March 21, 1944. F. E. DRUMMOND 2,344,807

PROCESS OF APPLYING COATING FILMS

Filed May 16, 1940

FIG. 1

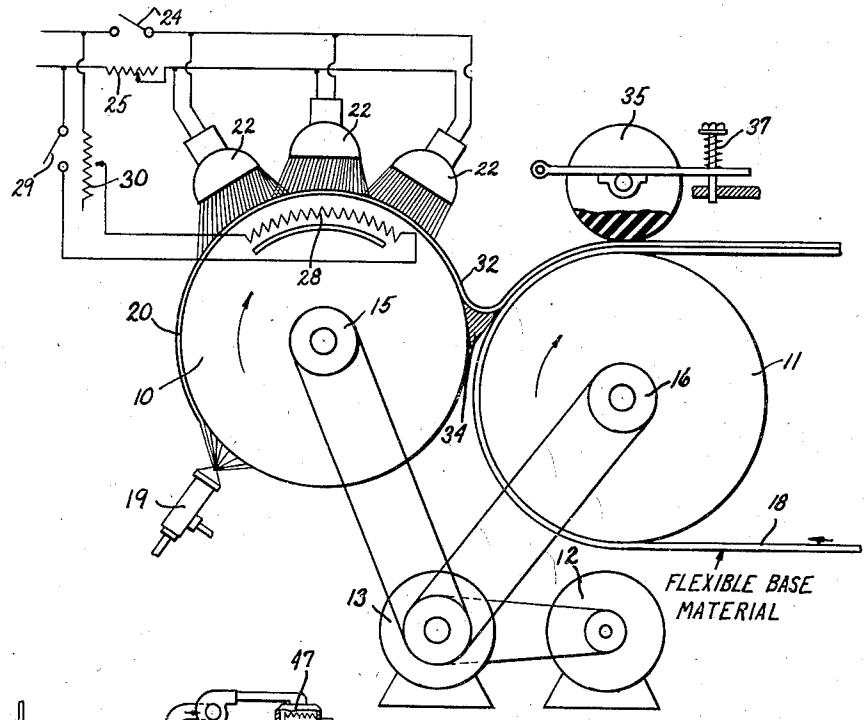


FIG. 2

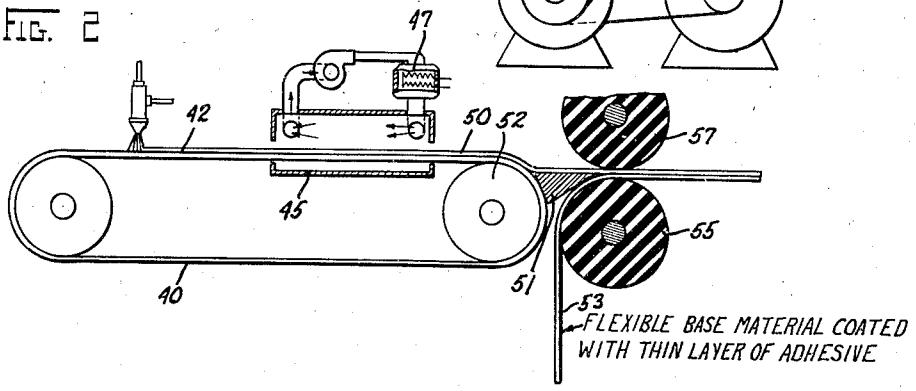


FIG. 3

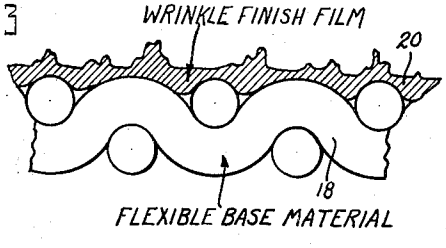
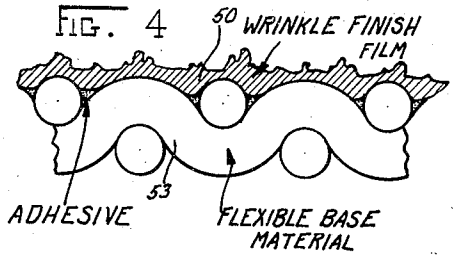


FIG. 4



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2,344,807

PROCESS OF APPLYING COATING FILMS

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Application May 16, 1940, Serial No. 335,591

6 Claims. (Cl. 117—116)

This invention relates to a method and apparatus for applying coating compositions to woven or felted fibrous articles having a porous absorbent surface.

It is a particular object of this invention to finish fabric or similar relatively porous flexible sheet material with a wrinkle finish without applying the coating composition thereto in liquid form.

It is another object to provide a method and apparatus for transferring coating compositions in the form of cured or partially cured film sheets onto the surface of an article to be finished, and firmly uniting the coating film thereon.

