June 30, 1942. W. F. GRUPE 2,288,188

METHOD AND APPARATUS FOR MAKING COATED FABRICS

Filed June 20, 1939

FIG. 1

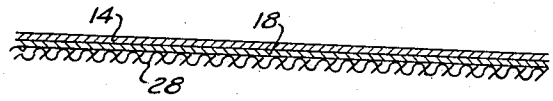
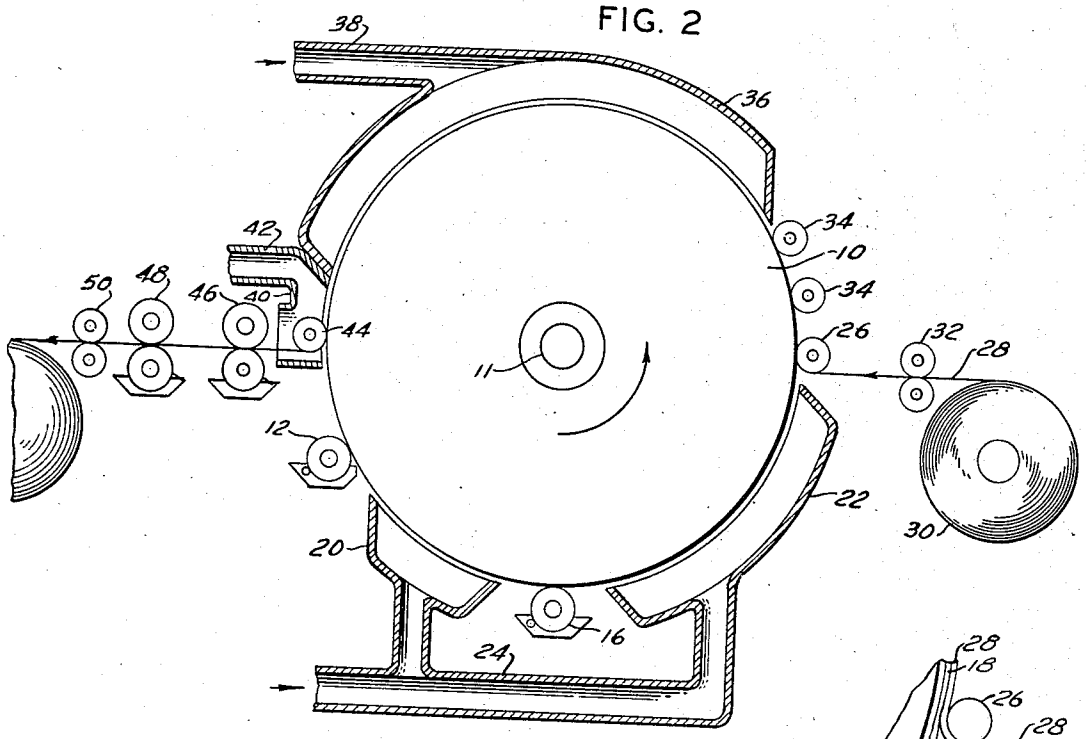


FIG. 2



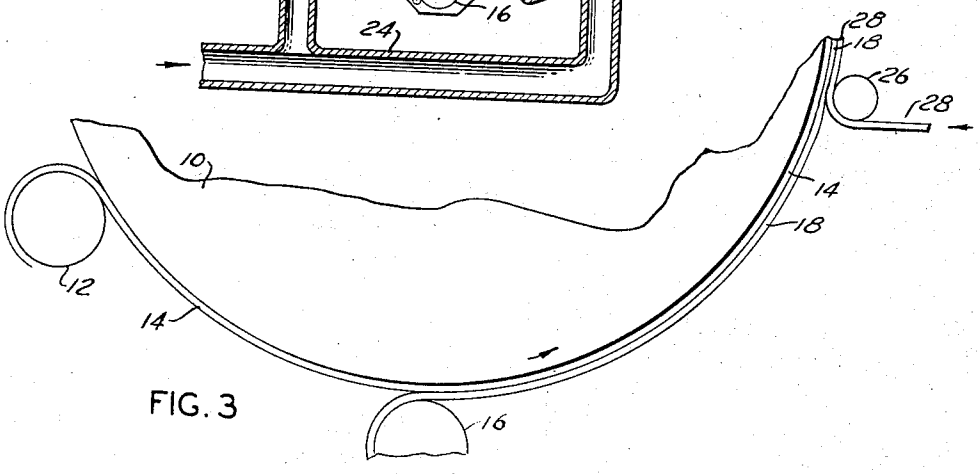


FIG. 3

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METHOD AND APPARATUS FOR MAKING COATED FABRICS

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2 Claims. (Cl. 91—55)

This invention relates to the art of coated fabrics, and aims to provide an improved method and apparatus for making them. The present application is a continuation in part of my copending application Serial No. 70,383, filed March 23, 1936.

