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Fleissner et al.

[11] **3,837,796**

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[54] **PROCESS AND APPARATUS FOR FIXING SYNTHETIC FIBROUS MATERIALS AND DYESTUFFS**

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[21] Appl. No.: **48,805**

Related U.S. Application Data

[63] Continuation of Ser. No. 596,321, Nov. 22, 1966, abandoned.

[30] **Foreign Application Priority Data**

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May 11, 1966 Germany 49170

[52] **U.S. Cl.** ..... **8/21 R,** 8/149.2, 8/176, 68/5.4

[51] **Int. Cl.** **D06p 3/82**

[58] **Field of Search** 8/21, 176, 149.2; 68/5.4

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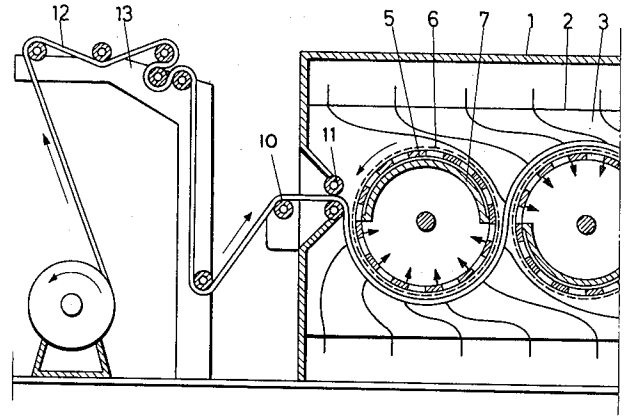
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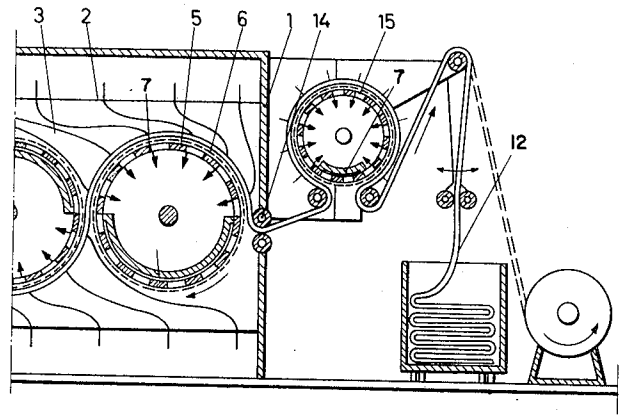
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[57] **ABSTRACT**

The damage to the selvage of a textile fabric and distortion of this fabric when subjected to a thermosetting or thermosoling process is avoided by passing hot air or other inert gas onto and through the fabric while it is supported on a perforated drum which is covered with a fine meshed sieve fabric.