Another object is to devise a method of treating fabric, paper and the like products so as to provide the same with an ornamental wrinkle finish coating which is flexible and weather resistant.

Another object is to treat fabrics and woven materials such as awnings and the like with ornamented flexible dried coating composition films whereby the use of heavy filler base coatings in order to prevent the fabric from absorbing the liquid coating is eliminated and a flexible light weight product is formed.

Another object is to apply a wrinkle finish coating film over a fibrous material so that the fibers will not obliterate the finish where a particular pattern or wrinkle texture of the wrinkle finish coating film is desired to be displayed.

Another object is to apply a wrinkle finish coating film to a fibrous sheet material without requiring the liquid coating to be applied directly to the fabric or fibrous structure whereby it is soaked up and absorbed, diminishing the flexibility of the product.

These and other objects will be apparent from the following description of the drawing wherein,

Figure 1 illustrates a preferred embodiment of my invention wherein there is shown in elevation diagrammatically an apparatus for applying the coating to a flexible base material.

Figure 2 is a modified construction illustrating the use of a continuous belt conveyor for transferring the coating film onto a flexible base material.

Figure 3 is an enlarged cross-sectional detail view of a flexible base material having a wrinkle finish coating film applied thereon.

Figure 4 is a view similar to Figure 3 wherein an adhesive material is applied before the wrinkle finish film is placed on the flexible base material.

In general, it has heretofore been the practice to apply liquid coating compositions directly onto a fabric or base material in coating the same. This method has the disadvantage that large amounts of the coating composition are absorbed into the body of the porous base material and greatly diminish the flexibility of the material. It has been discovered however, that when the coating composition is applied to the porous base material in the form of dried or semi-dried film the film can be readily made to adhere to the surface of the material without being absorbed into the body and forming a laminated sheet material wherein the outer coating comprises a layer of coating composition in the form of film.

Referring to the drawing in detail, Figure 1 illustrates a preferred embodiment of this invention wherein a drum 10 is mounted for rotation adjacent a drum 11 which are driven synchronously by means of a motor 12 and drive pulley means 13 which is connected to the respective pulleys 15 and 16 on the drums 10 and 11, respectively. The flexible base material, which may comprise fabric, felted or fibrous structures of a porous nature is drawn around the drum 11 as shown at 18. The coating composition to be applied as a film to the flexible base material 18 is sprayed upon the surface of the drum 10 by a suitable spray apparatus such as shown at 19 and the coating film 20 is moved by the rotating drum under the radiant heat lamps 22 which are positioned adjacent the surface of the drum and focused thereon. These lamps are suitably controlled through the switch means 24 and resistance 25 so as to provide the proper amount of heat. In addition, a heating element 28 is positioned beneath the outer peripheral surface of the drum as shown at 28 and is likewise controlled through the switch 29 and resistance 30 so as to provide a proper degree of heat treatment.

The drum 10 is rotated at a speed which will permit the coating composition to be dried to a soft flexible film as it reaches the opposite side of the drum, as at 32, whereupon it is peeled from the surface of the drum by the member 34, transferred to the surface of the drum 11 rotating adjacent thereto and which carries the flexible base material on which the film is to be applied.

A soft resilient roller means 35 is positioned to press against the drum 11 as shown in Figure 1 so as to press the coating film firmly against the fabric or flexible base material 18. Suitable means such as a spring pressed member 37 is

provided for varying the pressure which the roller 35 applies to the surface of the film as it passes over the roller 11. The roller 35 is preferably made of porous rubber or the like material and sufficient pressure is exerted by this member to compress the coating film firmly against the base fabric without destroying the wrinkle or surface ornamentation of the film.

Different types of coating film materials may be used but the invention is particularly adapted for transfer of wrinkle finish films, which heretofore have been impractical to apply on porous fabric and the like base materials since the coating was absorbed and the wrinkle texture was destroyed so that the desired finish could not be obtained.

Where is is found that the film does not properly adhere by itself, the application of adhesive material in a thin film over the base of the fabric or fibrous material being coated may be made as illustrated in Figure 4. In most instances, by gauging the time of transfer of the film onto the base of the material, the coating film will have sufficient adhesive property to unite with the fabric or flexible base material. If desired, the base material carrying the coating film may be passed through a heated chamber to thoroughly dry the coating film thereon so as to produce a finished article. Air drying of the coating film on flexible base material may be provided for by suitably guiding the coated material over a number of guide rolls prior to storing or shipping the finished product.

