United States Patent

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[54] **METHOD OF MAKING A MOPHEAD**
12 Claims, 4 Drawing Figs.

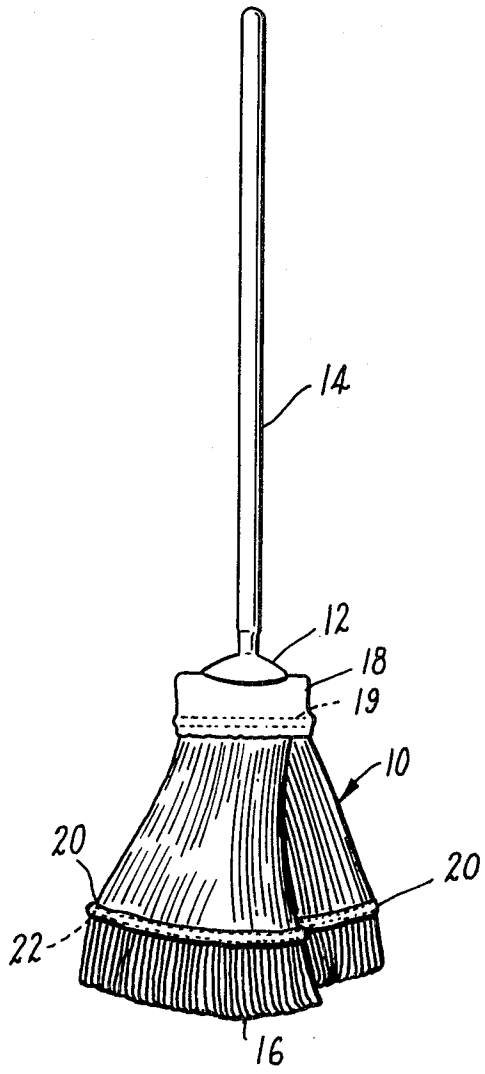
[52] **U.S. Cl.** ..... **300/21,** 15/229 R
[51] **Int. Cl.** **A47l 13/20**
[50] **Field of Search** ..... 15/229 R, 229 A, 229 AC, 229 AP, 229 B, 229 BC, 229 BD; 300/16, 21

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ABSTRACT: A mophead has generally U-shaped loops extending to both sides of the center band and the loops are extensively twisted along their lengths. In the method of making the mophead, an assembly of loops formed from twisted yarn is suspended from adjacent the centerline thereof and is agitated until extensive twisting of the loops along the length thereof is produced.



