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CLOTH DYEING AND FINISHING PROCESS AND PRODUCT.

APPLICATION FILED APR. 30, 1918.

1,370,412.

Patented Mar. 1, 1921.

Fig. 1,

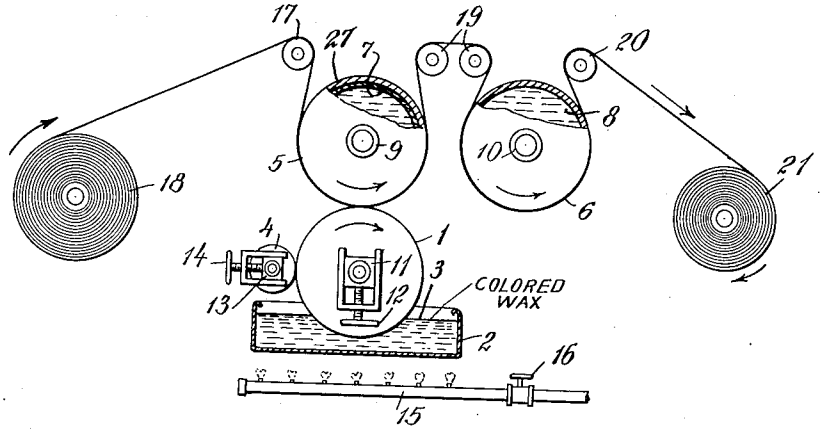


Fig. 2,

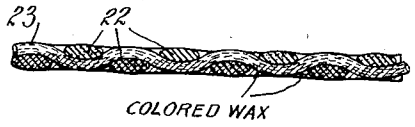
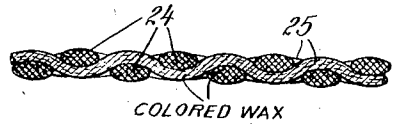


Fig. 3,



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CLOTH DYEING AND FINISHING PROCESS AND PRODUCT.

1,370,412. Specification of Letters Patent. Patented Mar. 1, 1921.

Application filed April 30, 1918. Serial No. 231,665.

To all whom it may concern:

Be it known that I, CHARLES H. CROWELL, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have made a certain new and useful Invention Relating to Cloth Dyeing and Finishing Processes and Products, of which the following is a specification, taken in connection with the accompanying drawing, which forms part of the same.

This invention relates especially to processes of dyeing and finishing cloth and to the resulting colored and calendered or otherwise finished wax-treated cloth produced thereby. Cloth, such as sheeting or print cloth, for instance, can be taken in its unbleached condition as it comes from the loom and rapidly and cheaply dyed and finished by applying thereto a thin and substantially uniform layer of molten colored waxy material, the cloth being simultaneously calendered, if desired, and also chilled if it is desired to maintain its smooth calendered appearance. This treatment may be given to one or both sides of the fabric, and, if desired, such a thin colored waxy layer may be applied to only one side of the cloth so as to penetrate and impregnate the interwoven threads on that side of the fabric which may be simultaneously chilled to prevent undesirable penetration, so that the fibers of the fabric on the untreated side may be maintained in more or less their original condition which is desirable in some cases where the cloth is to be adhesively secured as by gumming or other processes to articles or packages. Although the waxy composition may advantageously be colored by incorporating or dissolving therein suitable anilin or other colors when a dyeing or coloring action on the fabric is to be secured, yet this is not in all cases necessary and the ordinary uncolored paraffin or other waxy material may be used in some cases. Sufficient waxy material may be incorporated with the fabric so as to stiffen one or more sides thereof and this facilitates giving thereto either a smooth calendered finish or an embossed or moiré finish by passing the fabric through suitably surfaced rolls or other pressing devices. By treating in this way suitable close textured cloths or fabrics they may be waterproofed to the desired extent at the same time that they are colored and water-resistant fabric suitable for raincoats, umbrella cloth, tents and awnings may thus be cheaply and effectively produced.

The drawing shows in a somewhat diagrammatic way an illustrative form of apparatus for carrying out this process and samples of fabric produced.

Figure 1 is a longitudinal section through an illustrative form of apparatus.

