March 4, 1969 E. F. ENGEL ET AL 3,430,283

POLISHING BUFF

Filed Aug. 9, 1967 Sheet 1 of 3

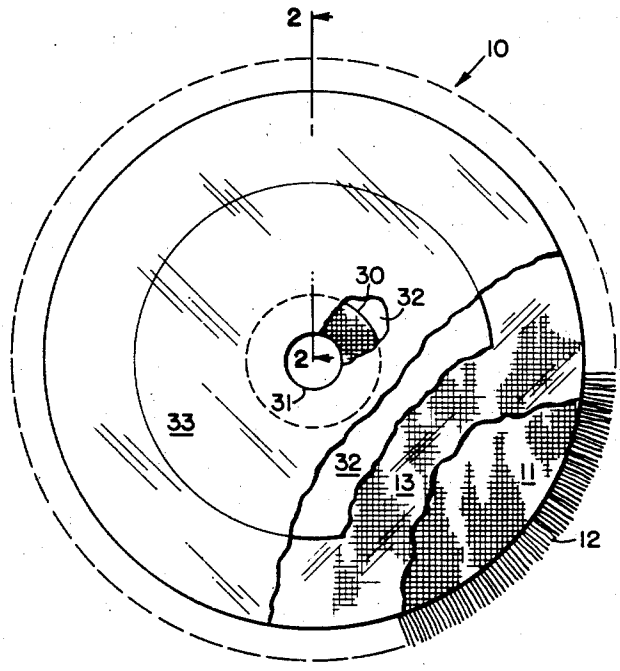


FIG. 1

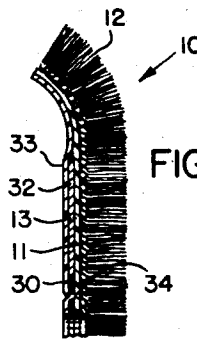


FIG. 2

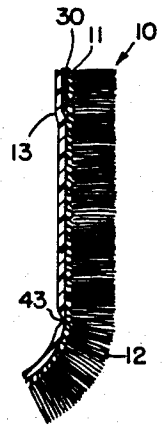


FIG. 5

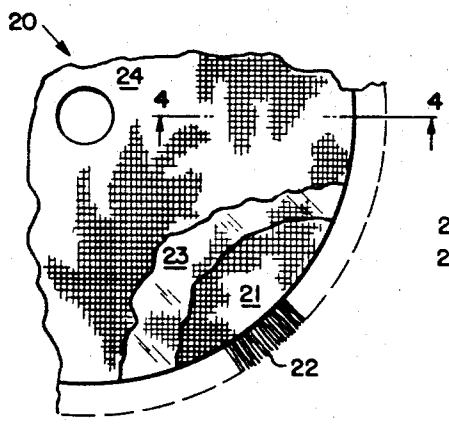


FIG. 3

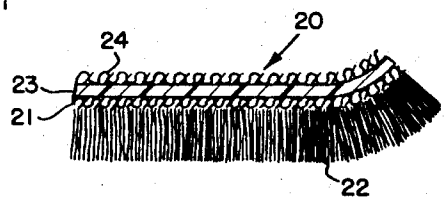
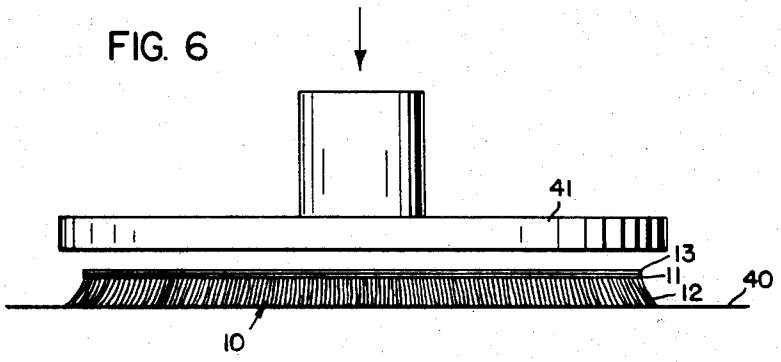


