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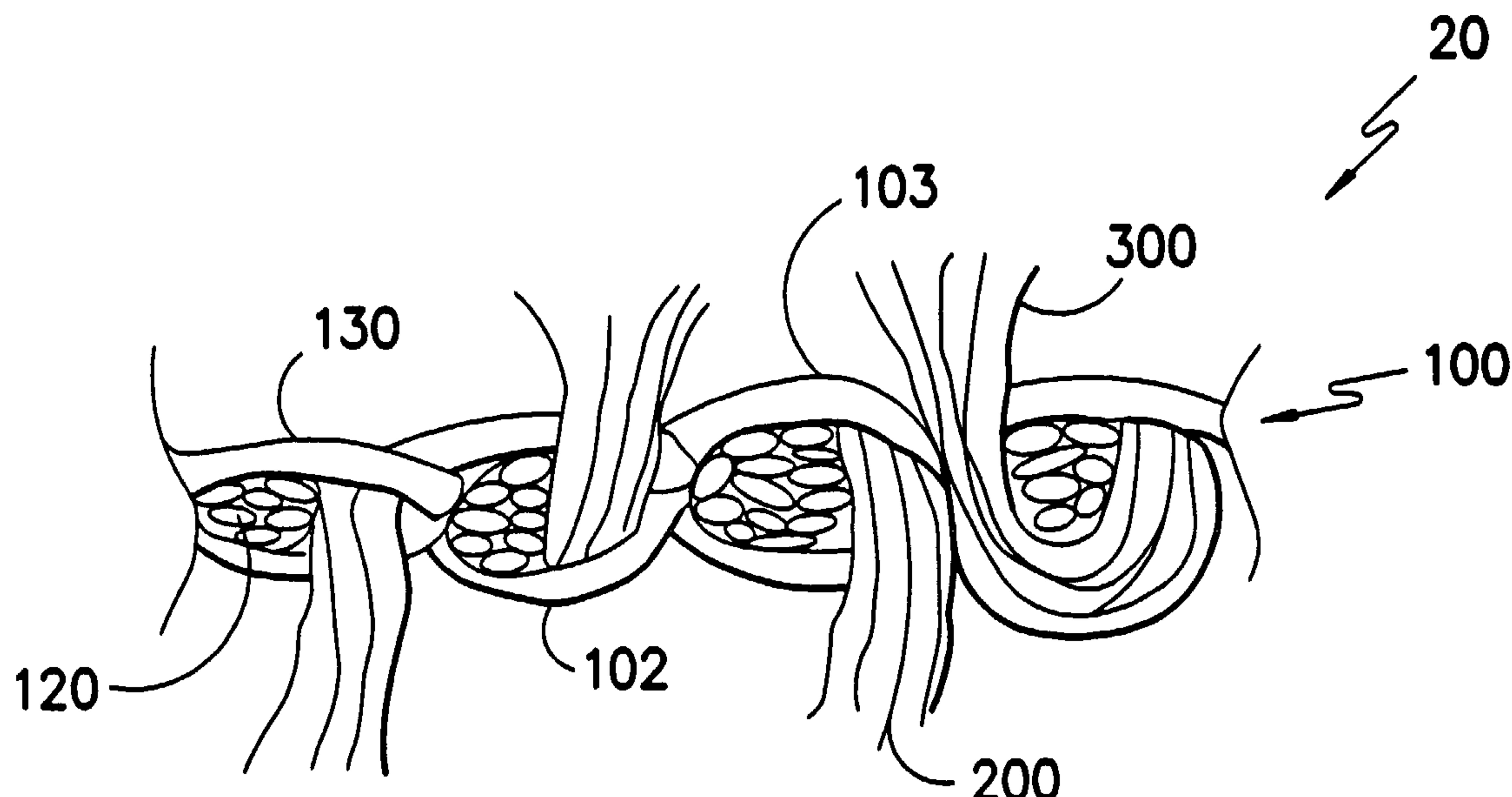
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A synthetic mop head or wiping cloth having a fabric with free end pile (200, 300) on opposing surfaces of the fabric, and a hydrophilic treatment.