Fig. 2 is an enlarged cross-section through a portion of treated fabric; and

Fig. 3 is a similar view showing another kind of fabric.

Various kinds of cloth even if in the original unbleached condition in which they come from the loom may be readily dyed, finished and rendered waterproof to the desired extent by these processes. The plain woven clothes commonly called gray goods, such as sheeting or print cloth may be taken just as they come from the loom and the pieces spliced together in any suitable way and wound up into rolls of one thousand yards or so each which facilitates their quick and convenient handling in the dyeing and finishing process. A supply roll 18 of such material may be mounted on the machine and the web of cloth may be led therefrom over a guide roll 17 and more or less around the presser roll 5 of heavy rigid construction and mounting. This roll may in most cases be advantageously formed with a hard smoothly finished periphery and its trunnions 9 may in some cases be formed hollow so that cooling liquid may be supplied during the process to the chilling space 7 within this metallic roll. This presser roll is mounted to coöperate with a color applying or carrier roll 1 preferably of accurately and smoothly finished periphery and having its journals mounted in the adjustable trunnion box or bearings 11 with which the adjusting screws 12 coöperate so as to accurately adjust the position of the roll with respect to the presser roll 5 above. This carrier roll is supplied with the coloring or waterproofing material such as the colored wax 3 which may be contained in a suitable tank 2 and maintained in the desired hot melted condition by any suitable heater, such as the gas heater 15 supplied with gas through the adjusting valve 16. A scraper or doctor device, such as the doctor roll 4, may coöperate with this carrier roll which may, if desired, be positively rotated in unison with the coöperating

presser roll above as indicated by the arrows. The doctor roll 4 may be mounted in adjustable trunnion blocks 13 and have its position accurately adjusted by the screws 14 so that it can be brought as close as desired to the surface of the carrier roll and thus insure a thin substantially uniform layer of the melted colored wax being taken up from the tank and applied to the fabric carried around the presser roll. A minute film or layer of this melted colored waxy material is thus applied to the cloth and forced into the fibers thereof so as to impregnate the fibers more or less uniformly throughout the fabric, or where only a very thin layer is applied the waxy material can be forced into the fibers on the exposed surface of the fabric in a substantially uniform manner so as to color and waterproof them while the other side of the fabric may remain comparatively free from the waxy material. This is of course promoted by rapidly chilling the melted wax after it is applied to or forced into the cloth and the use of a relatively hard or high melting waxy composition is desirable for this purpose and also the use of suitable cooling or chilling devices, such as a cooled or chilled presser roll, or the preliminary chilling or cooling of the fabric considerably below the melting point of the waxy composition applied thereto.

Relatively hard paraffin wax may be used to considerable extent in these waterproofing waxy coloring and treating compositions and for some purposes the waxy material may consist largely or wholly of such hard paraffin having a melting point of 130 to 140 degrees Fahrenheit, more or less, although for some purposes softer, cheaper grades of paraffin may be used especially if incorporated with suitable proportions of harder and higher melting point waxes, such as carnauba and ceresin or the like. Stearic acid may be advantageously used to a considerable extent and where 25 to 40 per cent. of stearic acid is employed in connection with paraffin wax it is possible to introduce, if desired, suitable non-waxy sizing material, such, for instance, as casein or bone glue which have been dissolved with strong water solutions of borax or other suitable material before incorporation with the melted waxy material which must be thoroughly stirred and mixed and kept in a homogeneous condition during the process of application to the fabric preferably by the use of suitable stirring devices in the tank, including the agitating action of the carrier roll 1, for example. In some cases also a relatively small quantity of silicate of soda can be similarly used with the waxy material and these aqueous components which of course involve for best results the use of a suitable amalgamating agent to promote miscibility with the wax, such as stearic acid or various soap compositions, preferably involve the use of supplemental drying arrangements where the moisture is to be completely eliminated from the treated cloth. For general use, however, the waxy composition may be composed of hard paraffin wax of about 135 degrees Fahrenheit melting point with which one to five per cent. of stearic acid may be incorporated. Where, as is usually desirable the waxy composition is to have a coloring or tinting action on the cloth the colors are incorporated with the wax composition as by the incorporation of about a half per cent. more or less of oil soluble anilin or other suitable colors with the wax which may usually be faciliated by dissolving or cutting such oil soluble anilin color in a relatively small proportion of turpentine at increased temperature, if desired, before uniformly mixing the color with the melted waxy composition. In some cases considerably more stearic acid can be used in the waxy composition and this component may in some instances be used to about the same extent as the paraffin wax and more or less Japan wax may be incorporated with this mixture for some purposes. Another illustrative composition may comprise equal parts of paraffin wax, stearic acid and Japan wax and the oil soluble anilin or other colors may be dissolved in the melted wax composition before application to the fabric in this general manner.

