

June 25, 1946.

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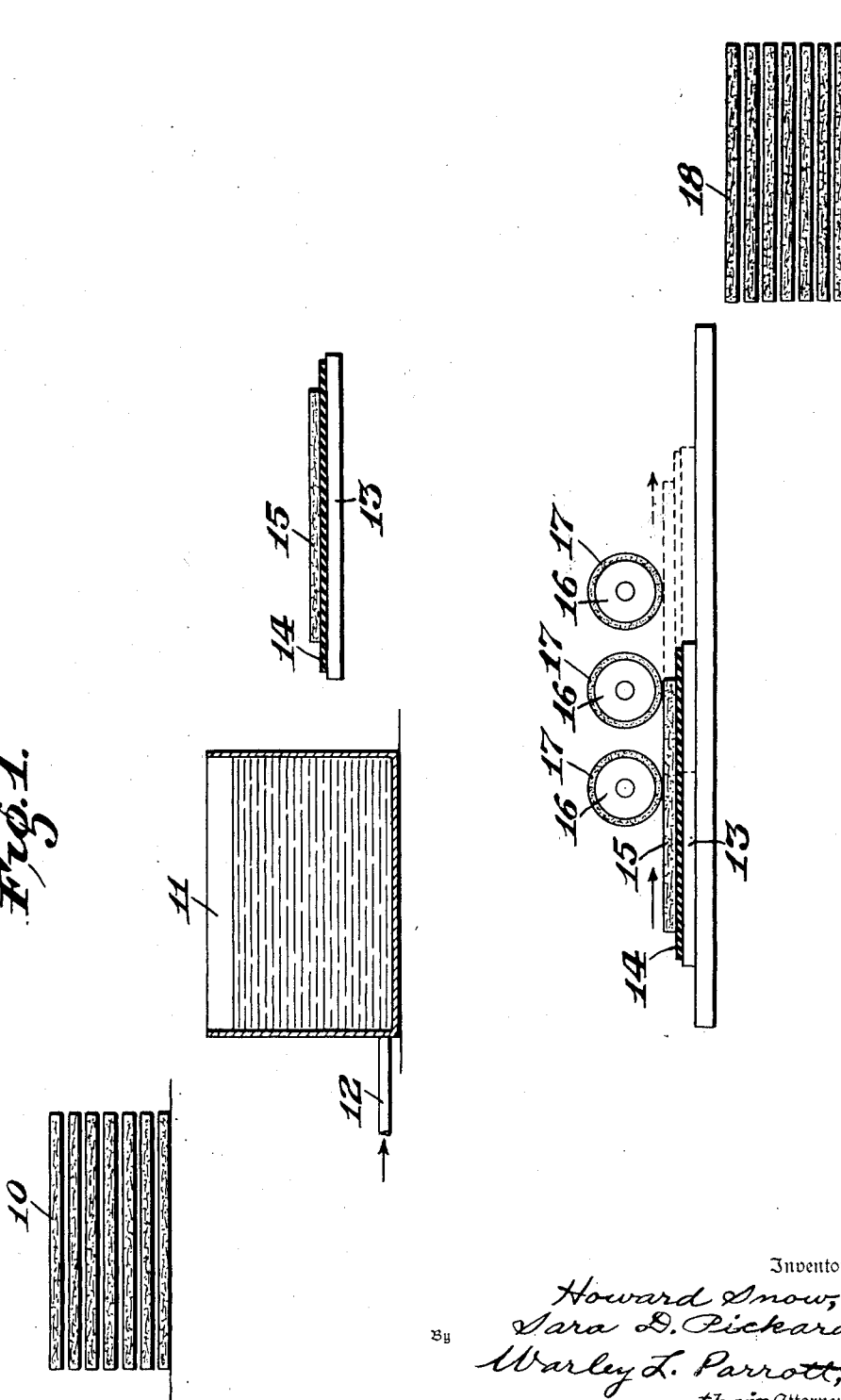
2,402,689

SURFACE FINISHING IMPREGNATED FABRICS

Filed April 12, 1944

2 Sheets-Sheet 1

Fig. 1.