9 Claims, 3 Drawing Figures





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SHEET 1 OF 2

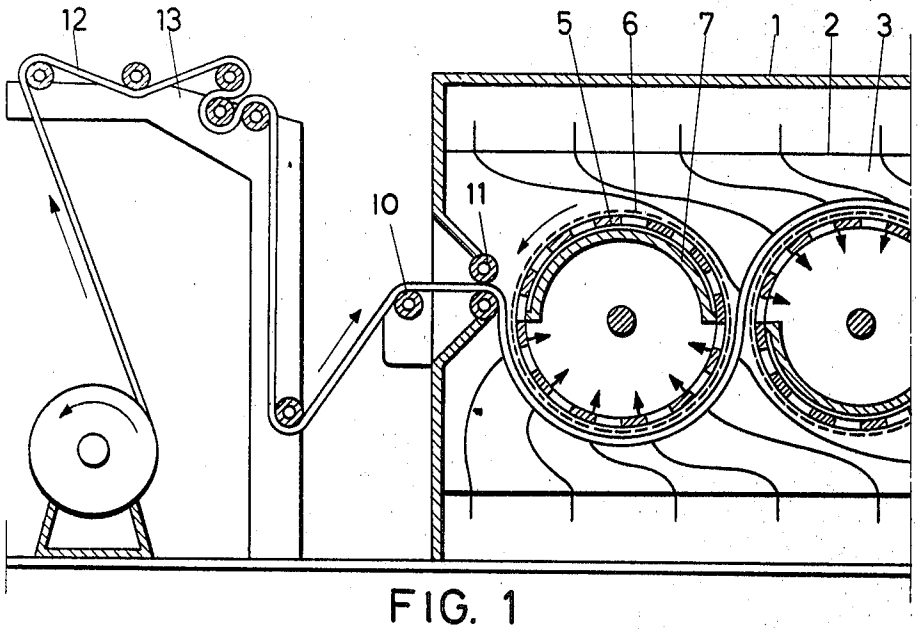


FIG. 1

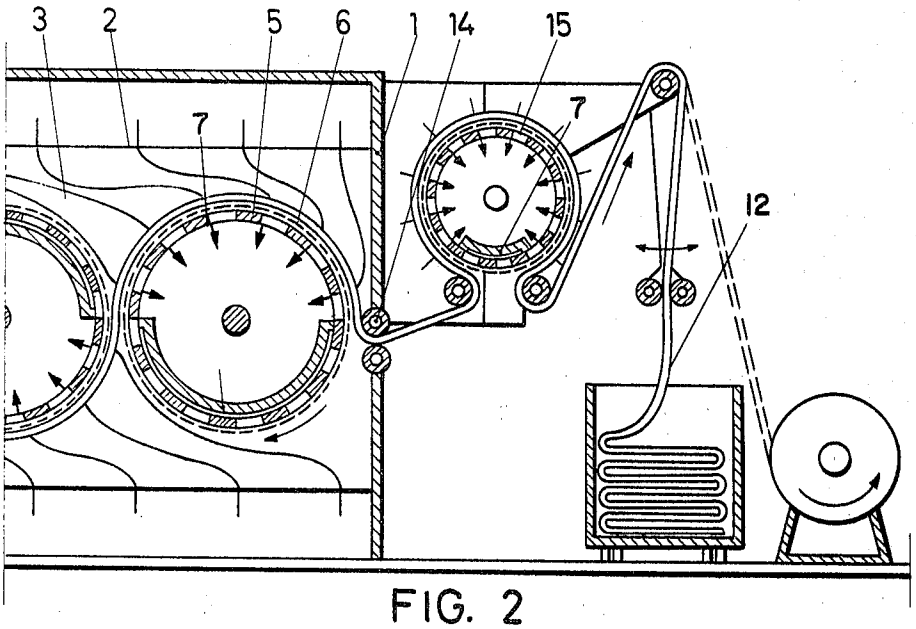


FIG. 2

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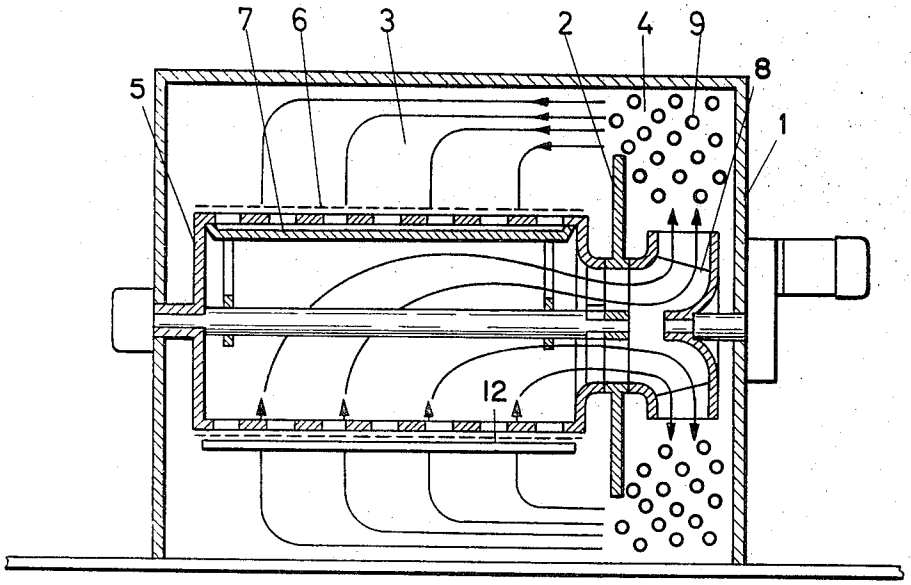


FIG. 3

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PROCESS AND APPARATUS FOR FIXING SYNTHETIC FIBROUS MATERIALS AND DYESTUFFS

This application is a continuation of application Ser. No. 596,321, filed Nov. 22, 1966, and now abandoned.

The present invention relates to a process and an apparatus for fixing synthetic fibrous materials and dyestuffs which are fixed under the action of heat on synthetic fibrous materials.

In general, textile materials made of synthetic fibres or of mixtures of these fibres with natural fibres, are subjected to a fixation, the so-called thermosetting process, in order to provide the synthetic fibres and thus the textile materials with the desired textile-technological properties, such as form stability, recovery from creasing, reduced tendency to pilling and the like. This thermosetting process is generally carried out on so-called stretching frames on which the textile material is fastened at both sides by means of pins or clamps, so-called clips. These clips enable the textile materials to be transported. Heat is conveyed by blowing heated gas, preferably air, from both sides of the frame, the temperatures applied being near the softening point of the synthetic fibres, mostly ranging from about 180° to 230° C. The fixing period required depends, above all, on the textile materials to be fixed. In this mode of operation, it amounts in general to about 20 to 60 seconds.