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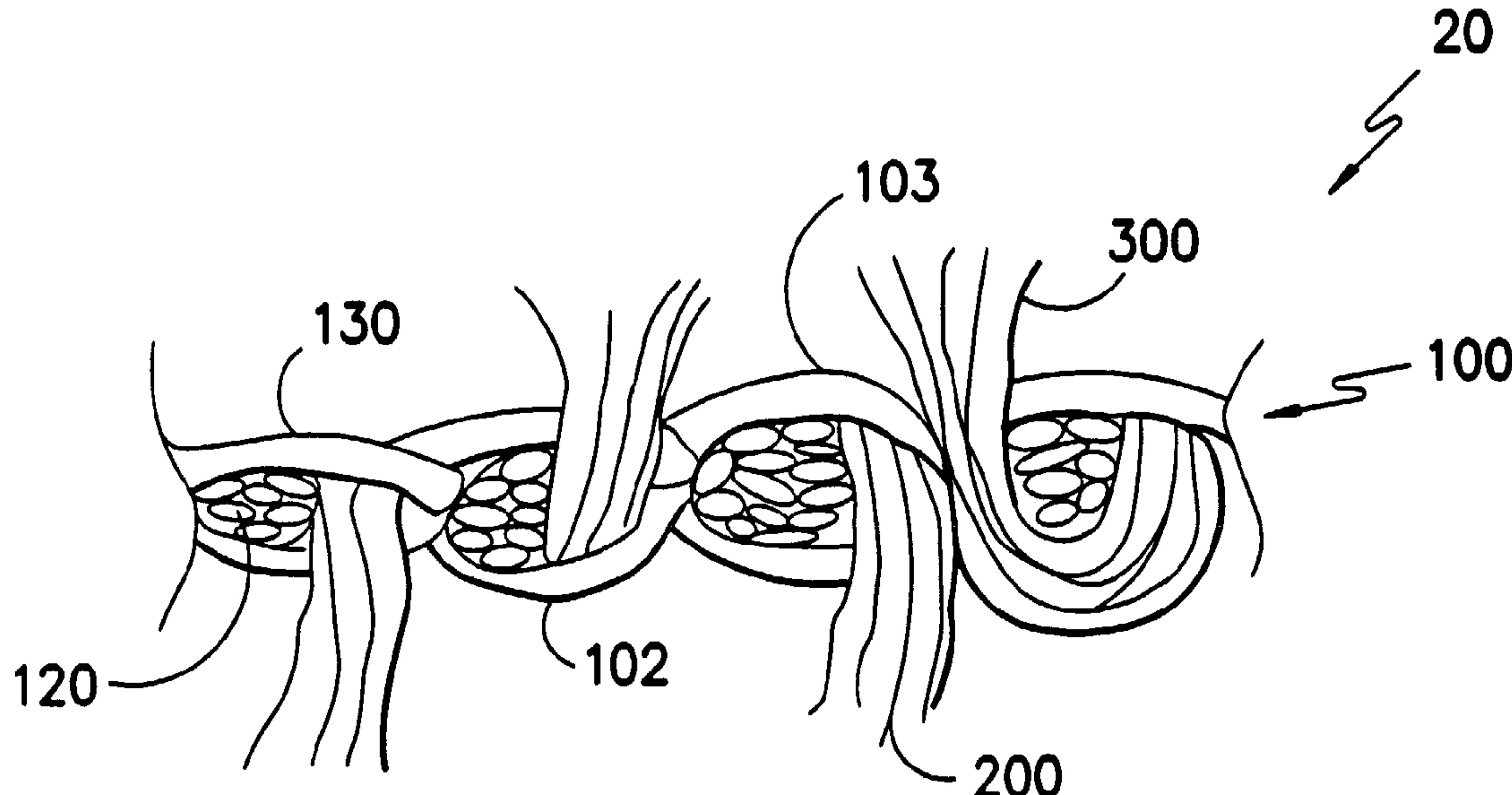
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(54) Title: WIPING CLOTH AND MOP MATERIAL



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(57) Abstract: A synthetic mop head or wiping cloth having a fabric with free end pile (200, 300) on opposing surfaces of the fabric, and a hydrophilic treatment.

WIPING CLOTH AND MOP MATERIAL

This application is a continuation-in-part of U.S. patent application number 09/544,426 filed April 6, 2000.

