding hosiery comprising a retort, a plurality of elongated boarding forms supported within said retort, each of said forms being adapted to receive a hose thereon, and means for introducing water in the form of saturated steam to the interior of said retort to set the shape of the forms in hosiery positioned thereon, the combination therewith of water spray means positioned inside of said retort for directing water in liquid form directly onto selected portions of the form so that only corresponding portions of the hose receive the water spray, and spray control means operable to actuate said spray means during the introduction of saturated steam into said retort.

2. In an apparatus for preboarding hosiery comprising a retort, a plurality of elongated boarding forms supported in a vertical position and in spaced apart side-by-side relationship within said retort, each of said forms being adapted to receive a hose thereon with the foot portion of the hose disposed on the upper end of the form, and means for admitting water in the form of saturated steam to the interior of said retort to set the shape of the forms in hosiery positioned thereon, the combination therewith of a plurality of liquid water spray nozzles positioned inside of said retort and supported to direct a spray directly onto the upper end portions of the forms so that only the corresponding foot portions of the hose receive the water spray and means for directing liquid water to said spray nozzles while the hose are subjected to the saturated steam and pressure.

3. In an apparatus for preboarding hosiery comprising a rectangular retort, having rear, side, top and bottom walls and a door closing the front of the retort, a plurality of elongated boarding forms supported in a vertical position within said retort, each of said forms having leg and foot portions and the foot portions of each

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of said forms being positioned at the upper ends of the forms, each of said forms being adapted to receive a hose thereon, and means for introducing water in the form of saturated steam to the interior of said retort for a predetermined period to set the shape of the forms in hosiery positioned thereon, the combination therewith of liquid water spray means positioned inside of said retort and supported on said rear wall and adjacent said top wall for directing a spray directly onto the foot portions of the forms so that only corresponding portions of the hose receive the water spray, and spray control means operable to actuate said spray means during the hosiery setting period.

4. In an apparatus for preboarding hosiery comprising a rectangular retort, having rear, side, top and bottom walls and a door closing the front of the retort, a plurality of elongated boarding forms supported in a vertical position within said retort, each of said forms having leg and foot portions and the foot portions of each of said forms being positioned at the upper ends of the forms, each of said forms being adapted to receive a hose thereon, and means for introducing water in the form of saturated steam to the interior of said retort for a predetermined period to set the shape of the forms in hosiery positioned thereon, the combination therewith of a

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branch pipe positioned inside of said retort and supported on said rear wall and adjacent said top wall, said branch pipe extending from adjacent one side wall to the other and parallel to said top wall, a plurality of liquid water spray nozzles communicatively connected to and spaced along said branch pipe for directing a spray directly onto the foot portions of the forms so that only corresponding portions of the hose receive the water spray, and means for directing water to said branch pipe during the hosiery setting period.

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