In this known thermosetting process, considerable difficulties arise in guiding the textile materials because these materials shrink in their warps and wefts during the thermosetting process. It is, therefore, necessary to over-feed the material a little in the direction of its warp and to allow it to sag in the direction of its weft before introducing it into the thermosetting apparatus.

These difficulties in guiding the textile materials involve the risk of deformation, in particular, for delicate knitted fabrics, and, for example, for texturated goods which easily distort. In many cases, the material is slightly damaged at the selvedge for the transport (by putting it on pins) and, in some cases, even the thermosetting effect in the border of the material is impaired.

In the so-called thermosoling process, the textile material which has been printed or padded with preparations of dyestuffs which are fixed on synthetic fibres under the action of heat, is subjected to a thermal treatment. The synthetic fibrous materials are simultaneously fixed by this process. For carrying out the thermal treatment, in many cases, a stretching frame is also used and the same difficulties and disadvantages as described for the thermosetting of synthetic fibres.

We have now found that the disadvantages described above can be avoided and a thermosetting of synthetic fibrous materials as well as a fixation of dyestuffs which are fixed under the action of heat on synthetic fibrous materials, are obtained by passing through the textile material to be fixed, which has been spread over sieves heated gas, preferably heated air, so that the textile material is pressed on the sieves. The textile material is made of synthetic fibres or contains such fibres and it may be printed or padded with preparations containing the dyestuffs mentioned and, if required, thickening agents as well as further auxiliaries.

It is surprising that, according to the process of the invention, by blowing or sucking heated air through the goods from one side or preferably from the two sides alternately heat is considerably more quickly conveyed to the textile material than by blowing heated gas from both sides simultaneously over it. This process permits a considerable acceleration of thermosetting fibres and fixing dyestuffs as compared to the known mode of operation on the stretching frame. According to the process of the invention, it is therefore possible to carry out the thermofixation of the synthetic fibres and the fixing of the dyestuffs at a higher rate of operation. A further advantage of the process of the invention resides in the fact that the textile materials need in general not be fastened with their borders, for example, by putting them on pins because they are pressed on the sieves and are kept there by the hot gas which is blown or sucked through them. By spreading the textile material on the sieves which serve as carrying and transporting elements while allowing for a correspondingly adjusted over-feeding, it is possible to achieve an unhampered shrinkage in the direction of the warp during the thermosetting process. It is, by the way, advantageous according to the process of the invention, to transport the textile material without tension and without fastening it by any mechanical means during the thermosetting process.

The fixing period for the synthetic fibres to be observed according to the process of the invention, depends above all on the materials to be fixed. In general, it is less than 15 seconds, it is considerably less for lightweight textile materials, for example, about 3 to 5 seconds, whereas a fixing period ranging from about 7 to 10 seconds is usual for heavy-weight materials. The fixing temperatures to be applied depend on the synthetic fibres to be fixed as well as on the accompanying fibres present in mixtures of fibres. The fixing temperatures are, if possible, adjusted to a range slightly inferior to the softening point of the synthetic fibres. In most cases, for example in polyamide fibres, polyester fibres and cellulose triacetate fibres, the temperatures chosen are in the range of from about 170° to 230° C, preferably from 185° to 220° C. In synthetic fibres having a lower melting point or, for example, in texturated fibres which are susceptible to heat, correspondingly lower temperatures have to be applied.

As synthetic fibrous materials to be fixed and/or to be dyed there may be used fibrous materials consisting of polyolefins, such as polypropylene, polyamides, linear polyesters, such as polyethylene terephthalates, cellulose triacetate, polyacrylonitrile or polyvinyl chloride, or mixtures thereof with each other, or mixtures thereof with wool, silk or native or regenerated cellulose fibres. The synthetic fibrous materials may be present as fibres or threads or the like or also as endless filaments or in texturated form. They may be present in the textile materials as such, in mixture with each other or in mixture with natural fibres such as wool, silk or fibres of natural or regenerated cellulose. The textile materials may be, for example, woven fabrics, knitted fabrics, fibre fleeces or the like.

