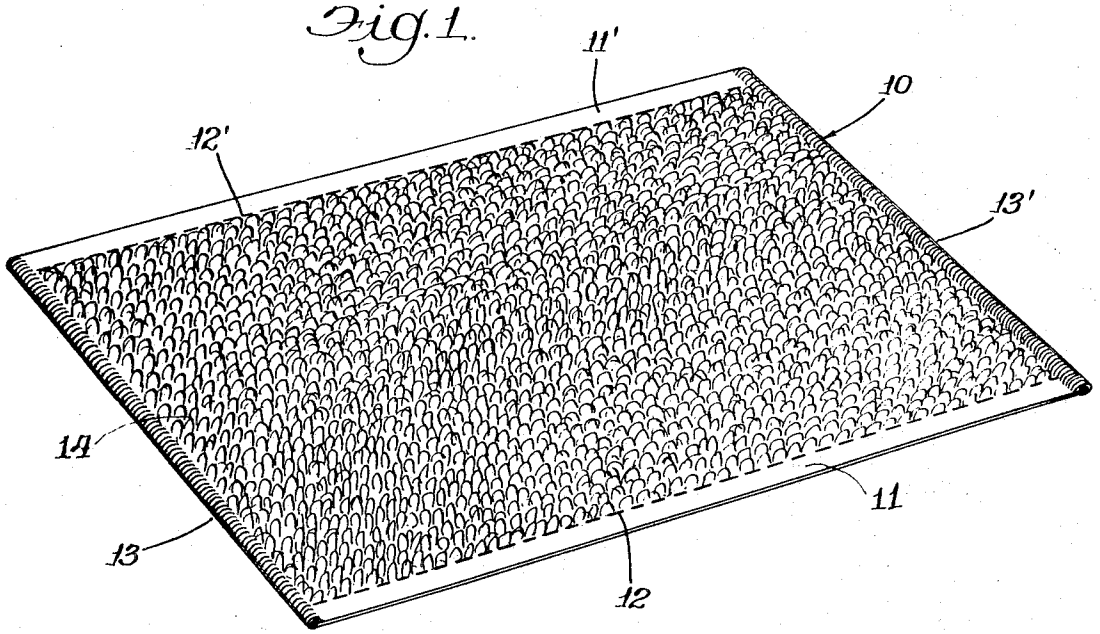
Oct. 6, 1970 A. H. HUTTO, JR., ET AL 3,531,953

PILE STRUCTURE

Filed Oct. 3, 1968 2 Sheets-Sheet 1

Fig. 1.



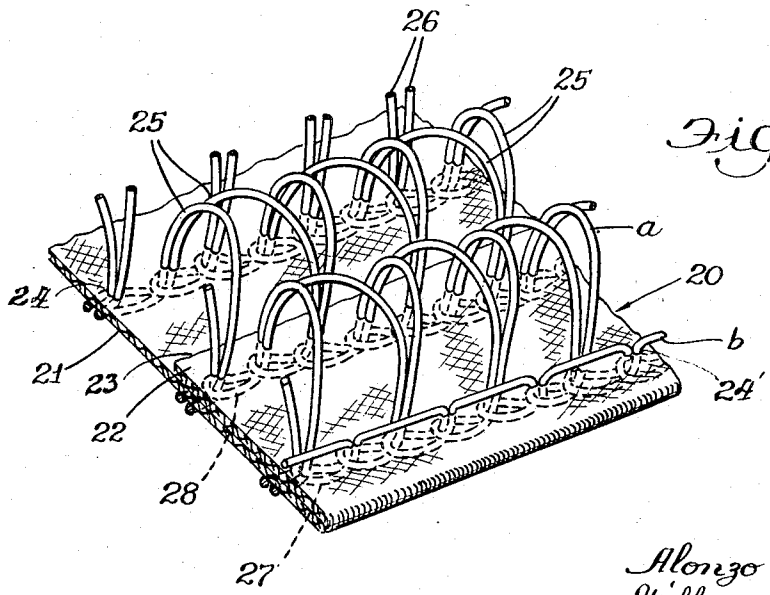


Fig. 2.

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PILE STRUCTURE

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Fig. 3.

