June 5, 1962 R. H. WHITE 3,037,852

METHOD OF PRODUCING ABRASIVE ROLLS AND SHEETS

Filed Nov. 2, 1959

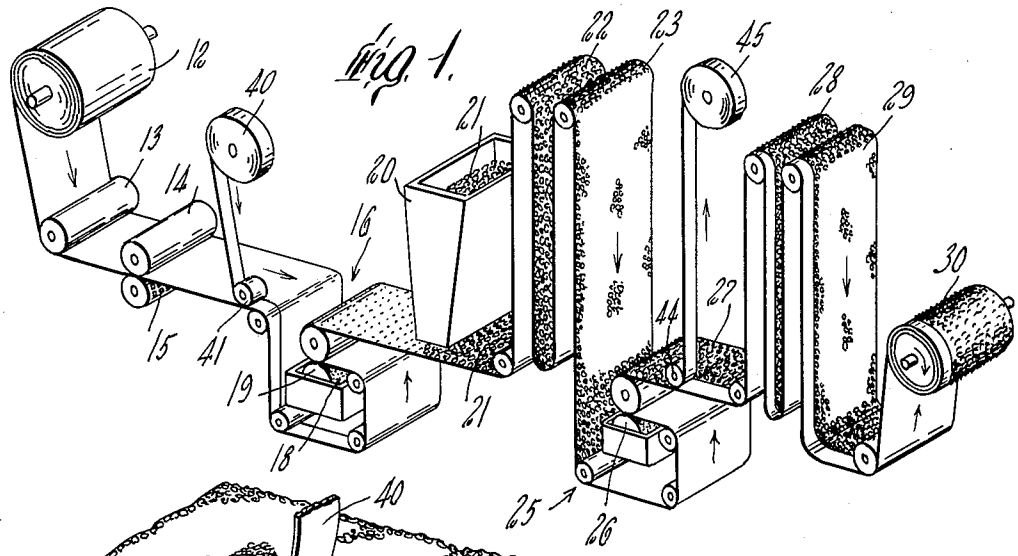

Fig. 1.

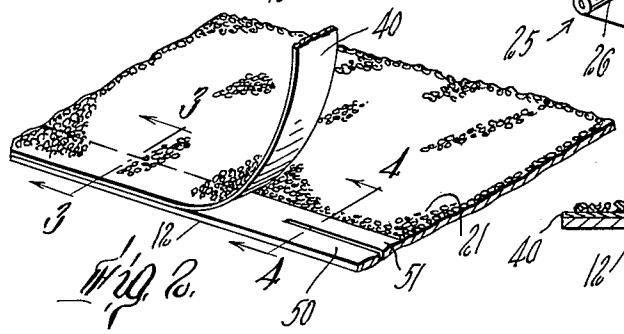

Fig. 2.

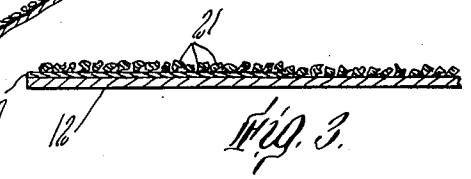

Fig. 3.

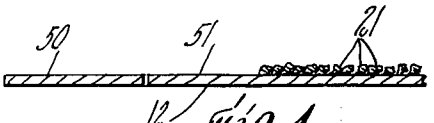

Fig. 4.

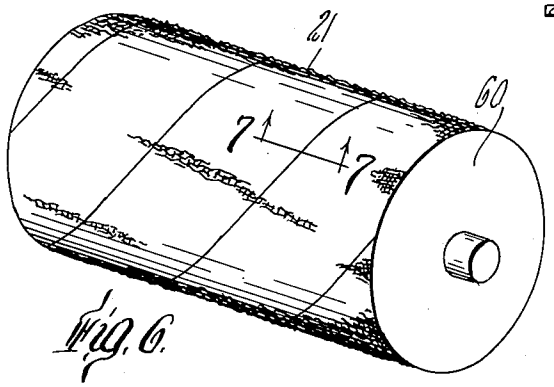

Fig. 6.

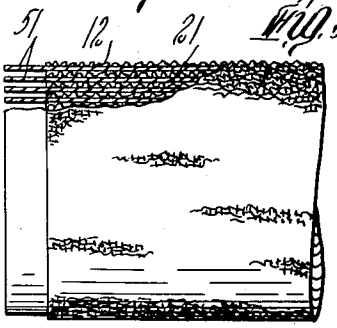

Fig. 5.