The heating period required for a complete fixing of the dyestuffs in the thermosoling process, is also considerably shorter according to the process of the invention, than that required for thermofixing at the same temperature according to usual processes, for example, on a stretching frame. In the process of the invention,

fixing periods of up to about 20 seconds have proved in general to be sufficient depending on the dyestuff and on the textile material used. For most cases, a fixing period ranging from about 4 to 10 seconds may be expected. For very light-weight fabrics and dyestuffs producing a light shade, these periods may even be shorter. The fixing temperatures to be observed according to the process of the invention, have to be adapted to each individual case. They depend above all on the textile materials to be used and on the synthetic fibres of which the textile materials are made. In general, the fixing temperatures range from about 170° to 230° C.

For the fixation of dyestuffs according to the process of the invention, all dyestuffs which can be fixed on synthetic materials under the action of heat, are used. In the first place there are used such dyestuffs which are known as "disperse dyestuffs", for example those of the series of the azo- or anthraquinone dyestuffs among which the azo dyestuffs may be metallized or not metallized. Further suitable dyestuffs are acid dyestuffs such as are used for dyeing polyamide fibres as well as leuco-ester salts of vat dyestuffs which undergo hydrolysis in the presence of acids or acid donators and which are oxidized by oxidizing agents or by atmospheric oxygen under the action of heat to yield water-insoluble vat dyestuffs and which are absorbed, in this form, by synthetic fibres in the same manner as disperse dyestuffs. Suitable are also selected vat dyestuffs such as are known by the trade name of "POLYESTRENE DYESTUFFS" and which may be used in the same manner as disperse dyestuffs.

There may furthermore be used the sparingly soluble salts of basic dyestuffs which in dispersed form are suitable for dyeing polyacrylonitrile fibres and which are obtained, for example, by adding anion-active auxiliaries to solutions of basic dyestuffs.

In the thermosoling process according to the present invention, the synthetic material is simultaneously thermofixed. In the process of the present invention, the dyestuffs are homogeneously fixed over the whole width of the fabric. An essential advantage of the process of the invention is, in addition, the extraordinarily short period of thermofixing which makes a high production rate possible. Thus, when for example, four cylindrical sieves arranged in series are used, the rate of production may amount to up to about 120 m/min. It is thus possible to avoid difficulties which have often occured in the thermosoling process owing to the long fixing period.

In the thermosetting process of the present invention, the textile material is passed over sieves, preferably, cylindrical sieves which serve as carrying and transporting elements for this material. For carrying out the process of the present invention, it is necessary to use a practically hermetically closed casing in which the textile material lying on the sieves, is exposed to circulating hot gases in such a manner that the material is pressed on the sieves. There are preferred rotating perforated cylinders (cylindrical sieves) the interior of which is under suction draft or on the exterior of which an excess pressure acts. The textile material passing over the cylinders is pressed and kept on the sieves by the heated gas which is forced through it, so that a guidance of the textile material by additional means is generally not necessary. In special cases, for example, to completely avoid the shrinkage of the textile material in the weft or to keep it within certain limits or to bring up the material to a certain final width, the textile materials may additionally be fastened at both sides by means of appropriate devices such as pins, cogs or clips. To that effect, there may also be used for example elastic endless belts which are permeable to air (sieve-like) and which are provided with pins or cogs. The belts may be passed through the apparatus together with the textile material during which process the metal belts which have a thickness of only some tenths of a millimeter, lie smoothly on the sieves, for example, cylindrical sieves. In many cases, it will, however, be sufficient only to provide the cooling appliance, preferably, a cooling drum arranged at the outlet of the thermosetting apparatus, with fastening elements and to instal an adjusting device at the inlet of the cooling appliance. With the aid of this adjusting device, the material is stretched to a determined value. To be able to stretch the material more easily it is also possible to heat the adjusting device. It is advantageous to provide the stretching and adjusting device with an infra-red heater.

When cylindrical sieves are used which are under suction draft or excess pressure, the heated gas is sucked or pressed through the textile material into the cylinders from which it is expelled, through the front side, with the aid of ventilators, it is passed over a heating device and once more conducted towards the surface of the cylindrical sieves. The continuous circulation of the gas assures a constant temperature and thus a uniform and quick conveying of heat to the textile material.