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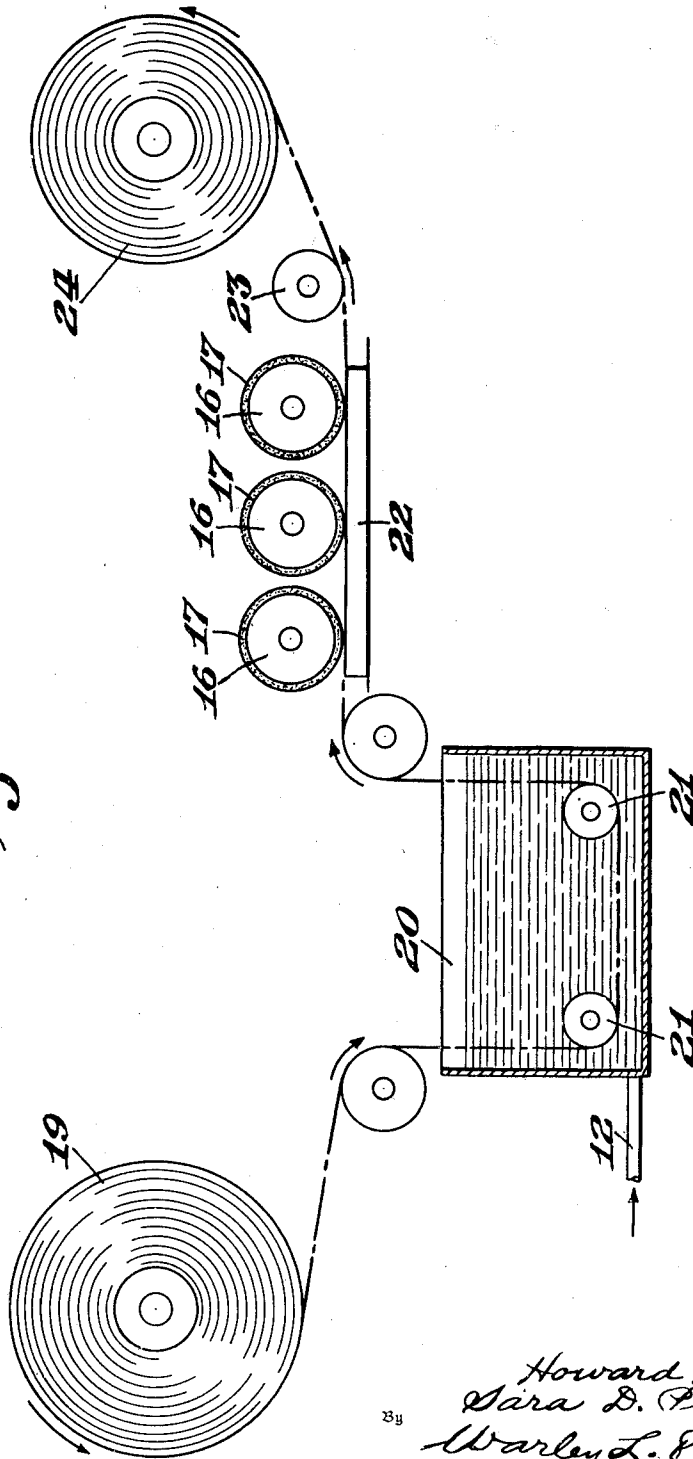
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2 Sheets-Sheet 2

Fig. 2.



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UNITED STATES PATENT OFFICE

2,402,689

SURFACE FINISHING IMPREGNATED FABRICS

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Application April 12, 1944, Serial No. 530,648

5 Claims. (Cl. 51-281)

1

2

Our invention relates to impregnated fabrics and more particularly to a method for surface treating such fabrics to remove incrustations of the impregnating material and to obtain the desired physical characteristics of such fabrics.

When fabrics are impregnated with resinous thermosetting materials and subsequently heat treated or "cured," as it is known in the art, the impregnating materials thicken and harden and have a tendency to form a stiff, hard crust on the surface of the treated fabric. Heretofore the surfaces of such fabrics have been ground with an emery wheel or wire brush to produce a leveling of the surface and to provide flexibility. These operations are subject to the disadvantage of some disintegration of the fabric or fibrous material, resulting in weakening of the strength of the finished product. Also, the excess friction that is generated in these operations frequently produces burning or blistering of the fibers, which likewise results in loss of strength.