Such waterproofing waxy compositions with or without the use of incorporated coloring matter may be applied in liquefied condition in a thin uniform layer to the fabric and where the fabric temperature is such as to simultaneously chill the incorporated waxy material the fabric tends to retain the surface character of the rolls or other elements forced into engagement therewith. Where, for example, the carrier roll 1 has a smooth polished surface and forces or compresses the fabric against the coöperating presser roll 5 of similar character the application of a substantial amount of such relatively hard waxy material tends to retain the smooth or calendered finish on the rapidly moving fabric. As is indicated in Fig. 2 the fabric may be relatively smooth on both surfaces and the filling threads 22 flattened and forced into the interwoven warp threads 23. Fig. 2 also indicates by the cross-hatched lower portion of the sectioned fabric the approximate extent to which the colored wax may penetrate and impregnate the fibers of the fabric, the dissolved color being thus instantly carried into the fibrous fabric to the desired extent so as to permanently color the same as well as give it the desired water-repellent or waterproof properties and somewhat in-

crease its stiffness. A moderately thin application of colored wax of this character may apply 40 to 50 pounds or so of the colored waxy material to a thousand yard length of sheeting or print cloth and where carefully and uniformly applied in this way the fibers on the untreated side of the fabric may be in substantially their original condition and give ample adhesion in connection with glue, gum or generally similar adhesive compositions so that the treated and colored fabric may be adhesively secured to articles, such as books, pads or packages, if the adhesive is applied to the untreated side of the fabric of relatively close woven character. Such a thin wax coating does not give even to the treated side of the fabric an objectionably waxy or greasy appearance or feel, and, indeed, in some cases a light wax treatment of this kind improves the appearance of the fabric. If desired, of course, the fabric may be more completely impregnated with the waxy material and this may be conveniently and cheaply effected by applying the waxy composition first to one side of the fabric and then to the other, or in some cases by applying a heavier or thicker layer of the waxy material to one side of the fabric. In some cases it is, of course, desirable to give the fabric an uncalendered appearance after treatment and this may be effected by forming the presser roll 5 with a relatively soft or yielding body or surface 27, the thickness of which is considerably exaggerated, as for instance, by coating it with rubber or the like or winding around the roll a number of layers of cloth which are secured in this position before the web of fabric is led between the presser roll and the coöperating carrier or wax applying roll. In this way treated or waterproofed colored fabric may be produced in which the threads project to about the same extent as in the original untreated cloth, as is indicated diagrammatically in Fig. 3, the filling threads 24 being indicated as more or less projecting beyond the adjacent warp threads 25. In this instance, the waxy material is indicated as having more or less penetrated and impregnated the entire fabric as is indicated by the widely spaced cross-hatching of this figure and where colored waxy material is used the color may in this way be carried thoroughly into and through the interwoven fibers of the cloth.

One or more chilling rolls may act on the fabric before or after the waxy material is applied thereto, and in Fig. 1 a second chilling roll 6 is indicated as coöperating with the fabric web subsequently to the presser roll 5. By the use of suitable guide rolls 19. 20, the web of fabric may be led around these chilling rolls throughout a greater part of their circumference and the chilling roll 6 may be provided with an internal chilling space 8 and with hollow trunnions 10 as previously described. After the fabric has been chilled and dried to the desired extent where the composition contains more or less water or other volatile material, it may be rewound or packaged in any suitable way, as for instance, by winding the fabric web on the rewinding roll 21 which makes the entire process a continuous one which can continue in a substantially uniform manner while the long webs of one or two thousand yard lengths are being treated. The cloth may be dyed and finished in this way at a relatively rapid rate and the cloth web may, for example, be passed through the machine at speeds of a number of hundred feet per minute which at a single operation dyes or colors the cloth to the desired shade and also waterproofs and stiffens it to the extent desired with a minimum of time and expense in marked contrast to the usual bleaching, dyeing and finishing processes generally employed. It is of course understood that where it is not desirable to directly use the large rolls of the finished fabric such large rewound rolls as 21 may be passed through suitable winding machines and wind up into bolts or smaller rolls or slit or divided into narrow strips of sheets for various purposes.