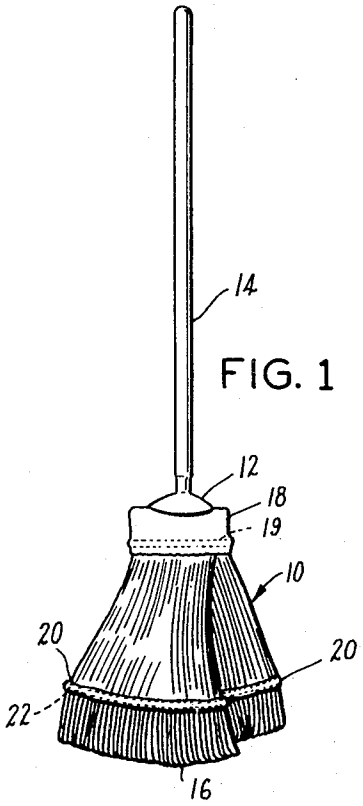


FIG. 1

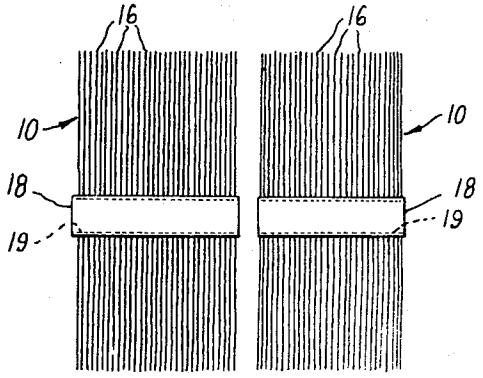


FIG. 2

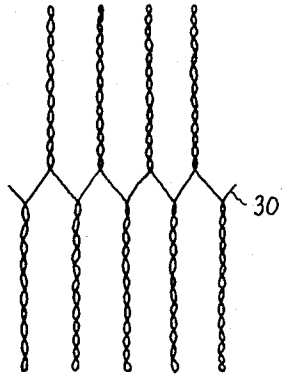


FIG.3

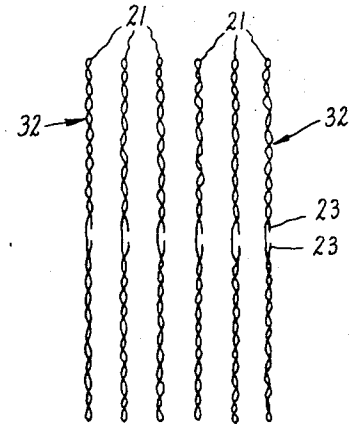


FIG. 4

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METHOD OF MAKING A MOPHEAD

BACKGROUND of the INVENTION

Various techniques have been proposed for the manufacture of mopheads, and one of the most widely accepted utilizes absorbent yarn. Preferably, such a mop should be constructed with an elongated loop construction which minimizes unraveling, and insures good surface contact with the floor being mopped. It has been proposed to twist the loops to provide better characteristics in such mopheads including durability, good conformity to the surface being mopped, avoidance of snagging objects on that surface, high absorption and reduced streaking. Attempts to produce such a mop having twisted elongated loops have been made with complicated twisting machinery requiring extensive capital outlays.

It is an object of the invention to provide a novel method for making a mophead having extensively twisted loops of absorbent yarn to provide for good floor coverage, durability and good water absorption.

It is also an object to provide such a method which is relatively simple, relatively economical and adaptable to various types of yarn.

SUMMARY of the invention

It has now been found that the foregoing and related objects can be readily attained in a method of making a mophead having elongated loops by forming absorbent twisted yarn into an array of a multiplicity of elongated U-shaped loops extending in both directions from the centerline of the array with the arcuate closely spaced end portions thereof providing the end portions of the array, the array is of substantial width and the loops measured from the centerline arc of substantially equal length and closely spaced together. Securing means is applied to the array adjacent the centerline to secure all the loops in the array together to form a secure assembly. Thereafter, the assembly is suspended adjacent the securing means with the loops depending freely therefrom and is agitated for a period of time sufficient to produce extensive twisting of the loops about their longitudinal axes. The twists formed thereby in loops are spaced along at least the major portion of the loop's length.

In one embodiment, the depending loops are arranged with their longitudinal axes substantially parallel when the loops are freely depending. In another embodiment, at least some of said generally U-shaped loops at least partially overlie some other loops. The forming step may involve the forming of an elongated yarn element into one of the generally U-shaped loops on each side of the centerline with the free ends thereof being disposed adjacent the centerline of the array, or it may involve the winding of an elongated yarn element back and forth to generate a multiplicity of loops on each side of the centerline of the array. In the latter instance, the forming step includes the winding of an elongated yarn element back and forth to form all of the loops.

Most preferably, the mophead method of manufacture includes after the agitating step, the step of fanning out the loops from the securing means into a generally planar form on each side of the centerline having a lateral region intermediate the closed end and the centerline, and the step of affixing flexible interconnecting means to the loops in the lateral region to secure them together. In one embodiment, the method includes securing one or more additional assemblies in superposed relationship to provide a laminated assembly either with or without first subjecting each additional assembly to agitation. Twisted rayon yarn having a predisposition to twist upon itself due to stresses therein as a result of is manufacturing process is most desirably employed in the present process. The agitation is preferably in a generally horizontal arcuate path, and the loops may be processed as by heating after agitation thereof in the twisted condition to set them in the twisted position.

It can be seen that the method of the present invention produces a mophead having highly desirable absorption and durability comprising a multiplicity of elongated generally U-shaped loops of twisted absorbent yarn extending to opposite sides of the centerline of the mophead with the arcuate end portions of the loops providing the ends of the mophead, which is of substantial width and has the loops closely spaced together across that width. The loops are of substantially equal length on opposite sides of the centerline and securing means bonds the loops together over a portion of the length thereto to opposite sides of the centerline, with the loops being substantially free from twisting along that portion of the lengths thereof and having a multiplicity of twists spaced along substantially the entire length thereof outwardly of the securing means.

The mophead may be constructed with the longitudinal axes of the loops substantially parallel when the loops are freely suspended, or with part of the loops at least partially overlying adjacent loops. A single piece of yarn may form only one loop on each side of the centerline, or a single piece of yarn may form all of the loops.