In accordance with our invention, we have developed a procedure by which the desired surface characteristics of the impregnated fabric can be obtained without any substantial deterioration of the product and at the same time overcome the usual stiffness of the impregnated product caused by the hardened or cured resinous constituents. The result of this procedure is a uniformly smooth surface, on a flexible product which has relatively great strength and water resistance and which possesses sufficient flexibility to make the product useful as a substitute for leather in many instances.

The characterizing features of our new process comprise a preliminary heating and partial softening of the impregnated fabric in hot water or steam, which also wets the surface of the fabric to some extent; and the subsequent abrading of this softened wet product by bringing it into moving contact with rotating rolls having an abrading material or surface. The preliminary heat treatment conditions the impregnated fabric so that it may be abraded more easily and prevents the scorching or burning of high spots on the fabric. Furthermore, the softening and wetting effects of the preliminary treatment produce somewhat of a "flow" of the surface materials during the abrading operation, so that the final product has a smooth, uniformly abraded surface. This operation effects removal of the crust of impregnating materials and thereby imparts flexibility to the otherwise stiff product.

As an illustrative but non-limiting example of the method of our invention, the following typ-

ical commercial operation which has been practiced on a substantial scale, is given:

A cotton fabric of the nature of cotton belting or "drier felt" material is impregnated with a resinous chemical composition, such as for example, the composition disclosed in a co-pending application Serial No. 490,877, filed June 15, 1943. The impregnated fabric is "cured" by heating to a temperature of about 250° F. for a period of about 24 to 48 hours, after which it is then ready for surface treatment. The impregnated and cured fabric is placed in a heated water bath, for example, a barrel containing water continuously heated by introduction of live steam. The product is permitted to remain in the hot water for a period of a minute or more to effect softening and wetting of the material as described above. It is then placed upon a movable support or carriage and passed through a sanding machine having a plurality of rolls covered with "sand paper." The fabric is brought into contact with the surface of these rotating rolls and the crust or surface impregnant on the fabric is quickly removed and without generation of any heat sufficient to damage the fabric.

The term "sand paper" as used herein is intended to apply to those types of sand paper or emery cloth or the like that are adapted for wet sanding or abrading operations generally, and particularly for the impregnated fabric of this invention. Illustrative examples of such sand paper, which we have used successfully in commercial operations, are waterproof "Silicon Carbide Cloth #24-X," and "Speed-Wet Durite Cloth #24-X," manufactured by the Behr-Manning Company, Troy, New York. These sandpapers have somewhat medium size grit particles which are particularly suited for wet sanding of the product of this invention. If the grit is too coarse, it will mark the fabric and if it is too fine, it will not remove the abraded dust efficiently.

The fabric may be abraded only on one side as described above; or if desired, it may be turned over and passed again through the abrading machine, so as to give the other side of the fabric similar treatment. After this operation, the impregnated fabric is ready for drying, packaging and shipment.

Instead of the above batch type of operation, the method of our invention may be carried out in a continuous manner from a continuous roll of the fabric or web material which would be passed slowly through a heated water bath and then through the sanding machine and after-

3

wards wound or otherwise packaged for use and shipment.

The hot water treatment referred to above may be augmented or modified by the use of chemicals where special surface effects on the material are desired. For example, if a somewhat softer or smoother or slicker finish is required for the abraded material, we have found that markedly improved results along these lines may be obtained by use of waxy emulsions in the treating bath. Special surface effects may also be produced by the use of water soluble phenol formaldehyde resins, and by drying oil or varnish emulsions. A non-limiting but illustrative example, is the use of a water emulsion containing a water dispersible wax in combination with an aluminum acetate water repellent material such as the product commercially known as "Paratex," sold by the Charlotte Chemical Laboratories, Inc., Charlotte, N. C. These emulsions or solutions facilitate the grinding operation as well as conditioning the surface of the fabric, so that an extremely smooth and uniformly ground surface is finally obtained. When it is desired to color the fabric suitable dyes may be incorporated in the above water emulsion.