In order to prevent the perforation of the sieves from leaving possible marks on the textile material, the perforation design may be finely shaped. It is however also possible, and it is a preferred embodiment of the invention, to cover the perforated cylinder mantle with a preferably seamless fine-meshed sieve which may be called sieve-fabric and on which the textile material then lies. It is also possible to use several layers of sieve-fabric or to form a hose of the sieve-fabric and to push this hose over the cylinder. This has the advantage of a seamless sieve-fabric cover or at least of an extremely fine welding seam which which has no impairing effect on the material to be fixed. Broad soldered seams involve the risk of leaving their marks on the textile material, in particular, in dark tints, that means, that the seam may cause a change of tint. In order to have the sieve-fabric smoothly and without folds spread over the cylindrical sieve, it is advantageous to arrange the sieve-fabric, i.e. the wires of the sieve-fabric in a diagonal order and to fasten the sieve-fabric elastically stretched at both borders, to or on the cylindrical sieves. It is suitable and advantageous that the sieve-fabric which gets in contact with the textile material, has the finest possible meshes, the distance between the wires of the sieve-fabric being advantageously less than 1 mm, if possible, less than 0.3 mm. When perforated cylindrical sieves are used, as is preferred according to the present invention, it is advantageous to limit the stream of the heated gas to the surface of the cylinder which is covered with the textile material, by means of appropriate arrangements such as sheet covers which have been fixedly installed in the interior of the cylinders. In general, the textile material is passed over the cylinders in such a manner as to cover about ⅓ to ½, expediently, not more than ¾ of the cylinder mantle, or

inversely, the cover generally screens about ¼ to ⅔ of the cylinder mantle against the access of gas.

The diameter of the cylinder may be adapted to each individual case and to the industrial requirements. The cylinders chosen generally have a diameter ranging from about 50 to 350 cm, but cylinders of a greater size may also be used, for example, those having a diameter of about 10 m. The breadth of the cylindrical sieves depends on the textile material to be treated. In most cases, it ranges from about 90 to 200 cm, it may however be even greater or smaller if required. It is not an inconvenience if a part of the perforated cylinder mantle is not covered with the material. In extreme cases, i.e. a broad cylinder and a narrow width of the material, the margin of the mantle surface which is not covered with the material, may be covered with a correspondingly adjusted cuff.

It is proved to be advantageous to pass the textile material over several cylindrical sieves arranged in series, the number of the cylinders depending, at a certain production rate, above all on the diameter of the cylinders and on their rotation speed. The textile material is advantageously passed in such a manner that the hot gas is alternately blown on opposite sides through the material.

The number of revolutions of the cylinders is advantageously adapted to each individual case, such as the diameter of the cylinder, the number of cylinders used and the fixing period required. It is also possible to vary the number of revolutions of the cylinders arranged in series so that each cylinder rotates a little slower than its preceding one, whereby an over-feeding of the material is achieved and thus the material can shrink in its warps without tension as a result of the action of heat. Another possibility of achieving an over-feeding of the material is obtained by passing the material to the cylindrical sieves over an introducing arrangement, for example, a pair of rolls, at a speed which is higher than that of the first cylinder. Another decisive influence on the fixing period required and, thus, on the production rate is exercized, in particular, by the speed at which the heated gas is passed through the material. This speed can be regulated by adjusting the number of revolutions of the ventilators as required. The speed of gas furthermore determined by the tightness of the textile material lying on the cylinder, it is generally adjusted to about 0.5 – 5 m/sec. It is advantageous to maintain a speed of the gas of more than about 2 m/sec.

The period of heat transfer to the textile material and of the fixing process may be shortened by further appropriate means. Thus, the material may be pre-heated before being introduced into the thermofixing apparatus, by passing it over heated rolls, by infra-red irradiation or similar arrangements. It is also possible to additionally heat the cylindrical sieves or the textile material in the thermofixing apparatus by appropriate devices, for example, by infra-red irradiators or by electric heaters. When the thermofixing apparatus has a sufficient capacity, it is also possible to do without a preliminary of the padded or printed textile material and to dry and fix the material within the apparatus.

Instead of rotating perforated cylinders, there may also be used other appropriate arrangements. Thus, for example, endless perforated bands (sieve-bands) which run in closed casings and on which the material lies and through which the heated gas is passed, sucked or blown in a similar manner as described for the cylindrical sieves. For this arrangement it is also advantageous to perforate the bands as finely as possible or to cover them preferably, with a fine-meshed sieve-fabric. It is also possible to arrange several of such casings in series and to transfer the arrangement described for cylindrical sieves in analogous manner to the casings containing the sieve-bands.

It is advantageous to cool the textile material after the thermofixing process. The textile material may be passed for that purpose for example over one or several cooling rolls or cold air may be blown on or passed through the material after its leaving the thermofixing apparatus.

As gases serving as heat transferring agents according to the process of the present invention, there may be used all inert, non-inflammable gases or mixtures of gases. Suitable gases are for example nitrogen or carbon dioxide, preferably air. There may furthermore be used steam as such or in mixture with the gases mentioned, advantageously, with air.

An apparatus suitable for use in carrying out the process of this invention is illustrated diagrammatically by way of example in the accompanying drawings.

Referring to the drawings,

FIG. **1** is a longitudinal section which also shows the inlet part of the apparatus.

FIG. **2** is a longitudinal section which shows also the outlet part of the apparatus and FIG. **3** is a cross section of the apparatus.