BRIEF DESCRIPTION of the DRAWINGS

FIG. 1 is a perspective view of a mop embodying the present invention;

FIG. 2 is a plan view of two mophead assemblies each comprising a plurality of closed loop portions showing the arrangement of the loops in one type of mophead and adapted to be superposed and secured together to form an assembly having greater thickness;

FIG. 3 is a partially diagrammatic plan view of a construction in which a single continuous yarn is employed to provide the loops, the center band being removed and the loops being spaced apart for clarity of illustration; and

FIG. 4 is a similar view showing another embodiment wherein separate yarns form the individual loops which are bound together to form a mophead.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Turning now in detail to the appended drawings, a mop embodying the present invention has a mophead or swab portion **10** to which is affixed by suitable securing means **12** to the handle **14**. The mophead **10** has two depending portions each comprising a multiplicity of elongated U-shaped loops **16** of twisted, absorbent yarn which are assembled into an array of rather substantial widths. A fabric band **18** encircles the loops **16** and is secured thereto by sewing as indicated by numerals **19** and in turn is engaged by the securing means **12**. Intermediate the length of each of the two depending portions is a flexible interconnecting band **20** which encircles the portion and is sewn to the loops **16** by the stitches indicated at **22** to hold them in a fanned out or planar position and thereby increase the absorption of the mophead.

Turning now in detail to FIG. **2**, therein illustrated is a pair of mophead assemblies embodying the present invention prior to twisting of the loops **16** and prior to assembly of the two mophead assemblies in superposed condition and engagement by sewing or the like. In this embodiment, each of the mophead assemblies is comprised of a multiplicity of twisted yarn elements **32** of relatively short length which have their free ends **23** (not shown) disposed adjacent the centerline of the array which is defined by the fabric band **18**. In this manner, each element **32** provides a closed loop **16** to each side of the centerline of the array. In the illustrated embodiment, the yarn elements **32** are spaced so that the loops **16** do not overlie each other in a freely depending condition when the mophead is suspended from the fabric band. After the loop elements **32** have been properly spaced, the fabric band **18** is brought about the entire surface of the array at the midpoint thereof and is secured to the individual loop elements **16** by the stitching **19**.

In accordance with the method of the present invention, the mophead assembly thus produced is suspended adjacent the band **18** so that the loops **16** freely depend therefrom. The mophead assembly is then subjected to rapid agitation to produce twisting of the loops **16** along substantially their entire length, and this agitation is preferably by movement in an arcuate path at a rapid rate, the arcuate path desirably being in the direction in which the strands of the yarn elements **32** are twisted. In this manner, the kinetic energy or biasing tendency of the twisted yarn will produce twisting of the loops **16** along their length, and the agitation is continued until the desired high degree of twist over substantially the entire length of the loops **16** outwardly of the band **18** is attained.

In this particular embodiment, two mophead assemblies are illustrated and the assemblies are superposed after the twisting operation and sewn together at the fabric bands **18** thereof to provide a thicker mophead for even greater absorptive capacity.

Turning now to the embodiment of FIG. **3**, there illustrated partially diagrammatically is another embodiment of the present invention in which a single length of yarn is wound back and forth across the centerline of the array to provide the loops **16** on both sides of the centerline of the array. It will be appreciated that the ends of the length of yarn are disposed adjacent the centerline of the array so as to be concealed and protected by the fabric band **18** when it is applied. Following the formation of the array, the fabric band is applied and the assembly is agitated to produce the twisted condition shown in the illustration. The loops **16** have been shown spaced apart for purposes of clarity of illustration and may lie in a common plane or overlap each other depending upon the disposition of the loops **16** at the centerline of the array. It can be seen that the loops **16** are not twisted adjacent the centerline of the array where the fabric band **18** is applied prior to agitation to produce twisting.

In the embodiment of FIG. **4**, the construction of the embodiment of FIG. **2** is partially diagrammatically illustrated. Here the individual yarn elements **32** are shown as having their free ends **23** disposed adjacent each other, and they are spaced apart for clarity of illustration. With either the embodiment of FIG. **3** or FIG. **4**, the individual yarn elements may be overlapped at the centerline to produce overlapping of the loops **16** if so desired. When the fabric band is applied, the loops **16** at the center portion of the array do not twist so that the center portion of the array is flat.

The manner of effecting the agitation of the mophead assembly to produce the twisting may be varied and may be both manual and mechanical, it being necessary that the agitation be sufficient in time and energy to produce a multiplicity of twists along substantially the entire length of the loops outwardly of the securing means or band. Agitating devices of the type used to mix paint have been found highly suitable for providing the motion desired. The motion can be circular or arcuate, and is preferably horizontal in the direction of the twisting of the yarn. The time period for the agitation will vary with the type of braided yarn, the degree of twisting required by the application and the nature and energy supplied by the agitating means. When generally circular manual agitation is employed, a typical time period will be on the order of 4–7 minutes.