In the production of coated fabrics, such as oilcloth and artificial or simulated leather, according to methods now in use, it is customary to put the piece or web of fabric through several different treatments before the finished material is produced. Usually the complete process is not continuous and it is necessary to wind and unwind the material for each separate treatment. Because of the materials now used in making coated fabrics and the type of equipment now available for this purpose, the coating is applied in many layers. Apparatus required for the application of each layer is cumbersome and utilizes a considerable amount of space since each layer is dried by passing the fabric or web through a large drying chamber where it is arranged in festoons and passed through very slowly. Between successive coats, it has been necessary to calender the partially completed material in an effort to obtain a smooth surface, since the coating tends to follow the surface contour of the fabric. In short, the entire method and apparatus are antiquated and impractical and entirely unsuited for modern production methods and schedules.

I have discovered that most of the difficulties in prior methods of producing coated fabrics may be successfully overcome and improved coated fabrics, such as oilcloth and artificial leather produced by a method, and with an apparatus, involving one continuous operation.

In accordance with my invention, all of the coating layers required in the finished product may be cast successively upon the surface of a casting drum or other suitable casting surface, and then the web or piece of fabric is brought into contact with the superposed layers under pressure and joined thereto. While in contact with the casting surface the thus coated web is dried and finally stripped from said casting surface and passed through any desired finishing, cutting and rewinding devices. By a selection of proper coatings, each having individual and selected characteristics, any desired resultant product may be obtained.

In carrying out my invention, I prefer to use a large casting drum having a smooth surface from which the final product, in its dried and finished state, may be readily stripped. The outside or final surface layer is first cast upon the drum, and this layer should consist of some material, having good stripping and film forming characteristics, such as a cellulose compound, which will dry comparatively quickly and be easily removed from the casting surface. The next layer or layers applied to the drum and upon the exposed surface of the first cast layer are the filler and body materials and should possess the property of adhering firmly to the first or prior cast layer and also to the fabric which is subsequently to be brought into contact therewith. Such materials are usually of a plastic and sticky nature so that they will be forced into the interstices of the fabric when pressure is applied, and generally consist of mixtures of oil and clay. Before bringing the web of fabric into contact with the cast layers, it may be desirable to heat or otherwise set them slightly so that a proper bond will be assured. The web is then fed to the drum and brought into contact with the superposed layers under pressure, sufficient pressure being applied, by means of pressure rolls, to produce a firm and permanent bond between the fabric and the coating layer. The thus coated fabric is then dried by the application of heat over the remaining arc of the drum; and is finally stripped from the casting surface and passed through any desired printing, cutting and rewinding devices.

The above and other features and objects of my invention will become apparent upon consideration of the following detailed description and the accompanying drawing, in which:

Fig. 1 is a fragmentary vertical section through a web of fabric coated according to my invention;

Fig. 2 is a diagrammatic vertical section through one form of apparatus with which my invention may be practiced; and

Fig. 3 is an enlarged fragmentary elevational view, partly in section, showing the lower portion of the casting drum and the manner of casting the coating layers thereon.

As shown in the drawing, a large casting drum 10, having a smooth peripheral molding or casting surface which may be plated with chromium or otherwise suitably polished, is mounted on a shaft 11 and rotated in any convenient manner in the direction of the arrows indicated in Figs. 2 and 3. The width of drum used in any particular instance will depend largely upon the width of fabric which is to be coated. A suitable coating or casting device is positioned at the bottom of the drum 11 and may comprise a reverse roll coater 12 which is adapted to apply or cast

the first layer 14 upon the surface of the drum 10. Such first layer preferably comprises some composition, such as a cellulose compound, which, when dried, may be readily stripped from the casting surface. The following is a typical example of such a first coating:

	Per cent
24 ounce, 15–20 seconds R. S. nitrocellulose solution	60
Pale blown oil (medium body)	23
Ethyl acetate	17

A second coating or casting device 16 is likewise positioned at the bottom of the casting drum and beyond the coater 12 in the direction of rotation of the casting drum 10. This second coating device 16 is adapted to apply or cast a coating layer 18 upon the exposed surface of the first applied coating layer 14. This second applied layer preferably comprises a suitable material which will give body to the ultimate coated fabric, and which is further of such a character that it will adhere firmly both to the first applied layer and to the fabric which is to be brought in contact therewith. I have found that mixtures including oil and clay or other body or filler material are suitable for the subsequent layers. For example, as a second coat for contact with the fabric I may use the following:

	Per cent
Ground kaolin	57
Blown linseed oil (medium body)	13
Starch solution (12% starch in 12% caustic soda)	10
12% Caustic soda solution	2
Water	18

It will be understood that pigments may be included with the clay, if desired. A typical example of a pigmented material which produces satisfactory results as the coating adjacent the first applied cellulose coating is the following:

	Per cent
Kettle bodied linseed oil	31
Lithopone	58
Ultramarine blue	1
V. M. and P. naphtha	10

Both of the layers 14 and 18 are cast upon the drum 10 in a plastic or fluid status and are of such a character that they may be partially set or matured by applying heat thereto. For this purpose, a duct or hood 20 may be arranged between coaters 12 and 16 for initiating the setting of the first applied layer 14. Similarly, a duct or hood 22 may be provided beyond the coater 16 for applying a heating medium to the last applied layer 18. A conduit 24 is connected to each of the hoods 20 and 22 for supplying heated air or other fluid thereto, although it will be understood that any suitable heating means may be used for partially setting or drying the layers applied or cast upon the surface of the drum 10.