The cylindrical sieve machine shown in the drawing has a closed casing **1.** The interior of the casing **1** is divided by a wall **2** into a treating chamber **3** and a ventilator chamber **4.** In the treating chamber **3,** cylindrical sieves **5** being under suction draft, are arranged, which sieves are covered with a fine-meshed sieve-fabric cover **6.** In the cylindrical sieves, the suction draft is barred by a cover sheet **7** in known manner at the side which is not covered with the material. The suction draft in the cylindrical sieves **5** is generated by means of impellers **8** arranged in the front side of the cylindrical sieves and installed in the ventilator chamber **4.** The impellers blow the hot air or the treating medium which has been sucked out of the cylindrical sieves **5** back to the treating chamber **3** over heating pipes **9.** At the inlet part of the apparatus, a spreader **10** and a pair of rolls **11** are arranged. It is advantageous to heat the pair of rolls **11** with vapor.

The textile material in webs **12** which may have been printed or padded with dyestuffs fixed under the action of heat, is generally conveyed to the apparatus after having been cuttled up or, as shown in the drawing, after having been batched up. The thermofixing device is preceded by an introducing frame **13** which may also be installed on the machine itself and over which the material is passed to the thermosoling apparatus.

The outlet part of the apparatus is likewise closed or sealed by a pair of rolls **14.** For quick cooling, the material in webs is passed over a cooling drum **15** before being batched or cuttled up. In the example of the invention according to FIG. **2,** the cooling drum is a suction drum. It may however also be replaced by a water-cooled roll.

The following examples serve to illustrate the invention, but they are not intended to limit it thereto.

EXAMPLE 1

A fabric made of polyethylene-terephthalate fibres

having a titer of 3.2 deniers and a tow length of 75 mm, and of wool in a mixing ratio of 55 : 45 was fixed while passing hot air at 185° C through it in an apparatus described as follows:

In essential, the apparatus consisted of four rotating cylindrical sieves of a diameter of 140 cm (diameter of the sieve perforation: 8 mm) which had been covered with a finely porous seamless sieve-fabric (distance of the sieve-filaments: 0.12 mm). The cylinders were arranged in series in a horizontal position in a closed casing. The interior of the cylinders was under suction draft which sucked the air heated to 185° C from outside through the textile material, the sieve-fabric and the perforation into the interior of the cylinders. The halves of the cylinder mantles which were not covered with the textile material, were screened against the draft by cover sheets which had been installed in fixed position in the interior of the cylinders.

The fabric which had been padded and dried, was passed — without tension and provided with an overfeeding — to the rotating cylindrical sieves over a pair of rolls. It was passed over one half each of the cylinders, it was transported to the next cylinder by means of the suction draft whereby face and back of the fabric lie alternately on the cylinders. After having left the thermosetting apparatus the fabric passed over a cooling drum.

The number of revolutions of the cylinder sieves was adjusted in such a manner that the fixing period was **5** seconds. The contents of material in the thermosetting apparatus amounted to 8.8 m and the production rate of the apparatus was about 100 m/min. The shrinkage in the warps obtained during the thermosetting process was **1.1** percent, that in the wefts amounted to 3.3 percent.

When the fabric was fixed on the usual stretching frame, it had to be heated for 30 seconds at **185°** C to obtain a sufficient finish. It shrank in its weft by 3.0 percent and in its warp by 1.1 percent.

When fabrics fixed according to the two different processes, were compared, practically no differences could be observed as regards their shrinkage on ironing and their crease angle both in warp and weft. The same applied to their free shrinkage obtained at 185° for 30 seconds.

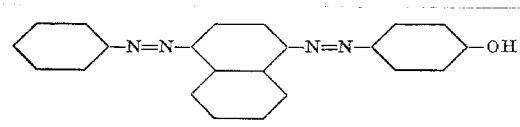
EXAMPLE 2

A fabric made of polyethylene-terephthalate fibres having a titer of 1.2 deniers and a tow length of 40 mm, and of cotton in a mixing ratio of 67 : 33, was subjected to thermofixation at 195° C for 10 seconds in the same apparatus as described in Example 1. The fabric shrank in its weft by 2.8 percent and in its warp by 2.0 percent.

As a comparison, a thermofixation was likewise carried out at 195° C on a usual stretching frame while air was blown on the material from both sides. After a fixing period of 30 seconds, the fabric shrank in its weft by 2.6 percent and in its warp by 1.1 percent. When the fabrics fixed according to both processes were compared, practically no differences could be observed. When measuring the shrinkage on ironing and the free shrinkage obtained at 185° C and for 30 seconds, identical values were found. The determination of the crease angles did also not show essential differences. The angles of the fabric fixed according to the process of the invention were 71° in the warp and 82° in the weft, that of the comparative fabric amounted correspondingly to 73° and 78° C.