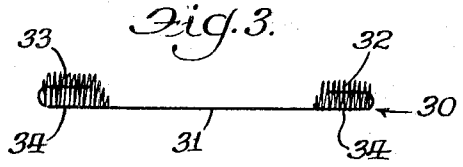


Fig. 4.

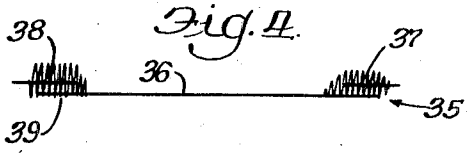


Fig. 5.

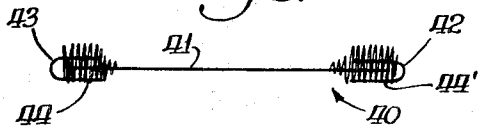


Fig. 6.

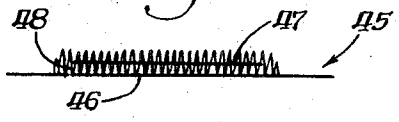


Fig. 7.



Fig. 8.

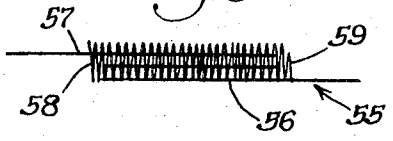


Fig. 9.

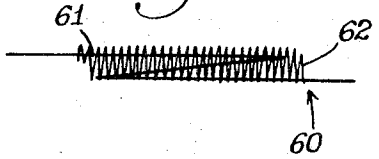


Fig. 10.

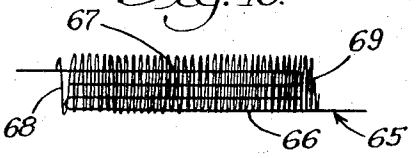


Fig. 11.

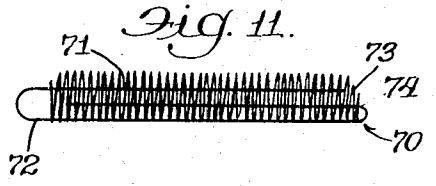


Fig. 12.

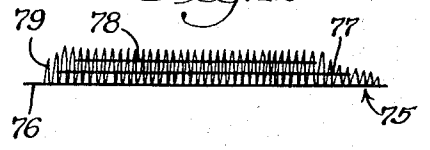


Fig. 13.

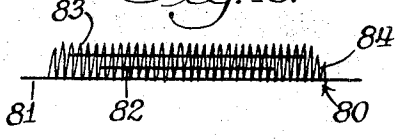


Fig. 14.

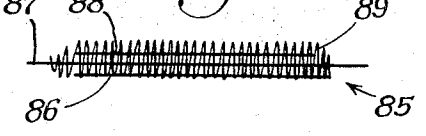


Fig. 15.

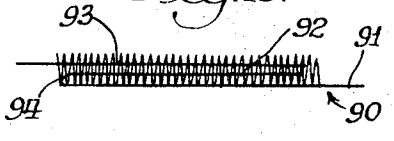
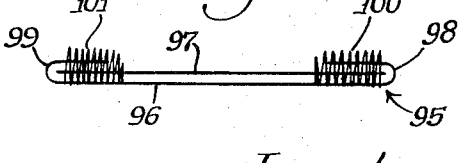


Fig. 16.



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United States Patent Office 3,531,953 Patented Oct. 6, 1970

3,531,953

PILE STRUCTURE

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Filed Oct. 3, 1968, Ser. No. 764,697
Int. Cl. D04b 23/10
U.S. Cl. 66—192 10 Claims

ABSTRACT OF THE DISCLOSURE

A unitary, layered, fabric structure wherein a pile surface formed of pile loops of yarn which are threaded through other yarn loops, partially obscures a layer edge disposed intermediate the fabric edges.

This application relates to flexible unitary pile-surfaced fabric structures of a plurality of layers wherein the pile yarns partially obscure the overlapping edge of one or more layers intermediate the fabric edge.