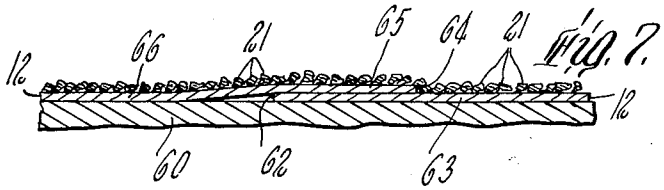

Fig. 7.

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METHOD OF PRODUCING ABRASIVE ROLLS AND SHEETS

Richard H. White, Keene, N.H., assignor to Abrasive Products, Inc., South Braintree, Mass., a corporation of Massachusetts

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This invention relates to the manufacture of abrasive sheet material and more particularly of flexible abrasive sheets adapted to be spirally wound upon power driven rotatable rolls for abrading usage.

Such rolls or drums are usually much wider than the conventional width of an abrasive sheet to be wound thereon. Accordingly, it has been common practice to wind the shorter width strips spirally around the cylindrical surface and then clamp or otherwise fix the wound material adjacent the ends of the drum. Two methods of winding have been used—with and without an overlap. In the case of the non-overlap or butt joint, a uniform contour is secured across the drum but at the expense of abraded matter working its way between and underneath the butted edges of the sheet. As the material builds up under the sheet, there is a tendency for the edges to tear thus shortening the intact useful life of the sheet on the drum. Shortened sheet life adds to the expense for each operation. Equally important from a cost standpoint is the greater number of shutdowns over a given period of time for covering replacement.

Some plants therefore avoid these disadvantages of butt-jointed coverings by overlapping the spiral windings. The resulting greater life, as compared to a butt joint, is, however, accompanied by the disadvantage of building up a double thickness of the flexible abrasive covering where the overlaps occur and with abrupt drop-offs at the joints which can cause grooving or otherwise marring of the material being abraded.

The present invention is directed to overcoming, at least in part, the disadvantages long present in the industry of both of these standard modes of abrasive drum covering and provides, for use with the overlap covering method, an abrasive sheet which has one marginal portion free of abrasive grit and preferably composed solely of the backing material for the composite sheet without added grit securing means or grit. Such a sheet, when spirally wound with overlaps, substantially reduces the thickness of each overlap. Instead of comprising two like thicknesses of backing-glue-grit-size sheet, the overlap then comprises only one such overlying thickness plus an underlying thickness of backing only. The total overlap thickness is thus reduced at least by the depth of the grit layer, which in the case of the larger grit sizes can be substantial.

The provision of such a flexible abrasive sheet with grit-free border for covering use on rolls is not readily provided. Conventional abrasive sheet fabricating machinery makes no provision for providing such a grit-free border and any attempt to remove the abrasive grit along one border involves not only a tedious operation but also it is likely to rupture the backing sheet.

In accordance with this invention, I provide an abrasive sheet having a grit-free border of substantially uniform width by masking one edge of the abrasive sheet backing material, before the backing material is fed to conventional grit-spreading equipment, with a strip of pressure-sensitive adhesive tape chosen for its ready separability from the backing sheet after the completion of the conventional grit-spreading operations. Thus without any modifications of existing machinery, I grit spread the entire width of the backing material and thereafter

strip so much of the grit and other materials as have been spread over the masking strip, away from the backing with the removal of the pressure-sensitive adhesive tape, thus leaving an exposed original surface of the backing for the marginal portion of the coated sheet. Such an operation, the resulting product and its manner of use are shown in the accompanying drawing, wherein:

FIG. 1 is a schematic view of a suitable method of fabricating the product of this invention;

FIG. 2 is an enlarged detail view illustrating two of the steps in the manufacture;

FIG. 3 is a cross-sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 2;

FIG. 5 is a side elevation, partly in section, of a roll of the completed abrasive sheet;

FIG. 6 is an illustrative view of a roll having a spirally wound cover formed of the novel sheet material of this invention; and

FIG. 7 is an enlarged cross-sectional view taken along the line 6—6 of FIG. 5, showing the character of the overlap on the spiral winding.