EXAMPLE 3

A mixed fabric made of polyethylene-terephthalate fibres and cotton in a mixing ratio of 67 : 33 was padded on a foulard, with a squeezing effect of 55 percent by weight, in an aqueous bath containing per liter 30 grams of the commercial disperse dyestuff of the formula



and whose pH-value was adjusted to 5.5.

The padded fabric was dried at 140° C for 40 seconds and subsequently subjected to a thermal treatment at 220° C for 10 seconds while passing air through it, in the thermosetting apparatus as described below:

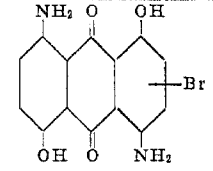
In essential, the apparatus consisted of four rotating cylindrical sieves of a diameter of 140 cm (diameter of the sieve perforation: 8 mm) which had been covered with a finely porous seamless sieve-fabric (distance of the sieve-filaments: 0.12 mm). The cylinders were arranged in series in a horizontal position in a closed casing. The interior of the cylinders was under suction draft which sucked the air heated to 220° C from outside through the textile material, the sieve-fabric and the perforation, into the interior of the cylinders. The halves of the cylinder mantles which were not covered with the textile material, were screened against the draft by cover sheets which had been installed in fixed position in the interior of the cylinders.

The fabric which had been padded and dried, was passed — without tension and provided with an overfeeding — to the rotating cylindrical sieves over a pair of rolls. It was passed over one half each of the cylinders, it was transported to the next cylinder by means of the suction draft whereby face and back of the fabric lie alternately on the cylinders. The contents of material in the thermofixing apparatus amounted to 8.8 m and the production rate of the apparatus was about 50 m/min. when a fixing period of 10 seconds was chosen.

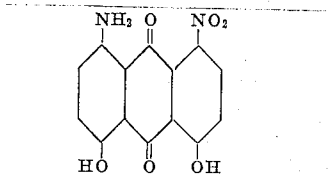
After having left the apparatus the fabric was rinsed in usual manner and was after-treated at 95° C in a bath containing per liter of water 5 ml of sodium hydroxide solution of 32.5 percent strength, 3 grams of hydrosulfite and 2 grams of a non-ionic detergent.

The fabric was subsequently rinsed with hot and cold water. There was obtained a fabric whose polyester portion was dyed deeply orange tint.

When the thermofixation was effected in usual manner likewise at 220° C on a stretching frame, a fixing period of 45 seconds was required to dye the polyester portion a similarly deep tint. The same favorable results were obtained by using in the process of the present invention described above, 30 grams of the blue disperse dyestuff of the formula



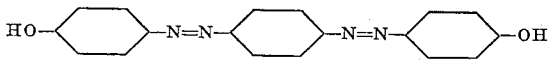
or **30** grams of the blue disperse dyestuff of the formula



instead of the disperse dyestuff mentioned above.

EXAMPLE 4

A fabric made of cellulose triacetate was padded on a foulard with a squeezing effect of 50 percent by weight, in an aqueous bath whose pH was adjusted to 6 and which contained per liter 30 grams of the commercial disperse dyestuff of the formula

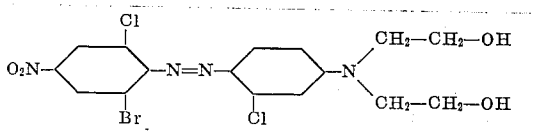


The padded fabric was dried for 40 seconds at 140° C. Subsequently, air which had been heated to 210° C was passed through it for 10 seconds in the apparatus described in Example 3. After having left the thermofixing apparatus the fabric was passed over a cooling drum and subsequently after-treated in the manner described in Example 3. There was obtained a fabric of an intensely yellow tint.

When the thermosoling process was carried out in usual manner on a stretching frame at 210° C, a fixing period of 45 seconds was required to obtain a tint of the same depth.

EXAMPLE 5

A fabric of polyamide was padded on a foulard with a squeezing effect of 50 percent by weight in an aqueous bath whose pH was adjusted to 6 and which contained per liter 40 grams of the commercial dyestuff of the formula



The padded fabric was dried at 140° C for 40 seconds. It was then subjected to a thermosoling process for 10 seconds while passing air which had been heated to 200° C, through it in the thermofixing apparatus described in Example 3.

After having left the apparatus the fabric was passed over a cooling drum and subsequently after-treated in the same manner as described in Example 3. There was obtained a fabric of a deeply red brown tint.