BACKGROUND OF THE INVENTION

Pile-surfaced fabric structures are well known and provide a wide variety of interesting decorative effects and functional characteristics which are unique. Products having pile surfaces vary considerably, however, in both their structures and in their characteristics, some pile surfaces being formed of continuous lengths of yarn which are merely punched through from the back side of a base fabric with a needle. The latter, upon withdrawal, leaves a pile loop of yarn on the face side of the fabric. Typical of such products are needle punched rugs. These rugs are still being made both in many rural areas and in sophisticated factories throughout the country, although presently the backs are coated with latex to make the pile loops more resistant to pull-out. Another well known pile-surfaced fabric is terry cloth, which is woven on special looms which produce a pile surface on one or both faces of the fabric. These methods are relatively slow and the best fabrics (those with selvage edges) must often times be woven in narrow widths. Terry fabrics are particularly susceptible to raveling if loop yarns are snagged after manufacture.

Because of the shortcomings of terry cloth and because of the expense of producing it, machines have been introduced which produce pile loop fabric from a base layer of material which may be a flexible integrated layer such as a film, a nonwoven fabric or a woven or knitted fabric, or the layer may be one of a mass of fibers or yarn in arranged or heterogeneous relationship. In any event, these more recently introduced machines produce a pile on one or both surfaces of the base layer using a plurality of yarns, some of which pass through the base layer tending to integrate it if it is not already a unitary layer. When it is desired to have a pile surface which extends less than the full width of the fabric, however, it has been the practice to finish the non-pile edges if they are not selvage edges by over-edge stitching as is illustrated in FIG. 5 of U.S. Pat. No. 3,367,333 issued Feb. 6, 1968, to Stanley C. Scheier. Other means such as hemming may also be used for edge finishing, the finishing being performed either before or after the pile surface is applied. In any event, it is an extra step which the preferred products of this invention avoid.

SUMMARY OF THE INVENTION

The products of this invention are unique in that the edge portions of the pile-surfaced fabric structure may be completely different than the layers which make up the bulk of the base layers and the pile is used to partially

obscure the juncture on the pile side of the fabric. Thus one may use a nonwoven fabric as the predominate base portion and use a ribbon of woven, knitted, crocheted or lace material as one or both of the side edegs. Or one may use a doubled leather edge or a fringe of a sequined cloth. Or one may merely avoid the extra step and cost of applying a finished edge where the base material in a single sheet by turning over the edges and partially obscuring the turned edge by the pile. The pile yarns or other yarns simultaneously piercing through the layers may fasten the latter in the folded relationship but this is not a requisite since the advantages of a doubled edge without the raw edge being objectionably apparent are obvious. Likewise the advantages of pile fabrics with edges which are decorative or unusual in other characteristics but which seem to be continuous with the material under the pile at present even though the edges may be fastened in place before the pile surface is applied.

It is, therefore, one object of this invention to provide a pile fabric which has edges which are folded finished edges using a base layer which has unfinished edges, the unfinished edge being partially obscured by the pile of said fabric.

It is a further object of this invention to provide a pile fabric which has a finished edge using a base layer with unfinished edges and overlapped at the edge with a second layer having the finished edge with the other edge of the second layer partially obscured by the pile.

It is a still further object of this invention to provide a pile fabric which has a layer extending to the fabric side edges and a second layer extending short of the fabric side edges, the edges of the second layer being partially obscured by the pile.

It is another object of this invention to provide a pile fabric which has a base layer whose side edges are covered by folded portions of one or more other layers which form a folded edge and whose edges on the pile side are partially obscured by the pile.

Other objects of the invention will be apparent from the drawings and their descriptions and from the specification and claims.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is an isometric view of the top side of a product **10** which might be a diaper, a towel, a dish cloth, a drape, a table covering, a place mat, or one of a number of other articles formed from a typical fabric of the invention with folded side edges of base material **11** and **11'**, over edged ends **13** and **13'**, body yarn loops **14** and edge yarn loops **12** and **12'**.

FIG. 2 is an enlarged isometric view of a typical fabric of the invention **20**, showing layers **21** and **22** of base material with the edge **23** of one layer partially obscured by loops such as **25**. Loops **26** are similar to loops **25** but of a different yarn. In the fabric illustrated, pile loops *a* are formed of body yarns, whereas the relatively flat loops *b* are formed of edge yarns. Both the body yarns and the edge yarns pierce the fabric repeatedly as a bight of doubled yarn at piercing points such as **24** and **24'**, the bight being formed on the other side of the fabric into stitch loops such as **28** and **27** which are interlocked with similar stitches into a plurality of longitudinally extending wales.