FIG. 1 shows schematically the elements of conventional abrasive grit-spreading machinery, including a supply roll of backing material **12**, such as vulcanized fiber, which is fed continuously around guide roll **13** between print rolls **14** and **15** by which the under surface of the backing material may be printed with indicia such as company name, grit size, trademarks, etc. **16** indicates generally an adhesive-applying station at which a liquid-settable adhesive **18** such as glue or other conventional heat-setting resin adhesive is spread over the backing material by means of a doctor roll **19**. **20** represents a hopper containing a supply of abrasive grain or grit **21** of any commercial size and nature which is gravity-spread on top of the adhesive-coated backing material as it travels continuously through the equipment. Normally after the grit is spread the material is festooned as over the festoon rollers **22, 23** and then is fed to a size-coating station **25** which applies by means of a doctor roll **26** an overlying size coat **27**. Again the material is festooned as over the festoon rolls **28, 29** and the material is finally led to a take-up roll **30**.

At a suitable point in this operation, preferably, as shown in the drawing, between the print roll **15** and the adhesive-coating station **16**, I apply to one marginal portion of the backing sheet, as it is fed, a strip of pressure-sensitive adhesive from a supply **40** thereof. The pressure-sensiive adhesive tape may be suitably laid by passing it under an idler guide roll **41**. This tape which may be for example of a two-inch width for use with a total backing material width of 26 inches remains attached to the backing material during the adhesive-coating operation at station **16**, the grit-spreading operation, the first festooning, and the application of the size at station **25**. Thereafter, it is stripped from the backing sheet as over the idler roll **44** and taken up on a waste roll **45**.

The removal of the pressure-sensitive adhesive strip **40** is shown also in FIG. 2, leaving an uncoated marginal portion of original backing surface. FIG. 2 illustrates also that, in accordance with common practice, the take-up roll **30**, after it has been oven-cured, if oven-curing is desirable, may be trimmed by slitting-off say the outer one-inch portion **50** of the uncoated marginal portion of the backing **12**. A trimming operation may, if desired, also be performed along the opposite edge.

After the trimming operations, the abrasive sheet with grit-free border **51** may be rerolled for shipment, as shown in FIG. 5. In the roll, the abrasive grit and adhesive and size thus terminate in a plane normal to the axis

of the roll a predetermined distance from the end of the roll. As can be understood, such rolls must be carefully packaged and handled with care, because of the voids between the projecting backing portions **51** of the convolutions.

A rigid rotatable cylindrical roll **60** is shown in FIG. 6, bearing a spirally wound covering of such sheet material. Any suitable clamping means (not shown) may be utilized to hold the cover on the roll.

FIG. 7 shows the overlapped joint at the junctures between adjacent convolutions of the sheet. Since the grit **21** terminates short of the edge **62** of right-hand convolution **63**, the edge **64** and adjacent overlapping portion **65** of the adjacent convolution **66** lies directly against the backing of the convolution **63** and the overlap thickness includes only a single thickness of size, grit and grit-securing base adhesive plus two layers of backing **12**.

As a result the bulk at the overlap is minimized and the depth of drop at the junctures of the grit layers on the convolutions **63** and **66** respectively are more nearly in the same plane than they would be if the grit of convolution **63** extended under the overlapping portion of convolution **66**.

The product thus avoids the disadvantages of a butt joint wind while also avoiding the disadvantages of a double grit thickness overlap at the junction.

What is claimed is:

1. The method of manufacturing a coated abrasive sheet which comprises feeding a sheet of backing material continuously to grit-spreading equipment while masking the entire portion of one marginal edge of substantially uniform width of the backing material as it is fed, with a strip of pressure-sensitive adhesive tape of less width than the width of the backing material, coating the entire composite material with liquid grit-securing adhesive, spreading grit over the entire coated composite material and thereafter stripping the adhesive-grit-covered masking tape from the backing sheet to provide a grit-covered abrasive sheet having one marginal edge thereof of uniform width free of grit and composed essentially of only said grit-covered backing material.

2. The method of manufacturing a coated abrasive sheet which comprises feeding a sheet of backing material continuously to grit-spreading equipment while masking one marginal edge of the backing material as it is fed with a strip of pressure-sensitive adhesive tape of less width than the width of the backing material, coating the entire composite material with liquid-grit-securing adhesive, spreading grit over the entire coated composite material, applying a size to the top surface of the grit and thereafter stripping the adhesive-grit-size-covered masking tape from the backing sheet to provide a grit-covered abrasive sheet having one marginal edge thereof free of grit and composed essentially of only said grit-covered backing material.

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