In the modification shown in Figure 2, an endless belt 40 is utilized for receiving the sprayed coating composition and conveying the film onto the flexible base material to be coated. In this illustration, the endless belt means 40 is arranged to receive the spray material as shown at 42 and thereafter the endless belt pases through a drying compartment 45 which is provided with suitable heating means such as shown at 47. The dried coating film 50 is stripped from the endless belt by the member 51 as it passes around the guide roller 52 and is transferred onto the base material such as shown at 53. The flexible base material may be coated with a thin layer of adhesive and passed around the resilient roller 55 as shown in Figure 2 and a corresponding rubber or resilient roller 57 is positioned thereover to press the coating film firmly against the flexible base material as it passes over the roller 55. In this manner, the semi-dried or dried coating film is applied directly to the base material and securely attached thereto to form a laminated product having a high degree of flexibility. The finished product provides a suitable method for ornamenting fabric and the like porous base material and produces a product which is durable and waterproof.

In order to provide for the ready removal of the dried coating film from the surface of the drum 10 and endless belt 40, the surfaces are preferably coated with soap, wax or the like substance which will withstand heat and not attack the film. In this manner, the film will not tenaciously adhere to the supporting base and can be readily detached by a doctor blade or similar means as shown at 34 and 51 whereby the film can be transferred onto the fabric or porous base material on which it is to be fixed. If desired, the surfaces upon which the coating is sprayed may be formed of metal and mercurized so as to provide a thin coating of mercury over the surface which permits the film to dry and be easily stripped from the temporary supporting surface.

It will be understood that the apparatus and method as described may be modified so as to apply the coating film onto porous rigid articles, such as acoustic blocks or panels commonly used in the fabrication of walls and ceilings of buildings to eliminate sound disturbances.

It will be further understood that the apparatus and method as disclosed may be modified and varied to suit different conditions and uses without departing from the spirit and scope of this invention as defined by the appended claims.

This application is limited to the method of coating hereinbefore described. The apparatus herein described and illustrated is the subject of my copending application Serial No. 412,092, filed September 24, 1941, as division hereof, on which was granted Patent No. 2,320,513 on June 1, 1943.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of applying a coating of wrinkle-forming absorbable solidifying film-forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter, which comprises: depositing a film of said absorbable material on a continuous, smooth, nonabsorbent surface; applying heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said nonabsorbent surface; depositing said film on a traveling web of said absorbent material with the underside of said film in contact with said absorbent material; and combining said partially set and surface wrinkled film and said absorbed material by pressure applied thereon.

2. The method of applying a coating of wrinkle-forming absorbable solidifying film-forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter, which comprises: depositing a film of said absorbable material on a continuous, smooth, nonabsorbent surface; applying radiant heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said nonabsorbent surface; depositing said film on a traveling web of said absorbent material with the underside of said film in contact with said absorbent material; and combining said partially set and surface wrinkled film and said absorbent material by pressure applied thereon.

3. The method of applying a coating of wrinkle-forming absorbable solidifying film-forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter, which comprises: depositing a film of said absorbable material on a continuous, smooth, nonabsorbent surface; applying heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said nonabsorbent surface; depositing said film on a web of said absorbent material traveling on a second continuous surface with the underside of said film in contact with said absorbent material; and combining said partially set and surface wrinkled film and said absorbent material by pressure applied thereon.

4. The method of applying a coating of wrin-

kle forming absorbable solidifying film forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter, which comprises: depositing a film of said absorbable material on a continuous, smooth, non-absorbent surface; applying heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said non-absorbent surface; depositing said film on a traveling web of said absorbent material with the underside of said film in contact with said absorbent material, said absorbent material being coated iwth an adhesive on the surface to be brought in contact with said film; and combining said partially set and surface wrinkled film and said absorbent material by pressure applied thereon.

5. The method of applying a wrinkle forming absorbable solidifying film forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter, which comprises: depositing a film of said absorbable material on a continuous, smooth, non-absorbent surface; applying radiant heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said non-absorbent surface; depositing said film on a traveling web of said absorbent material with the underside of said film in contact with said absorbent material, said absorbent material being coated with an adhesive on the surface to be brought in contact with said film; and combining said partially set or surface wrinkled film and said absorbent material by pressure applied thereon.

6. The method of applying a coating of wrinkle forming absorbable solidifying film forming material on a base of fibrous woven or felted material having an absorbent surface without substantial absorption of the former by the latter which comprises: depositing a film of said absorbent material on a continuous, smooth, non-absorbent surface; applying heat to said film whereby partially to set it and develop a wrinkle surface thereon; removing said partially set and surface wrinkled film from said non-absorbent surface; depositing said film on a web of said absorbent material traveling on a second continuous surface with the underside of said film in contact with said absorbent material, said absorbent material being coated with an adhesive on the surface to be brought in contact with said film; and combining said partially set and surface wrinkled film and said absorbent material by pressure applied thereon.

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