As previously indicated, the twisting should extend over substantially the entire length of the loops outwardly of the securing means or band and a multiplicity of twists should be provided. The number of twists along the length of each loop will vary with the length of the loop and the desired degree of absorption increase. As the number of twists are increased, the absorption is generally enhanced but excessive twisting must also be avoided to ensure that stresses are not produced by the twists which will prevent the loops from conforming closely to the floor. Thus, the number of twists along the length of each loop may vary from as few as 4 to 20, and even more depending upon the length and nature of the yarn. Preferably, at least 5 twists spaced along the length of the loop will be provided.

The tendency of the loops to twist in accordance with the present invention may be enhanced by the selection of unbalanced yarns known in the art resulting from excessive stresses in the twisting process. Normally, such yarns are undesirable for most applications but they do find application in the present invention. The material of the yarn may vary widely so long as it provides the requisite degree of absorptiveness and durability. Among the materials which are commonly employed are rayon, polyacrylontrile, polyester and cotton; rayon is generally preferred.

In accordance with one embodiment of the present invention, the yarn loops are set in the twisted condition by the application of heat, chemicals or mechanical means to anneal or relieve the stresses produced in the yarn by the twisting processes. The methods and time of the setting process will vary with the yarn selected as is well known in the art.

The flexible band spaced along the length of the loops as seen in FIG. **1** is advantageously employed in that it serves to spread out the loops into a wider width and increase the coverage of the floor surface. After the twisting operation has been completed, the loops are fanned out into substantially planar condition and the band is applied thereto, generally by stitching. The location of this band is not critical; however, it is desirably located at a distance of about 2–5 inches from the closed ends of the loops to provide the preferred effectiveness.

The yarn may be so assembled into the array so that the loops do not overlap each other, that is with their longitudinal centerlines in substantially parallel relationship, or alternatively so that the loops do overlap. By substantially avoiding overlapping, the bulk at the center of the array may be reduced and engagement facilitated. The manner of securing the loops together adjacent the centerline may vary from the sewn band of the illustrated embodiments to application of a matrix of a synthetic resin which embeds the loops to application of heat or solvent to suitable synthetic plastic members to produce fusion thereof. The specific means employed should provide secure and flexible engagement of the loops to facilitate gripping within the mop handle.

Thus it can be seen that the present invention provides a method for making a mophead having extensively twisted loops of absorbent yarn to provide for good floor coverage, durability and good water absorption. The method is relatively simple, relatively economical and adaptable to various types of yarn. Expensive equipment is not required and manual operation may even be employed.

We claim:

1. In a method of making a mophead having elongated loops, the steps comprising:

a. forming absorbent twisted yarn into an array of a multiplicity of elongated U-shaped loops extending in both directions from the centerline of said array with the arcuate closed end portions thereof providing the end portions of said array, said array being of substantial width and said loops being of substantially equal length from said centerline and being closely spaced together in said array:

b. applying securing means to said array adjacent said centerline to secure all of said loops in said array together to form a secure assembly thereof;

c. suspending said assembly adjacent said securing means with said loops depending freely therefrom; and

d. subjecting said suspended assembly to agitation for a period of time sufficient to produce to agitation twisting of said loops about their longitudinal axes, said loops having a multiplicity of twists spaced along at least the major portion of the length thereof.

2. The method of claim **1** wherein said depending loops are arranged with their longitudinal axes substantially parallel when said loops are freely depending.

3. The method of claim **1** wherein at least some of said generally U-shaped loops at least partially overlie some other loops.

4. The method of claim **1** wherein said forming step includes the forming of an elongated yarn element into one of said

generally U-shaped loops on each side of said centerline with the free ends thereof being disposed adjacent said centerline of said array.

5. The method of claim 1 wherein said forming steps include the winding of an elongated yarn element back and forth into a multiplicity of loops on each side of said centerline of said array.

6. The method of claim 5 wherein all of said loops are from a single of twisted yarn.

7. The method of claim 1 further includes after said agitating step, the step of fanning out said loops from said securing means into a generally planar form on each side of said centerline having a lateral region intermediate said closed end and said centerline and affixing flexible interconnecting means to said loops in said lateral region to secure them together.

8. The method of claim 1 further including a final step of securing at least one more additional assembly in superposed relationship to provide a laminated assembly.

9. The method of claim 8 further including suspending adjacent said securing means and subjecting each of said additional assemblies to said agitation step before securing in said superposed relation.

10. The method of claim 1 in which said yarn is rayon.

11. The method of claim 10 further includes an additional step after said agitating step comprising heating said twisted loops to anneal said loops in the twisted position.

12. The method of claim 1 wherein the agitating of said assembly comprises movement of said array in a generally horizontal arcuate path.

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