# United States Patent [19]

**Fleissner**

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[54] **PADDER-TYPE APPARATUS FOR THE CONTINUOUS APPLICATION OF LIQUIDS TO PERMEABLE MATERIALS**


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[51] **Int. Cl.** ..... **B05c 1/10**

[58] **Field of Search** ..... 68/200, 202, 203, DIG. 5, 68/205 R; 118/213, 230; 101/116, 119, 120; 34/115, 122



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[57] **ABSTRACT**

A padder-type apparatus for the continuous application of liquids to permeable, thick, voluminous web-shaped textile materials which includes support means for the material to be wetted, the support means being capable of being placed under a suction draft at several series disposed narrow suction zones extending over the operating width of the support means and printing stencil means operatively associated with said zones positioned on the side facing the material conveyed across these zones for applying said liquids thereto.


**6 Claims, 3 Drawing Figures**

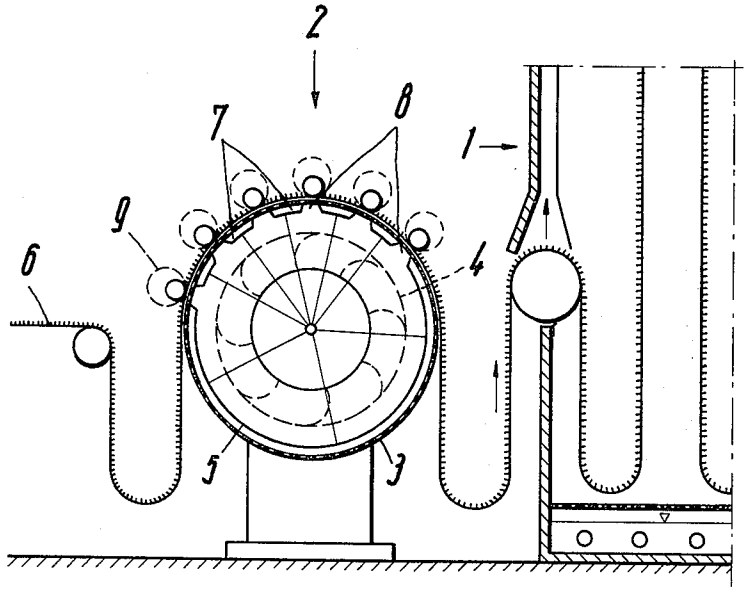


Fig 1

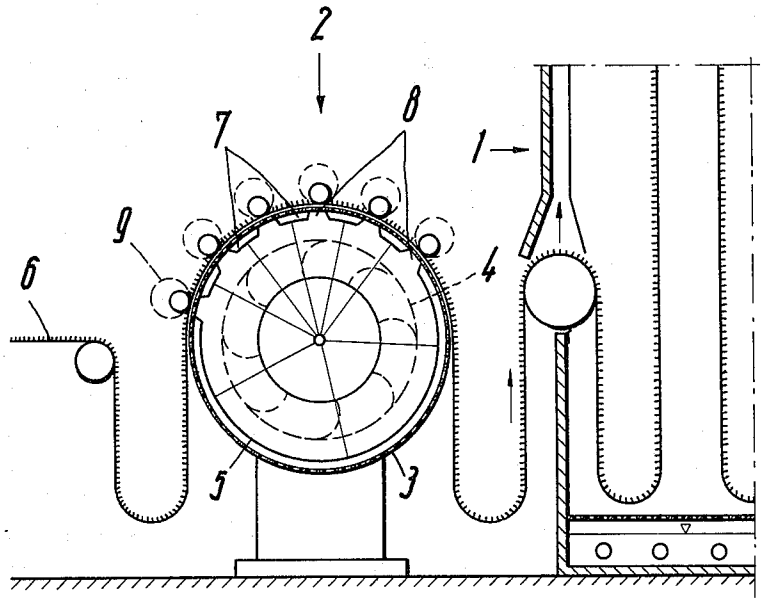


Fig. 2

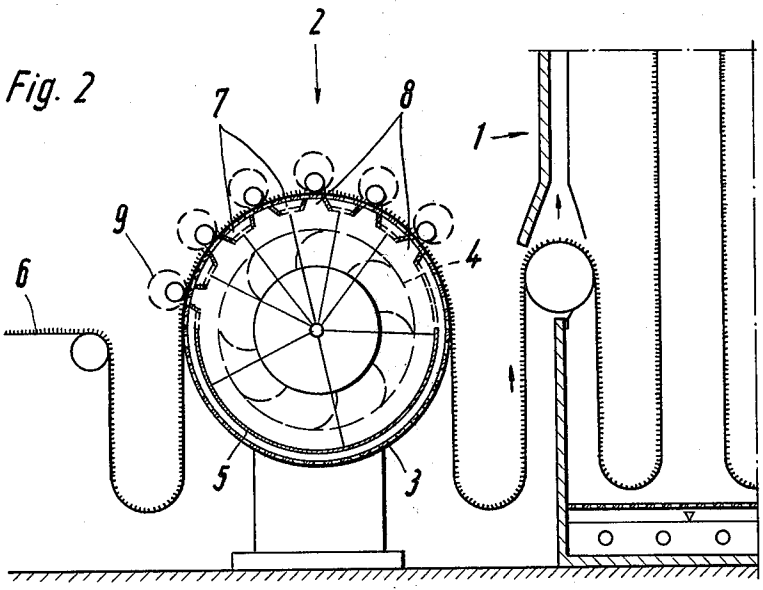
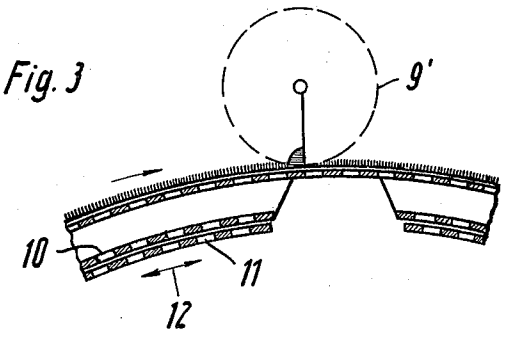



Fig. 3



# PADDER-TYPE APPARATUS FOR THE CONTINUOUS APPLICATION OF LIQUIDS TO PERMEABLE MATERIALS

This invention relates to a padder-type printing apparatus for the continuous application of liquids to permeable, preferably thick, voluminous web-shaped materials, such as tufted carpets and needled-felt carpets, or the like, which apparatus comprises a support, such as sieve drums, for the material to be wetted, which support can be placed under a suction draft at a plurality of narrow zones and a plurality of printing means associated with said zone.

In the textile field it is known that a padder consists of a trough with guide rolls, containing a liquid, the material to be wetted being guided through this trough and then being mangled by means of a pair of pressure rolls until the desired degree of moisture is obtained. If it is intended to wet only the surface of the material, rather than to saturate the material with a liquid, then the liquid can also be sprayed onto the material. In this connection, various color effects can also be obtained with different color hues. It is only difficult to apply the sprays of color, particularly in case of thick, voluminous materials, so that the pile is thoroughly dyed through its entire thickness. It is known from German Offenlegungsshrift **1,635,104** to eliminate this problem by placing the material under a suction draft during the spray application of the treatment agent. Thus, the suction draft is effective on the backside of the material to be dyed, while the material is sprayed, for example, on the topside.