FIGS. 3–16 are schematic sketches which illustrate some of the possible arrangements of base layers and loops. Pile loop lengths and hence pile height may be varied over a very wide range being either uniform or a patterned or substantially random mixture of varying loop lengths.

FIG. 3 illustrates schematically a fabric **30** composed of layers **31**, **32**, and **33**. The relative width of the layers **32** and **33** are arbitrary and would depend upon the final product to be made from the fabric. These layers may extend to abut or even overlap each other. Like-

wise the loops may extend in a series of stripes or may extend completely across the fabric with pile loops uniform or of mixed lengths.

FIG. 4 illustrates schematically a fabric **35** which has three separate base layers **36**, **37** and **38**. The layers **37** and **38** may be mirror images of each other or may be different. The layer **36** could have either cut edges or finished edges. The illustration illustrates the possibilities of attaching a lace, rick-rack or other fancy or plain edge to a wider possibly less expensive base layer with the pile partially obscurring the inner edges on the pile side. Again the loop pile **39** could be of uniform loop length or of mixed lengths and could occur in a striped or checkered pattern or in an overall coverage of uniform or non-uniform pile loops. Obviously the layers **37** and **38** could be on the underside of layer **36** so that the edges of layer **36** would be on the pile side and would be partially obscured by the pile.

FIG. 5 illustrates schematically the possibility of making a folded edge product **40** with three pieces of base materials **41**, **42** and **43** so that at each edge the fabric would have three layers of base material with a single layer in the central portion. Again the loop pile **44** and **44'** extends in patterns or in overall coverage of either uniform or nonuniform loop lengths.

FIG. 6 illustrates schematically another fabric **45** with a wider lower base layer **46** and a superimposed narrower base layer **47**. The pile **48** partially obscures both side edges of base layer **47**.

FIG. 7 illustrates schematically another fabric of the invention **50** consisting of a relatively broad base layer **51** and two superimposed base layers **52** and **54** with pile loops **53** partially obscurring both side edges of the narrower base layers **52** and **54**. This structure makes an excellent diaper or mat fabric.

FIG. 8 illustrates schematically still another fabric of the invention **55** with the edges of base layers **56** and **57** forming the fabric edges. A narrower base layer **58** is interposed between layers **56** and **57**, the inner edge of layer **57** and the corresponding edge of layer **58** being partially obscured by the loop pile **59**.

FIG. 9 illustrates schematically still another fabric construction **60** of the invention, a sheet-like base member **61** is folded with a zigzag fold into three layers, an edge of the top and bottom layer forming the two respective fabric edges and the pile loops **62** partially obscurring the folded edge on the pile side.

FIG. 10 illustrates schematically a four layer fabric **65** with two sheet-like base members **66** and **67** folded to form the four layers, the pile loops **68** partially obscuring the inner edge of one sheet-like member and the folded edge of the other at pile edge **69**.

FIG. 11 illustrates schematically a three layer fabric **70**, both fabric side edges being folded edges, the layers **71**, **72** and **74** being formed by folding one sheet-like base member, pile loops **73** partially obscuring the innerwardly spaced top edge of the folded base member.

FIG. 12 illustrates schematically another three layer base fabric **75** with the bottom layer **76** extending to the fabric side edges, the intermediate layer **77** having side edges inwardly of the fabric edges and the top layer **78** having its side edges inwardly of the intermediate layer side edges. The loop pile **79** partially obscures all of the edges of the top and intermediate layers.

FIG. 13 illustrates schematically a three-layer base fabric **80** with the side edges of layer **81** being the side edges of the fabric and with the top layer **83** extending beyond the side edges of the intermediate layer **82**. The pile loops **84** partially obscure the side edges of the top fabric.

FIG. 14 is another three layer base fabric **85**, schematically illustrated. The side edges of the intermediate layer **87** are the fabric side edges. The bottom layer **86** and the top layer **88** have their side edges inwardly of the fabric side edges and the pile loops **89** partially obscure the side edges of the top layer.