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BACKGROUND

The present invention is directed to material suitable for wiping cloths, mops, and the like.

Wiping cloths and mops are generally used for absorbing, scrubbing, and 10 polishing. Many materials have been selected for such uses. However, the fabric must be selected based upon its contribution to the desired attributes for the particular application. Also, there are additional considerations such as soil 15 resistance, lint generation, etc. Furthermore, the selection of fabric for a wiping cloth or mop can influence the life and cost of those products. There remains a need for wiping cloths and mops having desirable absorbing, scrubbing, and polishing characteristics, which also have high soil resistance and low lint generation.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be described with regard to the accompanying 20 drawings where:

FIG. 1 is an illustration of a wiping cloth according to the present invention;

FIG. 2 is an enlarged cross-section of the fabric in the wiping cloth from FIG. 1;

FIG. 3 is a block diagram illustrating a process for forming a wiping cloth;

25 FIG. 4 is a perspective view of a mop formed in accordance with the present invention;

FIG. 5. is a top view of a mop head formed in accordance with the present invention; and

30. FIG. 6 is a side view of a mop head formed in accordance with the present invention.

DETAILED DESCRIPTION

Referring now to the drawings and in particular to Figure 1, there is illustrated a wiping cloth 10 of the present invention. The wiping cloth 10 generally comprises a fabric 20 with edging 30. The edging 30 helps prevent the fabric 20 from unraveling 5 on the edges and corners. As illustrated, the edging 30 is a thread sewn around the edge of the fabric. However, it is anticipated that the edging 30 could also be an ultrasonic sealing of the fabric 20 on the perimeter of the wiping cloth 10.

Referring now to FIG. 2, there is shown an enlarged cross-section of the fabric 20 from FIG. 1. The fabric 20 includes a substrate 100 having a first substrate 10 surface 102 and a second substrate surface 103, a plurality of first free end pile 10 years 200 extending outwardly from the first substrate surface 120, and a plurality of second free end pile years 300 extending from the second substrate surface 103. As illustrated, the substrate 100 is a Raschel knit fabric having course years 120 and wale years 130. The first pile years 200 and the second pile years 300 are knotted 15 into the first side 102 of the substrate 100. The first side years 200 extend outwardly from the first surface 102 of the substrate 110. A portion of the second pile years 300 extend through the substrate 100, and emanate from the second surface 103 of the substrate 100. Another portion of the second pile years 300 emanate from the first surface 102 of the substrate 100, pass over at least one course year 120 and/or 20 one wale year 130, and then pass through the substrate 100 to emanate from the second side 103 of the substrate 100. The wrapping of the second pile years 130 around and through years of the substrate 100 is believed to provide additional security for inhibiting the ability of the pile years 200 and 300 to be removed from the substrate.

25 A preferred material for the fabric 100 is polyester, however, fabrics formed of synthetic such as polyester typically have a lower capability to pick up and retain liquids. Therefore, in accordance with the preferred embodiment of the present invention, the fabric 100 is chemically treated to improve the hydrophilic, wicking, and soil release properties of the fabric 100. A preferred chemical treatment is an 30 ethoxylated polyester. Examples of ethoxylated polyesters include an anionic-ethoxylated sulphinated polyester and high molecular ethoxylated polyester. Such agents are described in U.S. Patent 5,935,484, the content of which is incorporated herein in its entirety by specific reference thereto. It is believed that the additional

surface areas created by the open ends of the cut pile yarns 200 and 300, combined with the chemical treatment of the present invention, facilitate an unexpected wicking and retention of liquids by the wiping cloth.

Referring now to FIG. 3, there is shown a block diagram illustrating the 5 process of the present invention for forming a wiping cloth. Sandwich fabric is produced in Step 410 by knitting two Raschel knit fabrics face to face with float yarns interlaced between the two. After the knitted sandwich is produced, the knitted sandwich is heat set in Step 420. The heat set knitted sandwich is then silted in Step 430 to produce two pile fabrics having a substrate with the free end pile yarns 10 emanating from only one surface of the substrate.