This invention has been described in connection with a number of illustrative embodiments, forms, proportions, materials, conditions and orders of steps and apparatus and parts for carrying out the same, to the details of which disclosure the invention is not of course to be limited, since what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims:

1. The process of dyeing and finishing unbleached cloth which comprises applying to and momentarily forcing against one side of the cloth a thin substantially uniform layer of molten colored waxy waterproofing material comprising paraffin wax in which anilin coloring matter has been dissolved so that such waxy material penetrates and impregnates the interwoven threads on one side of the cloth and colors the same, and increases the weight of the cloth not more than about a twentieth of a pound per square yard, and simultaneously calendering the cloth and chilling its untreated side to produce a calendered colored waterproof cloth in which the fibers of the untreated side are in substantially their original condition.

2. The process of dyeing and finishing cloth which comprises applying to one side of the cloth a thin substantially uniform layer of molten colored waxy material comprising paraffin wax in which anilin coloring matter has been dissolved so that such waxy material penetrates and impregnates

the interwoven threads on one side of the cloth and colors the same, and increases the weight of the cloth not more than about a twentieth of a pound per square yard, and simultaneously chilling the untreated side of the cloth to produce a colored cloth in which the fibers of the untreated side are in substantially their original condition.

3. The process of coloring and finishing cloth which comprises forcibly applying to one side of the cloth a thin substantially uniform layer of molten colored waxy material of high melting point comprising paraffin wax so that such waxy material impregnates the interwoven threads on one side of the fabric and colors the same, and simultaneously calendering the fabric to produce a calendered colored fabric.

4. The process of coloring and finishing cloth which comprises applying to one side of the cloth a thin substantially uniform layer of molten colored waxy material so that such waxy material impregnates the interwoven threads on one side of the fabric and colors the same.

5. The process of finishing cloth which comprises applying to one side of the cloth a thin substantially uniform layer of molten waxy material comprising paraffin wax in which anilin coloring matter has been dissolved so that such waxy material penetrates and impregnates the interwoven threads on one side of the cloth and increases the weight of the cloth not more than about a twentieth of a pound per square yard, and simultaneously chilling the untreated side of the cloth to produce a cloth in which the fibers of the untreated side are in substantially their original condition.

6. The colored and finished cloth fabric comprising woven cloth having the fibers on one side thereof penetrated and impregnated with colored waxy waterproofing material comprising large proportions of paraffin wax in which anilin coloring matter has been dissolved so as to color and waterproof the treated side of the fabric and increase the weight of the cloth not more than about a twentieth of a pound per square yard, said fabric being calendered on its treated side while the exposed fibers on the untreated side of the fabric are in substantially their original condition.

7. The colored and finished cloth fabric comprising woven cloth having the fibers on one side thereof penetrated and impregnated with colored waxy waterproofing material comprising large proportions of paraffin wax in which anilin coloring matter has been dissolved so as to color and waterproof the treated side of the fabric and increase the weight of the cloth.

8. The finished cloth fabric comprising woven cloth having the fibers on the one side thereof impregnated with waxy waterproofing material comprising paraffin wax so as to waterproof the treated side of the fabric and increase the weight of the cloth not more than about a twentieth of a pound per square yard while the exposed fibers on the untreated side of the fabric are in substantially their original condition.

9. The finished cloth fabric comprising woven cloth having the fibers on the one side thereof impregnated with waxy waterproofing material comprising paraffin wax, while the exposed fibers on the untreated side of the fabric are in substantially their original condition.

CHARLES H. CROWELL.

Witness:
CAROLYN F. HINE.