FIG. 15 is another schematically illustrated three layer base fabric with the bottom layer **91** and the intermediate layer **92** being formed from the same sheet-like base member by folding. One side edge of the layer **93** and one side edge of bottom layer **91** are the fabric side edges. The pile loops **94** partially obscure the inner edges of the top and intermediate layers.

FIG. 16 illustrates schematically a fabric of the invention **95** with a two layer central portion formed of layer **97** and bottom layer **96** and three layered ends in which the bottom layer folds over layer **97** at the side edges to produce third layers **98** and **99** at the respective side edges. Pile loops **100** and **101** may extend only sufficiently inwardly to partially obscure the inward edges of layers **98** and **99** or they may extend transversely to form an overall loop pile surface. Alternatively the loop pile surface may be separated into a series of stripes or be otherwise in patterned coverage.

The products of this invention may be made on a number of machines but the Malipol machine, which is available in the United States from Crompton & Knowles-Malimo, Inc., Worcester, Mass., is a preferred machine. This machine is described in U.S. Pat. No. 3,253,426 issued May 31, 1966, to Heinrich Mauersberger. Another suitable machine is the Araloop machine developed in Czechoslovakia by Elitex, Zavody textilniho strojirenstvi, Liberec, Czechoslovakia, essentially described in U.S. Pat. No. 3,377,821, and available in the United States through Stellamcor Inc., 331 Madison Ave., New York, N.Y.

Other machines suitable for producing fabrics of the invention include the machine described in U.S. Pat. No. 3,376,835 issued Apr. 9, 1968, to Charles W. Watkins. This machine, marketed under the trade name Lok-Loop, is available from the Cobble Division of The Singer Company, Riverside Drive, Chattanooga, Tenn. Also suitable is the Kraftamatic machine which is being utilized by United Merchants and Manufacturers, Inc. in making their Terrytuft fabric. This machine is not yet available.

When a folded edge is to be secured in place simultaneously with formation of the pile surface on a single sheet of base material, a suitable edge folder is utilized just prior to the point where the base layers enter the machine which produces the pile surface. As the base layers pass through the machine, yarns pass through the inner portion of the folded-over edge and the underlying portion of base layer. The folded edge is thus fastened in place with pile yarns spanning the edge of the folded-over portion to partially obscure it.

Likewise, when a flat tape is to be the edge of the finished fabric, it is fed through a suitable guide so as to overlap the underlying base layer. It is fastened in place as it passes through the machine by yarns which pass through its inner portion and through the underlying base layer. Again the pile loops span the inner edge and partially obscure it.

When a flat tape is to be folded around the edge of a base layer so that one edge lies on top of the base layer and the other is under the base layer, a suitable folder is again used. The folded edge is fastened in place as it passes through the machine by yarns which pass through the top inner portion of the tape, through the base layer and through the underlying inner portion of the other edge of the tape.

The layers of the products of this invention may be integrated substantially nonporous sheets such as thin metal foils, polymeric films or porous accretions of attenuated or irregularly globular particles of polymeric materials or porous materials such as natural and synthetic open and closed pore foams and sponges or fibrous nonwoven fabrics and papers or natural proteinaceous and cellulosic porous sheets such as skins and animal membranes or bark and cellulosic membranes. Reticulated structures are also suitable and preferred as the layers of the products of this invention. Sheet-like reticulated

structures may be cast or extruded in reticulated form as open or closed pore foams or string-like polymeric nets. Other suitable reticulated layers include knitted, netted, woven, cross-laid, air-laid, water-laid, jet formed and otherwise formed reticulated structures either from fibers, filaments or bands. Partially integrated and completely integrated layers of natural or synthetic fibers and blends or of attenuated string-like members either in arranged or heterogeneous disposition may be used in that portion of fabric which is integrated by the yarns during the formation of the pile structure.

For purposes of this invention, a raised pile loop is defined as a loop whose length is at least 125 percent of the shortest distance between ends of the loop.