In Step 440, a portion of the pile is forced back through the substrate to emanate from the opposing side using fluid jets. The process for pushing the pile fabric through the substrate to the opposing side is known in the art and is described in U.S. Patent No. 5,235,733, which issued on August 17, 1993, to Charles E. 15 Willbanks et al., and which is hereby incorporated herein in its entirety by specific reference thereto. It is preferred to push 50% of the pile back through the substrate in an irregular or regular pattern that results in a continuous surface of pile yarns on both sides of the substrate. It is believed that the process of using fluid jets to position the pile yarns also results in the removal of lint and/or structures that could 20 break loose during use to become lint. This reduction of lint makes the wiping cloth or mops of the present invention particularly useful for applications such as clean rooms.

After the pile is pushed through the substrate in Step 440, in Step 450 the pile fabric is chemically treated to improve the hydrophilic, wicking and soil resistance of 25 the fabric. In Step 460, the dyed fabric is dried. In Step 470, the fabric is cut into wiping cloths, and in Step 480 the edging is applied.

The present invention can be explained by way of the following example:

EXAMPLE

A sandwich of two Raschel knitted substrates was knitted face to face using a 30 1/100/34 56T textured polyester ground yarn as the course yarn, and a (115)70/34 56 warp drawn dull polyester ground yarn as the wale yarn, and a pile yarn of 1/100/100 57 dull textured polyester yarn as the pile yarn connecting the two base fabrics. The fabrics were knitted as a 44-gauge needle bar, single pile bar knit.

After the fabric was knitted, it was heat set and slit to form two identical pile fabrics with the cut pile on one side of each of the two fabrics. The silted pile fabrics are then subjected to impact by multiple, thin, high velocity jet streams on to the pile surface of the fabric. The jets cause approximately 50% of the pile to be forced 5 through the substrate to the other side of the fabric. The result is a fabric with cut pile on both sides.

Following the jet treatment of the fabric, the fabric was then chemically treated to improve the hydrophilic and stain resistance of the material. The chemical treatment was a condensate of dimethyl terephthalic and a high molecular weight 10 polyethylene glycol sold by ABCO Chemical, Roebuck, S.C. under the name LUBRIL QCX. A dye was applied to the fabric at the same time as the fabric was chemically treated to increase the hydrophilic properties. The LUBRIL QCX was applied to the fabric as an aqueous solution having about 16% solids, and being applied to the fabric at a rate of about 3.0% of the weight of the fabric.

15 Following application of the chemical treatment, the fabric was dried, cut in to appropriate wiping cloth dimensions, and an edging was applied by sewing a thread around the edges of the material.

Referring now to FIG. 4, there is shown a mop 500 having a head 502 formed from the above-described material. One embodiment of the mop head structure is 20 described and shown in U.S. Patent number 5,221,124, issued to Nichols, the content of which is incorporated herein in its entirety by specific reference thereto. In a preferred embodiment, the mop head includes a plurality of strips 504 of the above-described material slit at each end thereof to form elongated fingers 506. A preselected number of strips are laid one on top of the other and connected centrally 25 in a transverse direction by a band or web 508 wrapped therearound and stitched along spaced lines, as shown in Figures 5 and 6. Preferably, the web used to centrally connect the strips of material is made from polyester or acrylic coated polyester, but it is to be understood that any suitable material may be used for this purpose. The elongated fingers 506 of the mop fabric, in a preferred embodiment, should be about 1 inch wide by 15 ½ inches long, although it is anticipated that other 30 shapes and sizes of individual strips may be utilized. The mop head 502 may be attached to any type of suitable mop handle 510 in any conventional manner.

Typically synthetic textiles used for soaking up water exhibit poor absorbance characteristics. Thus, a chemically treated synthetic material exhibiting high levels of absorbency provides a significant advantage over untreated synthetic mops. Further, synthetic mops generally tend to last longer than natural or natural blend 5 fiber mops, partially because they will not degrade over time when exposed to bleaching agents. Moreover, synthetic mops are resistant to mildew and mold, unlike natural or natural blend fiber mops. In summary, a synthetic mop constructed by using the novel fabric described herein exhibits absorbance characteristics roughly equal to cotton or cotton blend mops, and is bleach resistant, strong, 10 lightweight, and mildew resistant.

The spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein. All features disclosed in this specification may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated 15 otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

WHAT IS CLAIMED IS:

1. A mop head constructed from a fabric comprising:
 - 5 a substrate fabric having a first side and a second side,
 - a plurality of first pile yarns extending from the first side of said substrate fabric, and
 - a plurality of second free end pile yarns extending from the second side of the substrate fabric.
- 10 2. The mop head according to Claim 1, further comprising ethoxlated polyester applied to the substrate fabric, the first free end piles, and the second free end piles.
- 15 3. The mop head according to Claim 1, further comprising said substrate fabric being formed of a plurality of yarns, and a plurality of said second free end pile yarns originating from the first side of the substrate fabric, passing around the substrate yarns and through the substrate to emerge from the second side of the substrate fabric.
- 20 4. The mop head according to Claim 1, wherein said mop head comprises a plurality of strips of said fabric slit at each end thereof to form elongated fingers.
- 25 5. The mop head according to Claim 4, wherein a preselected number of said strips are laid one on top of the other and connected centrally by a web wrapped therearound.
6. The mop head according to claim 1, wherein said fabric is made from polyester.

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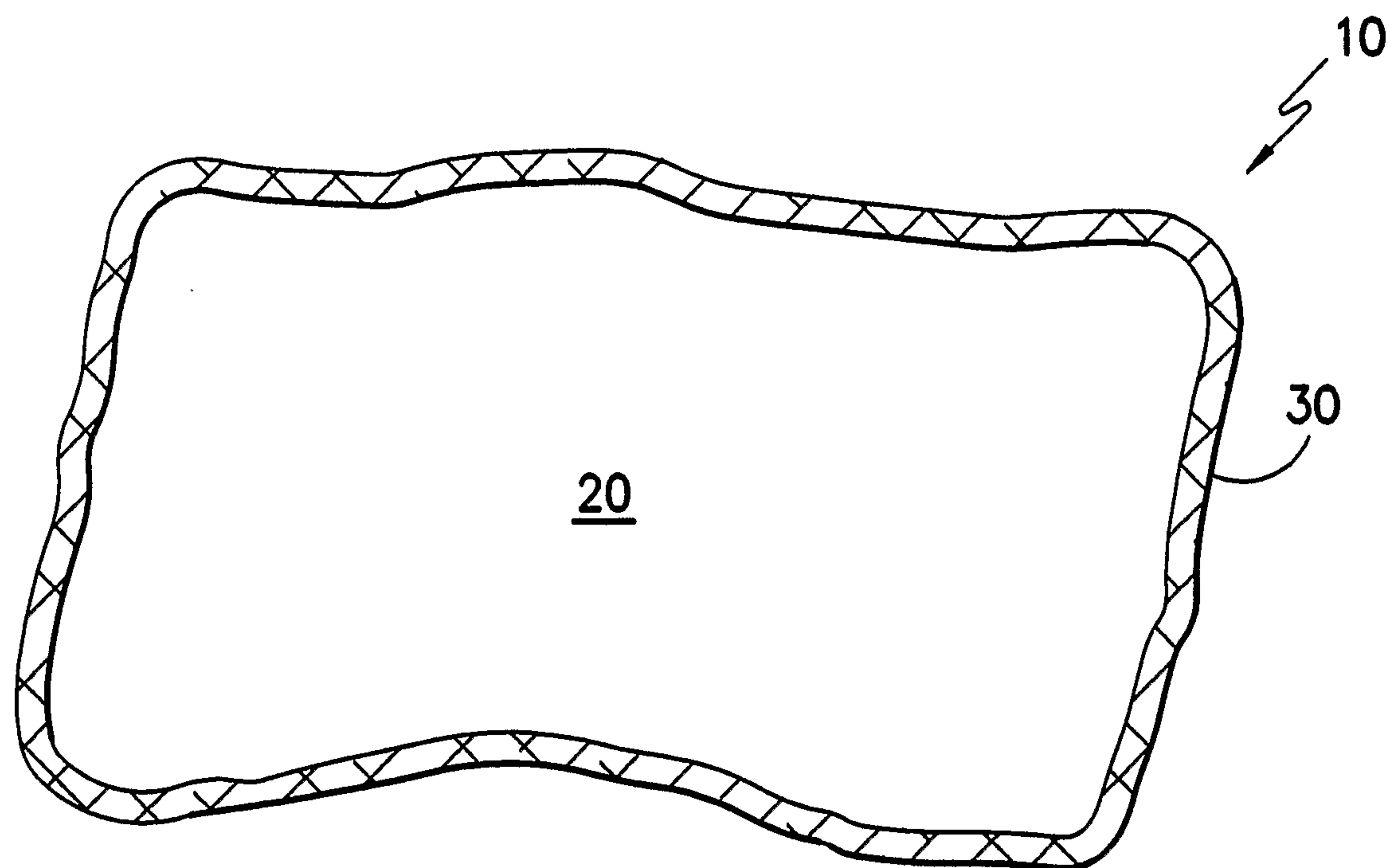