In general, color patterns are produced by means of the cylinder printing process. The apparatus necessary for this purpose consists of sieve drums which are used as stencils or templates for the pattern to be imprinted. One color doctor is provided within each of the sieve drums for squeezing the dye through the openings in the stencil onto the material to be imprinted. It is quite clear that this dye penetrating through the openings wets only the surface of the web-shaped material, which results, in case of plushes and voluminous carpets, in an only partial dyeing of the pile.

Therefore, the invention is based on the problem of developing an apparatus ensuring a thorough dyeing of thick pile even when employing the printing method.

The thus-posed problem is solved, in an apparatus of this invention, by placing the support on which the material is transported at several narrow zones extending over the operating width and arranged in series, under a suction draft; these zones are coupled with printing stencils, e.g. printing cylinders on the face side of the material conveyed over these zones for applying a colored liquid, e.g. a dye thereto. Preferably, these stencils are arranged at the beginning of each of the suction zones, in order to provide sufficient time over the subsequent suction zone for wetting the pile down to the roots, i.e. the base of the materials.

Another advantage of this apparatus is based on the fact that the material, during the printing step, is firmly held on the support. Thus, the material cannot move relatively to the printing stencils during the printing operation. As a consequence, the color patterns produced by different cylinders are well superimposed. The coincidence of the pattern is more accurate.

Consequently, in one embodiment of the apparatus according to this invention, the provision is made that



an inner cover within the sieve drum, forming a suction slot or slots, is at least partially gas-permeable in a zone covered by the material. Thereby, the material is constantly held firmly on the support, i.e. the sieve drum, even if the material is not directly under the effect of a printing stencil, or travels over a suction slot. This constructional detail is important for materials which are particularly sensitive to tension, such as, for example, hosiery or knitted carpets. Heretofore, such materials were glued to a rubber sheet; for this purpose, a binder must first be applied to this sheet, and after the printing step must again be removed from the rubber sheet. The consumption of water and adhesives can be avoided by this invention. The material is held, during the conveyance over the printing apparatus, from the beginning to the end uniformly firmly and fixedly on the drum and is provided with the dye in the zone of the suction slots, where a more intense suction draft is effective.