The method of our invention may be carried out with varying types of equipment, and in the accompanying drawings we have illustrated diagrammatically two respective examples of batch and continuous systems.

Figure 1 is a diagrammatic illustration of the batch system; and

Figure 2 is a diagrammatic illustration of the continuous system.

In the batch system shown in Fig. 1 of the drawings, the stack or other supply of impregnated and cured fabric sheets are illustrated at 10 and the "flow" of the procedure or method is shown in the succeeding parts of this figure. These comprise a treating bath 11, which may contain only water or may comprise one or more of the waxy, resinous or oil emulsions mentioned above. Suitable means for heating this bath to a temperature of about 175° F. are supplied. This may be in the form of live steam introduced through a steam pipe shown at 12.

After the fabric sheet has been conditioned in the treating bath 11, it is placed upon a supporting member which serves to hold it in proper, unwrinkled position while it is being abraded. This supporting member comprises a wooden board 13 which has a rubber mat covering 14 for holding the conditioned fabric sheet 15. This rubber mat functions in a most practical and efficient manner to hold the fabric sheet in place and in a flat, smooth condition while it is being passed in contact with the series of abrading rolls shown at 16. These rolls may be of metal or other suitable material and have a sand paper covering indicated at 17. The moisture and/or chemical emulsion previously applied to the treated fabric sheet serves to wet the sand paper and effect the desired low-temperature abrading, to provide a smooth, unscorched surface on the finally treated sheets which are shown at 18.

The continuous method diagrammatically illustrated in Fig. 2 shows a supply roll 19 of the treated fabric in continuous web form. The treating bath is indicated at 20 and the web material is guided therethrough by means of guide rolls 21. Following the treating bath, the web is passed under and in contact with the rotating rolls 16,

4

and is held in movable, frictional contact there- by by a suitable support 22. The finished material is guided around roll 23 and wound upon finishing roll 24.

Various other modifications and changes may be made in the foregoing procedure, materials and conditions without departing from the scope of our invention some of the novel features of which are defined in the appended claims.

We claim:

1. A method of abrading without deleteriously affecting impregnated fabric material treated with an impregnant which tends to thicken and harden upon curing to form a stiff, hard crust on the surface of the impregnated material, but which is slightly heat-softenable so that the impregnated material may be rendered limp by heating, comprising heating and wetting the impregnated material sufficiently to cause incipient softening of the impregnant and wetting of the surface of the material, and then bringing the thus treated material into abrading contact with rotating rolls having abrading surfaces so as to remove the crust of the impregnant from the material and provide a uniformly abraded surface thereon.

2. A method of abrading a resinous impregnated fabric treated with a resinous impregnant which tends to thicken and harden upon curing to form a stiff, hard crust on the surface of the impregnated fabric, but which is slightly heat-softenable so that the impregnated fabric may be rendered limp by heating, said abrading being carried out to remove the surface incrustating materials and impart flexibility to the fabric without damaging the strength thereof, comprising heating the fabric to effect slight softening of the impregnating material on the surface of the fabric, wetting said surface and passing the thus treated material over an abrading surface.

3. A method of abrading a resinous impregnated fabric to remove the surface incrustating materials and impart flexibility to the fabric without damaging the strength thereof, comprising immersing the impregnated fabric in hot water for a short length of time to effect partial softening and surface wetting of the impregnated material, and then bringing the wet fabric into moving contact with rotating abrading rolls.

4. A method of abrading a resinous impregnated fabric to remove the surface incrustating materials and impart flexibility to the fabric without damaging the strength thereof, comprising immersing the impregnated fabric in an emulsion adapted to wet the surface of the material and to facilitate surface grinding, and bringing the thus treated fabric into moving contact with rotating abrading rolls.

5. A method of abrading a resinous impregnated fabric to remove the surface incrustating materials and impart flexibility to the fabric without damaging the strength thereof, comprising immersing the impregnated fabric in a heated aqueous waxy emulsion to wet and condition the surface of the fabric for abrading, and abrading the thus treated fabric surface by bringing it into moving, frictional contact with sand paper, so as to remove the surface crust of the impregnating material from the fabric and provide a smooth, slick finish thereon.

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