A knitted pile structure is defined, for purposes of this invention, as a series of connected loops of yarn and including pile loops threaded through other loops.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the invention has as a base material a woven birdseye weave fabric of 56 x 52 construction with 30s warp yarns and 13.5s filling yarns. Prior to introduction into the Malipol machine, both edges are turned by a suitable folding device so that about one inch is turned at each side onto the upper face of the fabric. The Malipol machine is adjusted to a stitch length of 1.4 millimeters and the pile height adjusted to 4 millimeters, the pile extending to cover the edge of the turned fabric with about one half inch of doubled uncovered fabric at the side edges. After the fabric has come from the machine, it is cut into suitable lengths and a strip of bias tape is folded around the cut edges and sewn into place to seal the ends. This product is a commercially acceptable attractive dish towel. It is particularly attractive when colored yarns are introduced into selected needles to form a multicolored striped pile surface.

We claim:

1. A fabric structure including a plurality of layers of at least one sheet-like base material, at least two of said layers being secured together in an area of overlapping face-to-face contact, an edge of one of said layer extending inwardly of and spaced from an edge of said fabric structure, raised pile loops forming a pile surface area extending on both sides of, adjacent to, and at least partially obscuring said edge of said one layer, said pile loops being formed of yarn loops threaded through other yarn loops being a part of a network which penetrates and secures together overlapped portions of said layers.

2. The fabric structure of claim **1** wherein an edge thereof is a folded edge.

3. The fabric structure of claim **1** wherein an edge thereof is a woven selvage.

4. The fabric structure of claim **1** where said pile loops penetrate said layers and secure said layers in a face-to-face contact.

5. The fabric structure of claim **1** wherein the loop piles are part of a knitted network which penetrates and secures together overlapped portions of said layers.

6. The fabric of claim **1** wherein the pile loops are ravel resistant.

7. The fabric of claim **1** wherein the plurality of layers is greater than two.

8. A composite fabric comprising a plurality of layers of at least one sheet-like flexible base material, at least one of said layers having a portion of a major surface in face-to-face contact with a portion of a major surface of another of said layers, an edge of one layer extending inwardly of and spaced from an edge of said fabric, a knitted pile structure including a plurality of individual yarns, at least one of said yarns fastening said layers in said face-to-face contact, some of said yarns piercing through one or more of said layers and the fabric at a longitudinally extending series of separated points as a bight of doubled yarn, the bights of each of said yarns being formed on one side of said fabric into longitudinally extending stitch loops, successive stitch loops being interlocked into a wale, a plurality of such wales formed from some of said plurality of individual yarns, said doubled yarns diverging on the other side as single strands from each of said separated points of a longitudinally extending series and again piercing through said fabric as a doubled yarn at another separated point, the single yarn strands forming a path between said separated points, a plurality of said paths formed from some of said plurality of individual yarns, the edge of said one layer being at least partially obscured by yarn loops forming a part of the knitted structure.

9. A composite fabric comprising a plurality of layers of at least one sheet-like flexible base material, at least one of said layers having a portion of a major surface in face-to-face contact with a portion of a major surface of another of said layers, an edge of one layer extending inwardly of and spaced from an edge of said fabric, a knitted pile structure including a plurality of individual yarns, at least one of said yarns fastening said layers in said face-to-face contact, each of said individual yarns piercing through one or more of said layers and the fabric at a longitudinally extending series of separated points as a bight of doubled yarn, the bights of each of said yarns being formed on one side of said fabric into separated longitudinally extending stitch loops, alternate loops being of one of said individual yarns and intermediate loops being of another of said yarns, successive stitch loops being interlocked into a wale, a plurality of such wales formed from said plurality of individual yarns, said doubled yarns diverging on the other side of said fabric as single strands from each of said separated points of a longitudinally extending series and again piercing through said fabric as a doubled yarn at a second longitudinally extending series of separated points, the single yarn strands forming a zig-zag path between said first and second series of separated points, a plurality of said zig-zag paths formed from said plurality of individual yarns, the edge of said one layer being at least partially obscured by a single yarn strand forming at least one zig-zag path.

10. The fabric of claim **9** wherein at the edge of said pile surface a series of flat loops of edge yarn form a longitudinal path between the outermost longitudinally extending series of alternate points at each of which alternate points the edge yarn pierces the fabric as a doubled yarn, the bight of which is formed on said one side into separated stitch loops which are interlocked into a wale with alternate stitch loops formed from the bights of doubled yarn from the next adjacent single strands constituting a part of the pile surface.

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RONALD FELDBAUM, Primary Examiner