Any treatment given to the second applied layer 18 should be of such a nature that the material is in a relatively soft and adhesive state when it reaches a feed or pressure roll 26 which is positioned beyond the drying hood 22. It will be apparent, then, that at this point the cast superposed layers are in condition to have the fabric, or other material to which they are to be applied, brought into contact therewith. Accordingly, a web 28 of uncoated or coated fabric, supplied from a suitable roll 30 is fed by means of feed rolls 32 to the pressure roll 26 and is passed between said pressure roll and the cast layers adhering to the surface of the casting drum. As indicated in Fig. 3, the pressure roller 26 is so set with reference to the surface of the casting drum that the cast layers 14 and 18 and the web of fabric 28 will be squeezed together and the soft adhesive layer 18 will be partially forced into the interstices of the fabric to produce a firm bond. However, the setting of said pressure roller 26 need not necessarily be such as to produce the desired final thickness in the coated fabric; and any further compression of the coated fabric may be obtained by means of additional pressure rollers 34, 34 arranged in operative relation with respect to the drum 10 and above and beyond the pressure roller 26. I have shown, in the present instance, two such additional pressure rollers 34, but it is to be understood that any desired number may be employed depending particularly upon the type of materials used as the coating layers, the fineness of texture of the fabric, and the amount of compression desired.

As the casting drum rotates and the coated fabric passes beyond the last pressure roller 34, said fabric is substantially in its final state of compression, any further reduction in the thickness thereof being caused only by the further and complete setting and drying of the coating material. To facilitate this final and complete drying of the coated fabric, a duct or hood may be provided over the major portion of the upper half of the drying drum and furnished with heated air or other drying fluid by means of a conduit 38. Should it be desired to accomplish the final drying of the coated web in more than one stage, an additional hood 40 supplied with heated air of a different temperature through a conduit 42 may be arranged adjacent the hood 36. Whatever the thermal treatment that is applied to the coated web, it should be such that said web is sufficiently dry that it may be stripped from the casting surface when it reaches a guide or stripping roller 44. Preferably the first applied and outside layer 14 is completely dry at the point of stripping and the second and adhesive layer 18 has so little solvent left therein that there will be no remoistening of the layer 14.

In connection with the drying of the coated layers 14 and 18 and the finally coated fabric, the following may be noted. First, the layer 14 is dried from both sides thereof by the heated drum 10 and the hood 20 and all during its travel on the casting surface is heated by the drum 10. Next, when the layer 18 is applied, it will receive heat by conduction through the layer 14 and also on its exposed surface by means of the hood 22. Finally, heat is applied to the fabric side of the completely coated product by means of the hoods 36 and 40.

After being stripped from the casting surface at the guide roller 44, the completely coated fabric may be printed or otherwise decorated on the coated side thereof, in any desired number of colors, by means of the printing units 46 and 48. It will be understood, however, that the printing units could be arranged to print on both sides of the completely coated fabric, should this be desired. Feed rollers 50 may be provided to pass the coated web to a suitable cutter (not shown) or it may be rewound as indicated.

From the foregoing description, it will be apparent that by means of the apparatus and method herein disclosed a web of fabric may be treated in one continuous operation to produce a finished and marketable coated fabric, such as commercial oilcloth or simulated leather. This

product may have any desired characteristics depending upon the type of materials used as coatings. In all cases, the outside surface thereof will be perfectly smooth and possess, in effect, a duplicate of the casting or molding surface of drum 10, hence being free from the irregularities in the surface to which it is applied. While I prefer to apply the body and filler coating materials in a single layer, said materials may be applied in a plurality of layers, if desired. Various other changes may be made in the apparatus and method herein disclosed, and certain features or steps may be employed without others without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. A method of making oilcloth or similar material, which comprises casting a first layer of a film forming medium upon a smooth casting surface; partially setting said first layer by applying heat thereto applying upon the exposed surface of said film forming layer a layer of material including oil and clay and being of such consistency as to adhere to said film forming layer and to be adapted to fill the interstices of a web of fabric and adhere to the fabric; partially setting said last mentioned layer by applying heat thereto, and then bringing a web of fabric into contact with the second applied layer and successively applying positive pressure thereto so as to insure a bond between the cast layers and said fabric; finally heating the thus coated fabric while in contact with said casting surface so as to dry said coated fabric; and then stripping said coated fabric from said casting surface.

2. Apparatus for continuously producing coated fabrics comprising a continuously moving casting surface; coating means for applying a first layer of a film forming material upon said casting surface; heating means for partially setting such first applied layer; means for applying a second layer of a different coating material upon the exposed surface of the first applied layer; means for bringing a web of fabric into contact with said second layer; means for successively applying positive pressure to the web and cast layers; heating means for drying the materials while adhering to the casting surface; and means comprising a roll for stripping the web with the cast layers bonded thereto from said casting surface.

WILLIAM F. GRUPE.