United States Patent [19]

Passler et al.

[11] **3,881,329**

[45] **May 6, 1975**

[54] **APPARATUS FOR TREATMENT OF FLEXIBLE MATERIALS IN LIQUID MEDIA**

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[22] Filed: **June 28, 1973**

[21] Appl. No.: **374,545**

[52] **U.S. Cl.** ..... **68/175;** 26/54 R; 118/428; 134/122; 226/118; 242/75; 242/153; 354/339

[51] **Int. Cl.** **B05c 3/152**

[58] **Field of Search** ..... 68/175, 181 R, 184, 5 D, 68/5 E, 38; 134/9, 15, 64, 122; 118/419, 428; 354/339; 226/118, 196; 34/159, 161; 26/54 R; 242/75, 153

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[57] **ABSTRACT**

An apparatus for treatment of strips or sheets of flexible material in liquid media comprises a tank for holding the liquid media; inlet and outlet openings on said tank for moving the material in and out of the tank; a plurality of guide rolls disposed in said tank in staggered relationship; baffle walls disposed between opposed guide rolls and between the lateral end guide rolls and the walls of the tank; projections provided on said baffle walls, the said projections being arranged in staggered relationship as between opposed baffle walls, and the baffle walls being sufficiently closely spaced from the adjoining and opposed wall to provide a constrained pathway for the moving material.

5 Claims, 3 Drawing Figures

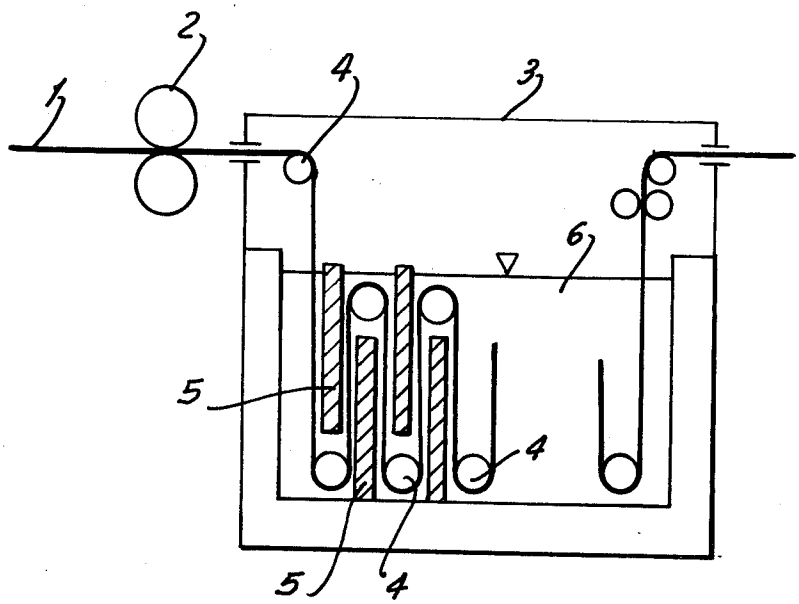


FIG. 1

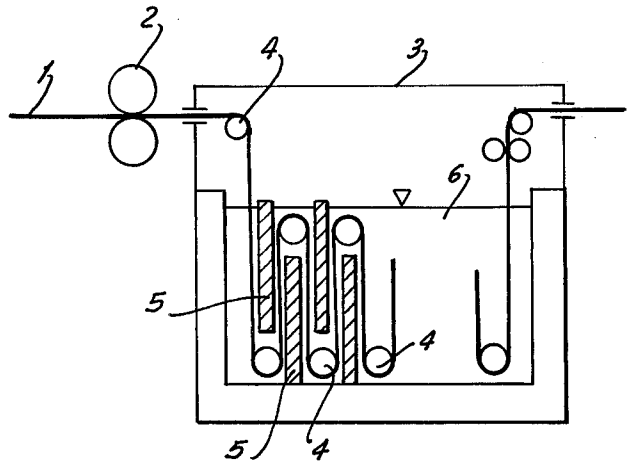


FIG. 2

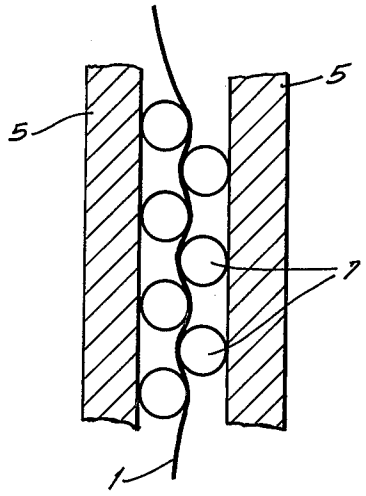
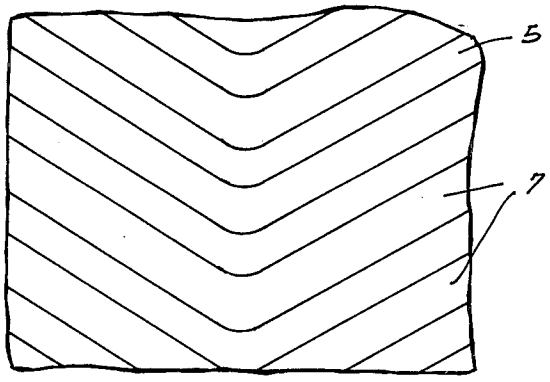


FIG. 3



APPARATUS FOR TREATMENT OF FLEXIBLE MATERIALS IN LIQUID MEDIA

BACKGROUND OF THE INVENTION

The invention relates to an apparatus for treating sheet materials with liquid media, particularly for modifying textile sheet materials by radiation-initiated graft copolymerization.