The suction draft can be adjustable to be of different strengths at the inner cover in the zone covered by the material, in order to adapt this suction draft to the material to be treated in each particular case. For this reason, the inner cover could consist, in the zone covered by the material, of two perforated metal sheets or the like extending in parallel to each other, one of which can be displaced in order to cover the perforations of the other sheet.

In the accompanying drawings various embodiments of the apparatus of this invention are illustrated, to wit:

FIG. **1** shows a color applicator apparatus in the form of a sieve drum under a suction draft in front of a festoon steamer;

FIG. **2** shows the apparatus of FIG. **1** with a modification in the universal covering of the sieve drum; and

FIG. **3** shows an enlarged fragmentary view of the sieve drum shell in the zone of a printing stencil.

In front of the festoon steamer **1**, a padder-type printing apparatus in the form of a cylinder printing apparatus **2** is illustrated, consisting of a sieve drain **3** under a suction draft associated at its end face with a fan **4**. On the inside of the sieve drum, cover sheets are provided, of which the one designated by reference numeral **5** covers the zone not occupied by the textile material **6** to be printed, and the ones designated by reference numeral **7** leave vacant narrow suction slots **8** extending over the operating width of the drum. Above or at the beginning of the suction zones provided by these suction slots **8**, respectively, one printing stencil is illustrated which, in the embodiment of FIGS. **1** and **2**, consists of a printing cylinder **9** with a color doctor disposed therein and, in the example of FIG. **3**, is a printing cylinder **9'** with a coating blade arranged therein. The numer of stencils corresponds to the respectively desired printing pattern.

By the suction draft produced by the fan **4**, which must be adjusted to be very high, due to the relatively minor effective suction surface on the sieve drum **3**, the dye applied by the stencil to the surface of the fibrous textile material **6** is sucked with great force to the root of the pile of the material. A flawless dyeing effect throughout the material is thus ensured.

In the embodiment of FIGS. **2** and **3**, the cover sheets **7** are fashioned to be gas-permeable, by making them perforated in a similar manner as the sieve drum **3**. In this way, a holding force is effective on the material not only in the zone of the suction slots **8**, formed between

the cover sheets, but also in the entirety of the zone of the sieve drum covered by the material. This has the advantage that also materials sensitive to tension can be perfectly well printed. In order to be able to adapt the suction draft effective in the zone of the cover **7** to the respective material **6,** the cover according to FIG. **3** consists of two parallel-disposed cover sheets **10** and **11,** which can be displaced mutually according to the arrow **12.** Thus, the amount of air passing through the sheet **10** can be varied with the aid of the sheet **11** to increase or decrease the flow area available.

While the novel embodiments of the invention have been described, it will be understood that various omissions, modifications and changes in these embodiments may be made by one skilled in the art without departing from the spirit and scope of the invention.

What we claim is:

**1.** A padder-type apparatus for the continuous application of liquid to permeable, thick voluminous, web-shaped materials including tufted carpets and needled-felt carpets, plush and the like textile material, said apparatus comprising at least one sieve drum means having a gas-permeable surface with an operating width for supporting and for conveying the material to be wetted with said liquid, said sieve drum means having an interior placed under a suction draft and means within said interior for defining a plurality of series-disposed, narrow, suction zones extending across the operating width of said sieve drum means, and a plurality of printing stencil means each operatively associated with one of said suction zones positioned on one side of the material conveyed across said zones for applying said liquid thereto, whereby said liquid is drawn into the material by an intense suction draft applied at said suction zones.

**2.** The apparatus of claim **1,** in which each of the printing stencil means is arranged to apply said liquid onto said material as the material initially passes over the associated suction zone.

**3.** The apparatus of claim **2,** in which said means defining said narrow suction zones comprises cover sheet means providing vacant slots forming said suction zones extending across the operating width of the sieve drum means and providing sheet portions extending between said slots, said sheet portions being at least partially gas-permeable in a region of the sieve drum means covered by the textile material whereby a partial suction draft sufficient to hold said textile material against said gas-permeable surface is provided.

**4.** The apparatus of claim **3,** in which said sieve drum means is also provided with another cover sheet means which is not gas-permeable and which extends over a region of the sieve drum means free of contact with said material.

**5.** The apparatus of claim **3,** in which the sheet portions of the cover sheet means in the region of the sieve drum means covered by the material consists of two perforated metal sheets extending in parallel to each other, one of said sheets being displaceable in order to vary the amount of suction draft, by covering the perforations of the other sheet.

**6.** The apparatus of claim **1,** in which said interior of said sieve drum means also includes means for applying a suction draft to portions of the material being conveyed on said gas-permeable surface, less intense than the suction draft applied to the material overlying those portions of the gas-permeable surface superjacent to said suction zones, said less intense suction draft being sufficient to retain said material on said gas-permeable surface.

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