This invention relates to abrasive coated cloth. More particularly the invention relates to abrasive coated cloth having improved flexibility, improved adherence of the adhesive to the cloth and high strength, and to abrasive articles made therefrom.

Abrasive coated cloth is usually made from a woven cotton fabric backing upon which a film of adhesive holds and supports a coating of abrasive grain. Various types of adhesives, such as glue or synthetic resins are commonly used. All types of abrasive grains, for example silicon carbide, aluminum oxide, flint, garnet, emery, and the like may be employed. Virtually all backings for abrasive coated cloth are made from cotton yarns. The two most common types of these cotton fabrics are drills and jeans, each having a twill weave. The principal difference between these types of fabrics is that drills are made from heavier yarns, though fewer in number, and are heavier and stronger than jeans. Drills therefore are used mainly for heavy work and for coarser grades, whereas jeans are preferred where more flexibility is required and less strength can be tolerated.

However, conventional abrasive coated cloth suffers from the disadvantage that the adhesive used to secure the abrasive grains to the cloth backing penetrates the yarns of the cotton cloth to a considerable extent thereby greatly reducing the flexibility of the cloth when the adhesive is cured or set. Since flexibility is a primary requisite for most abrasive coated cloth it is obvious that such a reduction in flexibility is a serious disadvantage which makes the use of such abrasive coated cloth impractical for many applications.

In an attempt to overcome this disadvantage it has been suggested that synthetic fibers, such as polyester fibers, be used as a backing material. However, their use has never been successful because while such backings have good flexibility, the adherence of adhesives and liquid filling materials to the synthetic fibers is practically nil. Articles made from such a backing material have been commercially unfeasible due to excessive loss of abrasive grain during use because of the poor adherence of the abrasive grains to the backing.

An object of this invention is to provide abrasive coated cloth having improved characteristics.

Another object of the invention is to provide abrasive coated cloth having an improved backing.

Another object is to provide abrasive coated cloth having improved flexibility, improved adherence of the adhesive to the backing, and high strength.

A further object is to provide improved abrasive articles made from this novel abrasive coated cloth.

Various other objects and advantages will appear from the following description of the invention, and the novel features will be particularly pointed out in connection with the appended claims. The improved abrasive coated cloth, according to the present invention, incorporates a novel backing material of fabric woven from sheathed synthetic fiber yarns. The sheathed synthetic fiber yarns from which the fabric is woven consist of a core or filament of synthetic fiber surrounded by a sheath of cellulose fibers, covering the synthetic fiber core. This material is also known as cotton core spun synthetic fiber. It has been discovered that abrasive coated cloth embodying this fabric backing possesses a greater degree of flexibility, greater strength and better adherence of the adhesive to the backing than the abrasive coated cloths herebefore known.

Fabric woven from the sheathed synthetic fiber yarns has high tensile strength and tear, and a high degree of toughness contributed by the synthetic fiber core. On the other hand, filling and coating thereof can be carried out with conventional materials and procedures used on cotton cloth, because of the sheathing. Since the adhesive will not penetrate the synthetic fiber core, the fabric will retain a high degree of flexibility even after the abrasive coated cloth has been cured. Because the adhesive bonds to the shear the abrasive grains are firmly secured to the backing. Thus the abrasive product does not suffer from the disadvantages which made the use of synthetic fiber backings unfeasible.

The core or filament of the sheathed synthetic fiber yarn comprises a continuous strand of a synthetic fiber. Suitable fibers can be formed from materials such as polyamides, polyesters, polypropylene, polyacrylonitriles; copolymers of vinyl chloride—vinyl acetate, vinyl chloride—acrylonitrile, and the like. Fibers made from such materials and others are well known and are commercially termed synthetic textile fibers. These fibers are impermeable to liquid adhesives used to secure abrasive grains to the backing. The core of the yarn may be a continuous monofilament of synthetic fiber or it may be a bundle of such continuous filaments. Abrasive coated cloth woven from yarns having either a monofilament or multifilament core surrounded by the sheath of cellulose fibers has higher tensile strength and greater resistance to tear than abrasive coated cloth having a backing woven from conventional cotton yarn. However, abrasive coated cloth having a fabric backing woven from yarns containing a multifilament core is slightly less flexible than cloth made from monofilament core yarns.

The core or filament of synthetic textile fiber is surrounded by a sheath of cellulose fibers such as for example, fibers of cotton, linen, rayon, and so forth. These fibers may be formed into a sheath surrounding the synthetic fiber core by conventional processes, such as, for example, spinning, knitting, and so forth. Cotton is preferred for the sheathing material.

The amount of cellulose fiber sheath material present in the yarn of this invention is not critical, the only requirement being that there must be sufficient cellulose fibers in the sheathed synthetic fiber yarn to ensure good adherence of the adhesive. Also, the yarn diameter must not be so large that the yarns cannot be woven into fabric.

While the preferred backing material of this invention is a fabric woven entirely from the sheathed synthetic fiber yarns, the backing may be woven so that the sheathed yarns run in one direction only and conventional cotton yarns run in the other direction. Abrasive coated cloth made in accordance with this in-
vention may be used to form all types of abrasive coated articles. Thus, abrasive belts, discs, sheets, strips, cones and the like may be formed from the abrasive coated cloth having a backing of fabric woven from sheathed synthetic fiber yarns. Conventional coating processes are especially useful in forming articles which, in use, require a high degree of flexibility together with high strength and good tear resistance.