In order to avoid curling, particularly of knits, on unsupported stretches, the conventional textile-modifying machines use mostly sieve drums or willows. Thus a positive guidance is obtained for the material in the liquid medium. These drums have however the disadvantage that they require a large space, in spite of a small holding capacity. Where large-volume capacity is necessary, an unreasonably large amount of suspension liquid is required. This has the disadvantage not only that it creates the necessity for large amounts of liquid but the requirement for rather large machines in order to obtain the necessary treatment within a required time.

It is therefore an object of the present invention to provide for an apparatus having a large holding capacity in spite of a small liquid ratio and small apparatus dimensions. Thus, the treatment can be carried out with use of a comparatively small volume of treatment liquid.

More specifically it is the object of the invention to provide for a positive quidance of the material by reducing the unsupported stretches and at the same time increasing the holding capacity of the apparatus.

SUMMARY OF THE INVENTION

These objects are met by an apparatus which includes guide rolls disposed in a tank in staggered relationship, and baffle wall means provided between opposed guide rolls. Furthermore, projections are provided on the baffle walls which are also arranged in staggered relationship as between opposed baffle walls and diverge in the direction of movement of the material. The baffle walls are spaced sufficiently close so as to provide a constrained pathway for the moving material.

The novel features which are considered characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of preferred embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross section in schematic showing of an immersion tank according to the invention;

FIG. 2 is an enlarged cross-sectional view of a detail of the baffle walls and projections; and

FIG. 3 is an enlarged perspective view of a detail of the baffle walls and projections.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The projections preferably are rod-shaped and accordingly have a round or semi-round cross-section. As between the opposed baffle walls the projections are arranged in V-shaped manner. The spacing between the baffle walls or projections and the opposed baffle walls and their projections is prefererally of a thickness of ten to twenty times the thickness of the material.

It is preferred that successive projections in the course of the material should overlap.

The apparatus of the invention is particularly useful for radiation-initiated grafting processes applied to polymeric sheet material such as polyamide sheets. This is based on the narrow pathway formed through the slots between the projections and the consequent small suspension ratio.

EXAMPLE

With reference to the drawing and to the grafting process as described, the particular apparatus shown is used in a grafting process of a polyamide flat-warp knit of a surface mass of 100 g/m^2 where the grafting is initiated by electron rays until a dose of about 5 . 10^6 rad is obtained. The material **1** in this case is moved by means of feed rollers **2** into the tank **3.** Provided in the tank are guide rollers **4** and baffle walls **5.** The tank may for instance be filled with a 50 percent concentration of aqueous acrylamide solution which constitutes the grafting solution **6.** The temperature of the liquid is maintained at about 35°C. The moving speed of the material is predetermined so as to obtain a time of 5 minutes for the grafting operation.

The baffle walls **5** are arranged at a distance of 8 mm. They are provided with projections **7** which have a circular cross section and are arranged in a V-shape. Their diameter is 5 mm. There is thus obtained a completely uniform guidance for the material. The degree of grafting under the conditions stated is 15 percent.

If the grafting was carried out under otherwise the same condition with a greater suspension ratio but without the baffle plates and projections, the degree of grafting would only be 8 percent.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that from the standpoint of prior art fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. An apparatus for treatment of strips or sheets of flexible material in liquid media, comprising a tank for holding a liquid medium; means for feeding the flexible material into and out from the tank and along a zig-zag path through the liquid medium in said tank such that successive portions of the flexible material during their path through said liquid medium extend substantially parallel to each other, said means including two vertically spaced rows of guide rolls, with the guide rolls in each row transversely spaced from each other and with the guide rolls in one row transversely spaced with respect to the guide rolls in the other row; a plurality of successive substantially parallel and transversely spaced baffle walls, successive baffle walls respectively extending from opposite sides toward the guide rolls of one and the other row between successive portions of the flexible material guided by said guide rolls; and a plurality of rod-shaped projections fixed in staggered relationship along successive baffle walls and projecting with portions thereof into the path of the material

guided by said guide rolls to constrain the material to move between successive baffle walls along as undulating path.

2. The apparatus of claim **1**, wherein the projections have a round transverse cross-section.

3. The apparatus of claim **1**, wherein successive baffle walls are spaced from each other by a distance about ten to twenty times the thickness of the material moving through the apparatus.

4. The apparatus of claim **1**, which is adapted for use in the radiation-initiated graft copolymerization of a polymeric textile material.

5. The apparatus of claim **1**, wherein said rod-shaped projections are of V-shape and have an apex and two arms, each of said projections being arranged along the respective baffle wall with said arms diverging in direction of movement of the material between successive baffle walls from said apex.

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