When the thermosoling process was carried out in the same manner on a stretching frame likewise at 200° C, a fixing period of 40 seconds was required to obtain a tint of the same depth.

EXAMPLE 6

A mixed fabric made of polyethylene-terephthalate fibres and cotton in a mixing ratio of 67 : 33 was padded on a foulard, with a squeezing effect of 60 percent by weight, in an aqueous bath containing per liter

2 g of the commercial leuco ester vat dyestuff C.I. No. 60531, (Colour Index 1956, Second Edition, Volume 3)
2 g of ammonium sulfate and
2 g of a reaction product of **1** mol of nonylphenol with 8 mols of ethylene oxide.

The padded fabric was dried for 3 minutes at 120°C. It was then subjected in the thermofixing apparatus described in Example 1 for 25 seconds to an air stream heated to 220°C. The fabric was subsequently treated for 3 minutes at 95°C with an aqueous bath containing, per liter, 2 g of soda and 2 g of soap.

In the fabric thus treated which had a yellow tint, the polyester portion and the cotton portion were dyed the same shade.

When the thermosoling process was carried out in the usual manner on a stretching frame, likewise at 220°C, a fixing period of 50 seconds was required to obtain a tint of the same depth.

Equally good results were obtained when using in the above-described method of operation instead of the above-mentioned leuco ester vat dyestuff each time 3 g of one of the dyestuffs listed below

C.I. No. 73046 — blue tint
C.I. No. 73361 — red tint
C.I. No. 59831 — green tint
C.I. No. 73671 — grey tint
C.I. No. 70801 — brown tint

What is claimed is:

1. In a process for continuously thermosetting synthetic fibrous materials consisting of a polyolefin, polyamide, linear polyester, cellulose triacetate, polyacrylonitrile, polyvinyl chloride or a mixture thereof with each other or a mixture thereof with wool, silk, native or regenerated cellulose fibers, or for continuously thermosoling on said fibrous materials dyestuffs being fixed thereon by heat, or for simultaneously carrying out the aforegoing thermosetting and thermosoling operation in a continuous manner, the fibrous material being exposed continuously to the treatment with an inert gaseous fluid at a temperature between 170° and 230°C., not exceeding 25 seconds, the improvement of which comprises: feeding a fibrous textile material onto a fine-meshed sieve fabric covering a perforated drum zone; passing heated gas through the fibrous material and sieve material from the exterior of said drum zone whereby the fibrous material is pressed onto the sieve fabric and kept in contact therewith.

2. A process as claimed in claim **1** wherein the heated gas is circulated through the fibrous material at a high rate of velocity.

3. A process as claimed in claim **2,** wherein the velocity of the heated gas ranges between 0.5 and 5 m/sec.

4. A process as claimed in claim **3** wherein the velocity of the heated gas is greater than 2 m/sec.

5. A process as claimed in claim **1** wherein the fibrous material is subjected to the thermosetting operation without tension in warp and weft.

6. A process as claimed in claim **5,** and wherein the fibrous material is transported onto the drum zone with an overfeed sufficient to compensate for corresponding shrinkage of the goods in their warp.

7. A process as claimed in claim **1,** wherein the fibrous material is treated alternatively on opposite sides with heated gas.

8. A process as claimed in claim 1, wherein the fibrous material fed is passed alternately over and around successive cylindrical drum zones, whereby the heated gas passes through the fibrous material first in one direction and then in the opposite direction relative to one side of the material.

9. In a process for continuously thermosetting synthetic fibrous materials consisting of a polyolefin, polyamide, linear polyester, cellulose triacetate, polyacrylonitrile, polyvinyl chloride or a mixture thereof with each other or a mixture thereof with wool, silk, native or regenerated cellulose fibers, or for continuously thermosoling on said fibrous materials dyestuffs being fixed thereon by heat, or for simultaneously carrying out the aforegoing thermosetting and thermosoling operation in a continuous manner, the fibrous material being exposed continuously to the treatment with an inert gaseous fluid at a temperature between 170° and 230°C., not exceeding 25 seconds, the improvement of which comprises: feeding in and transporting across the treatment zone a web or band of the said fibrous material in its open width over at least one rotating, perforated drum means of endless conveyor belt means which on its outer, peripheral surface is covered with at least one layer of a fine-meshed sieve fabric; passing simultaneously said heated gas through the fibrous material and the sieve material from the exterior of said drum or conveyor means so that the fibrous material is pressed onto the sieve fabric and kept in contact therewith.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,837,796 Dated September 24, 1974

Inventor(s) Fleissner et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Heading: Item [30], replace "50923" by -- A 50923 -- and replace "49170" by -- F 49170 and F 49171 --.

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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