Thus, the abrasive coated cloth of this invention comprises abrasive grain secured to a backing, the backing being woven from sheathed synthetic fiber yarns. Conventional techniques for making abrasive coated cloth are followed in making such fabric. That is, a first or making adhesive coat is applied to the fabric backing after which abrasive grains are then applied by conventional procedures. A second or sizing adhesive coat may then be applied over the abrasive grain, the sizing coat combining with the making coat to anchor the abrasive grain more firmly to the backing.

Any conventional adhesive used in making abrasive coated cloth may be used in this invention. Such conventional adhesives include, for example, resins such as phenol-formaldehyde condensation products, glues and the like. The same adhesive may be used for both the making or sizing coats or the making and sizing coats may be different adhesives.

Any conventional abrasive material may be used in this invention. Suitable abrasives include for example, silicon carbide, fused alumina, emery, garnet, corundum flint and the like, and mixtures thereof. Abrasive grain size may vary from fine polishing powders to coarser grit sizes.

The invention will now be described with particular reference to several specific examples, it being understood that such examples are given for illustrative purposes only and are not limiting. Unless otherwise specified in the examples, all percentages will be expressed as percentages by weight.

Example 1

In order to demonstrate the superiority of abrasive coated cloth made in accordance with this invention, two samples of abrasive coated cloth were prepared. One sample had a conventional all cotton woven backing to serve as a control specimen and provide a basis for comparison. The other sample was made in accordance with the teachings of the present invention, and had as a backing a fabric woven from 8 ounce cotton sheathed polyethylene terephthalate fiber yarns. The fabric woven from these yarns had the following construction:

Percent by wt.

2 ply warp—2 x 250 denier high tenacity:
- Polyester fiber
- Cotton sheath

Single weft—4 x 250 denier high tenacity:
- Polyester fiber
- Cotton sheath

Thread count—60 x 35.

In order to provide comparative results a standard procedure was followed for making both samples of abrasive coated cloth. That is, the type, quantity and grit size of abrasive grain, type and quantity of adhesive and the coating technique employed were the same for both samples of abrasive coated cloth.

Conventional coating practice was followed. That is, a first or making adhesive coating was applied to the backing, abrasive grain was applied to the adhesive coated backing and a second or sizing adhesive coating was applied over the abrasive grain. In both samples the making coat was phenolic resin applied at about 18 pounds per ream and the sizing coat was also phenolic resin applied at about 28 pounds per ream. The abrasive grain was 36 grit aluminum oxide applied at about 16 pounds per ream. The two samples of abrasive coated cloth were each made into abrasive belts 136 inches long by 4 inches wide and were tested under the same uniform operating conditions as a belt speed of 3500 surface feet per minute. Belts made from each sample were tested at 66 pounds per linear inch for 60 minutes and at high contact pressure (262 lbs./sq. in.) for 3 minutes on a mild steel workpiece. The results observed are tabulated below:

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<tr>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton Yarn</td>
<td>1,780</td>
<td>20</td>
<td>618</td>
<td>48</td>
</tr>
<tr>
<td>Sheathed Synthetic Fiber Yarn</td>
<td>1,810</td>
<td>13</td>
<td>600</td>
<td>17</td>
</tr>
</tbody>
</table>

It will be seen that the stock removal figures are substantially the same for both backing materials, but that the belt losses are significantly lower for the belt having the backing of sheathed synthetic fiber yarns. Lower belt loss means increased belt life and is indicative of improved adhesion. Examination of the two belts revealed that the belt made from the novel abrasive coated cloth of this invention was noticeably more flexible than the belt having a cotton yarn backing.

It will be understood that the particular abrasive grain, grit size, adhesive and manufacturing technique described above are intended to be illustrative only and are not limiting of the invention. The novel abrasive coated cloth of this invention may be made by the use of any conventional abrasive grain, adhesive and manufacturing technique.

It will be understood that various changes in the details, materials, steps and arrangements of elements which have herein been described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

1. An abrasive coated cloth consisting essentially of a fabric, abrasive grain, a bonding agent and an adhesive bonding said grains to said backing, said backing consisting essentially of a fabric comprising sheathed synthetic fiber yarns, said yarns consisting of a core of synthetic fiber impenetrable by said adhesive surrounded by a sheath of cellulose fibers.

2. The article as defined in claim 1 in which said backing has cotton yarn in one direction and sheathed synthetic fiber yarn in the cross direction.

3. An abrasive coated belt consisting essentially of a fabric backing comprising sheathed synthetic fiber yarns and a layer of abrasive grain adhesively bonded to said fiber backing, said yarns consisting essentially of a core of a continuous synthetic fiber impenetrable by said adhesive surrounded by a sheath of cellulose fibers.

4. The article as defined in claim 3 in which said backing has cotton yarn in one direction and sheathed synthetic fiber yarn in the cross direction.

5. The article as defined in claim 1 in which said synthetic fiber is a fiber formed from a material selected from the group consisting of polyamides, polystyrene, polypropylene, polycrylonitriles, vinyl chloride—vinyl acetate copolymers and vinyl chloride—acrylonitrile copolymers.

6. The article as defined in claim 1 in which said core is a synthetic fiber in the form of a continuous monofilament.

7. The article as defined in claim 1 in which said core is a bundle of continuous filaments of synthetic fiber.

8. The article as defined in claim 3 in which said syn-
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5 The article as defined in claim 3 in which said core is a continuous monofilament.

10. The article as defined in claim 3 in which said core is a bundle of continuous filaments of synthetic fiber.

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