FIG. -1-

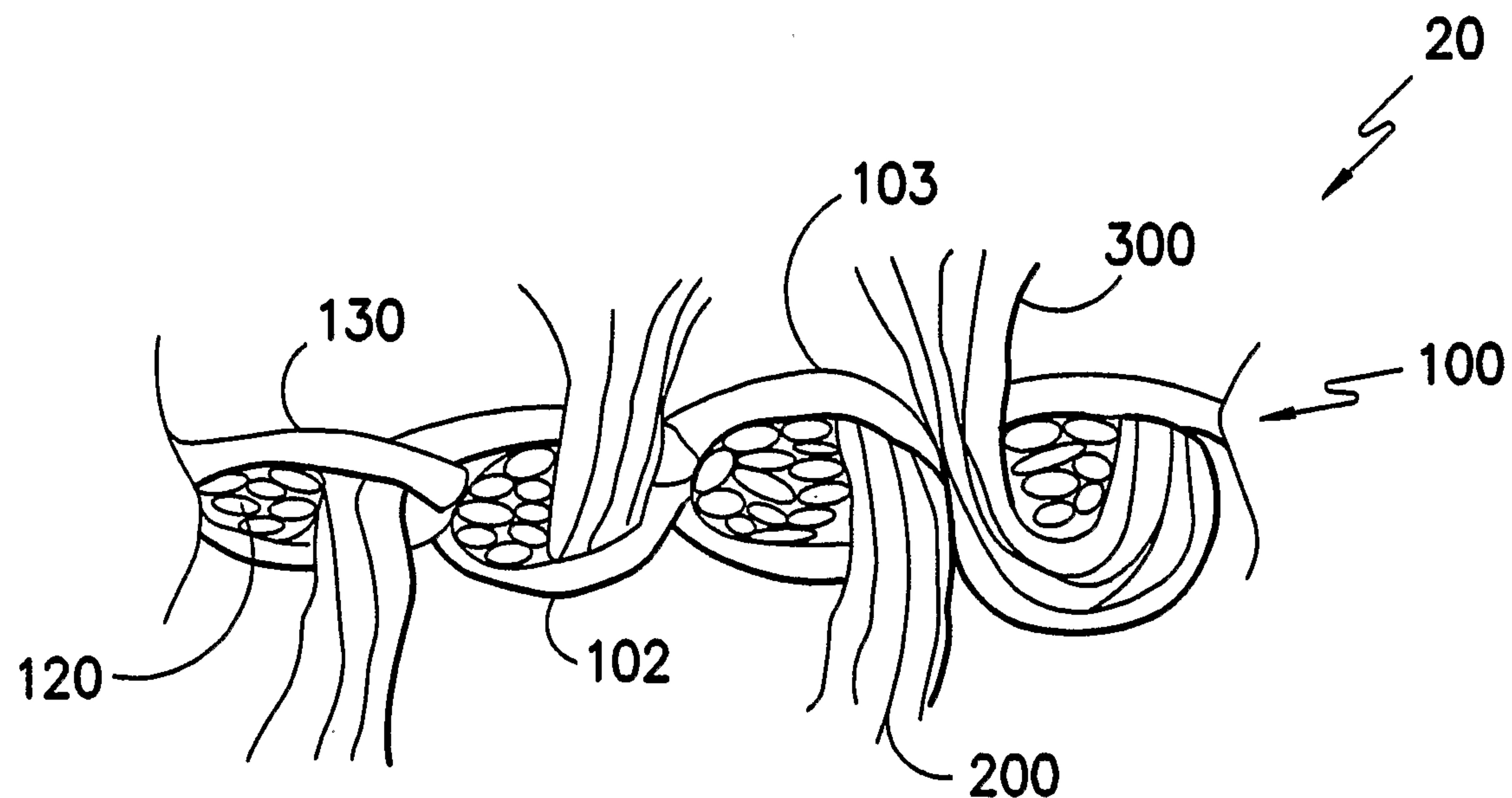
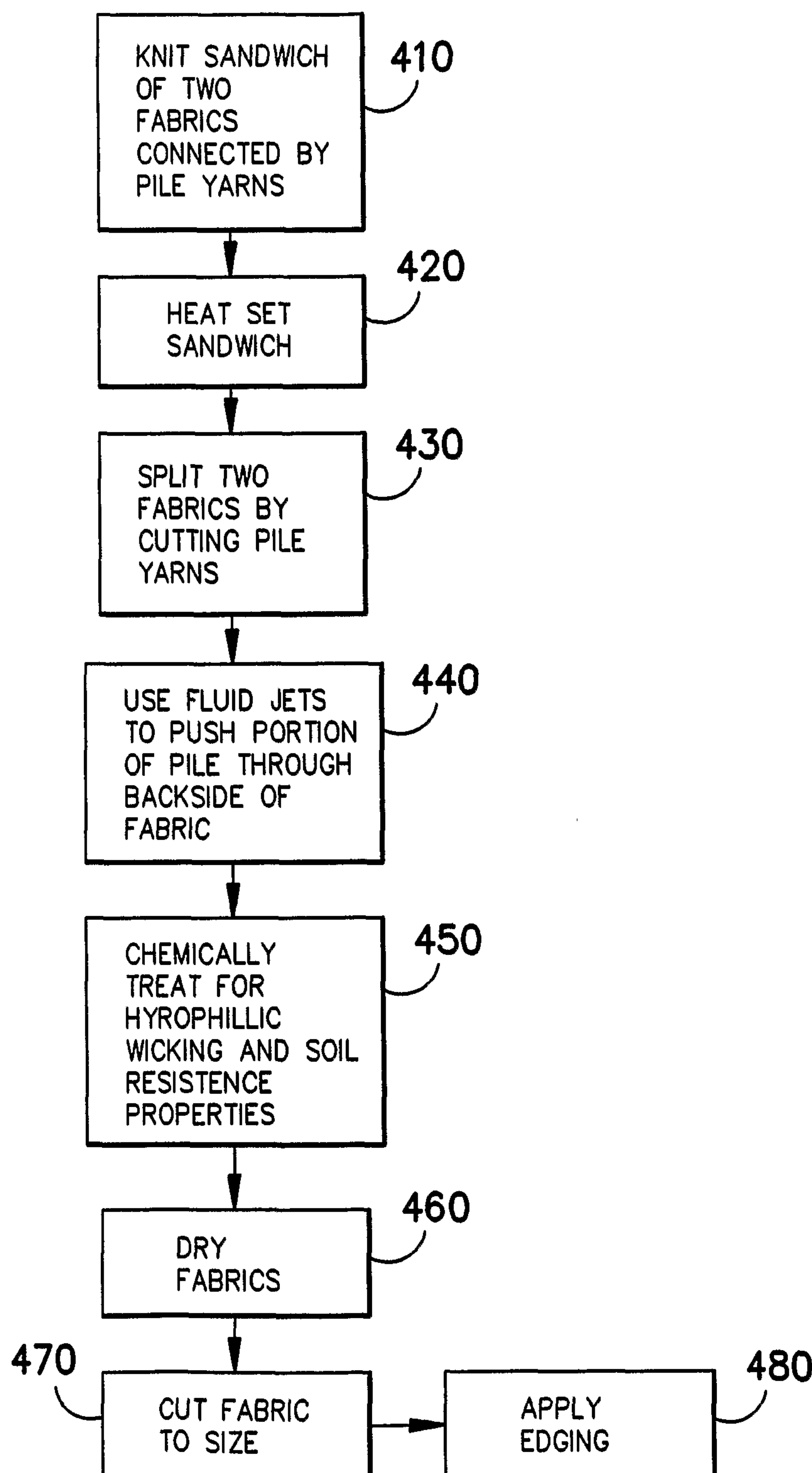
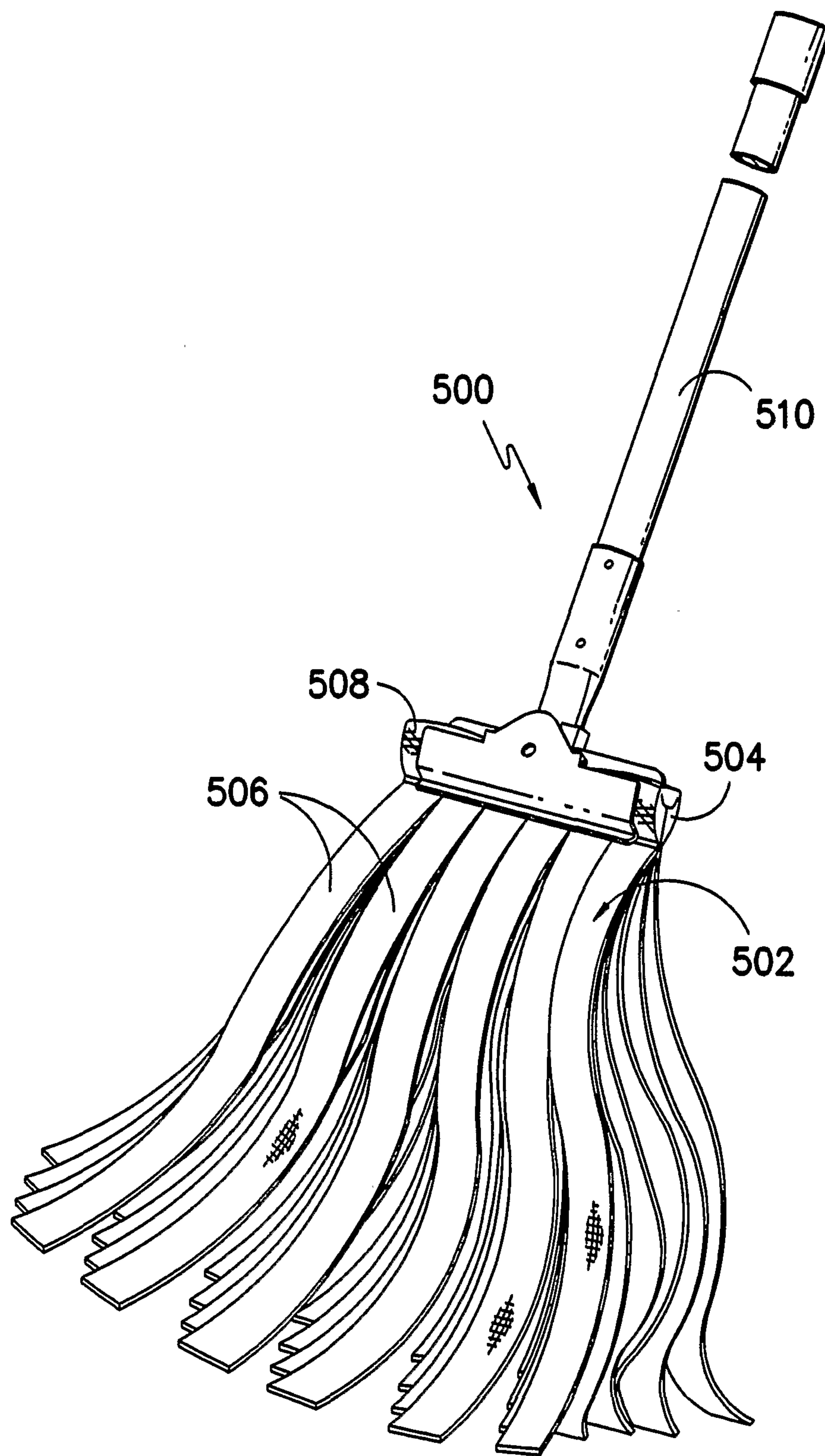


FIG. -2-

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**FIG. -3-**

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*FIG. -4-*

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