FIG. 4

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FIG. 6



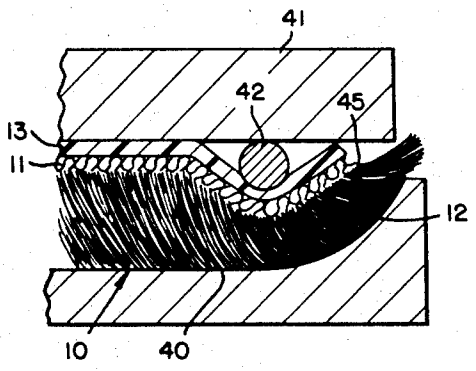


FIG. 7

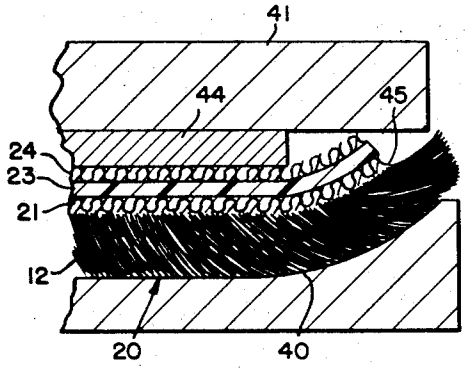


FIG. 8

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FIG. 9

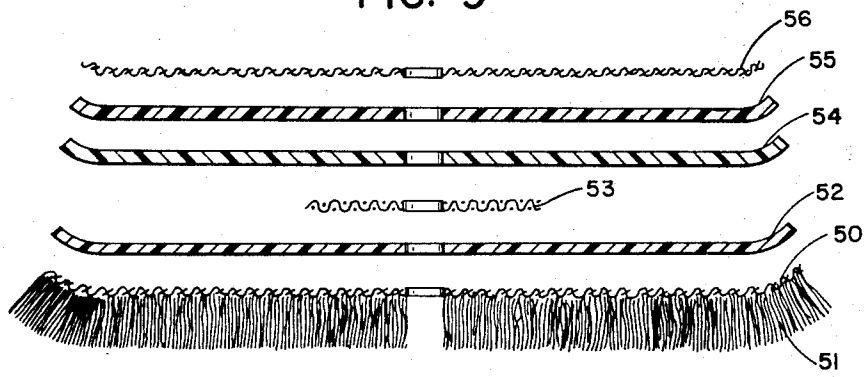
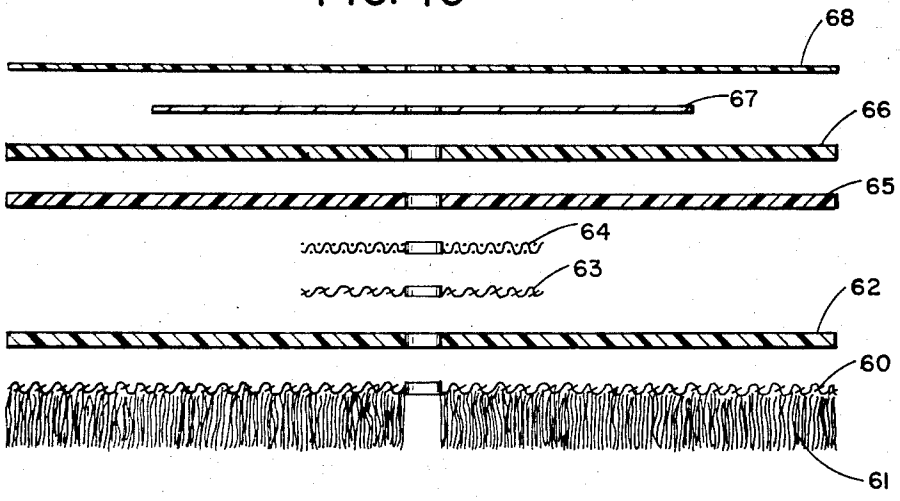


FIG. 10



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3,430,283

POLISHING BUFF

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Continuation-in-part of application Ser. No. 463,832, June 14, 1965. This application Aug. 9, 1967, Ser. No. 659,505

U.S. Cl. 15—230.12 11 Claims

Int. Cl. A46b *3/02;* B05c *1/00*

ABSTRACT OF THE DISCLOSURE

A polishing buff is formed of a base fabric disk of relatively, coarse open weave, having pile material extending away from one face. Plastic material applied to the back face of the disk impregnates interstices in the fabric to anchor the pile in place and stiffen and support the buff which can be formed in a generally dished or curved-edge shape. For greater stiffening and strength, additional layers of plastic can be added to the back of the buff, a reinforcing ring of metal screening can be embedded in plastic around a central arbor hole in the buff, and a fabric backing material can be added to the back of the buff.

This application is a continuation-in-part of our copending application, Ser. No. 463,832, now Patent No. 3,342,533 issued Sept. 19, 1967.

The present invention relates to a polishing buff that is cheaper and easier to manufacture and that has improved characteristics.

The objects of the invention include without limitation:

(a) A polishing buff that will not be damaged by dry cleaning solvents so that the buff's life can be extended by dry cleaning;

(b) A buff that is cheaper and easier to make than prior art buffs and yet has high quality characteristics such as long life, resistance to injury, and high polishing capacities;

(c) A buff having pile that is easily formed in place and securely anchored on its backing sheet;

(d) A buff having a generally dished-shape that is economically formed and retained throughout the life of the buff; and

(e) A generally dished-shape buff having pile disposed around the periphery of the fabric backing disk of the buff to protect the buffed surface from any contact with such fabric disk.

These and other objects of the invention will be apparent hereinafter from the specification which describes the invention, its use, operation and preferred embodiments, from the drawings which constitute a part of the disclosure, and from the subject matter claimed.

In the drawings:

FIG. 1 shows a plan view, partially cut-away, of a preferred embodiment of the buff according to the invention;

FIG. 2 shows a partial cross-section of FIG. 1 taken along the line **2—2**;

FIG. 3 shows a partial plan view, partially cut-away, of another preferred embodiment of buff according to the invention;

FIG. 4 shows a partial cross-sectional view of the buff of FIG. 3 taken along the line **4—4**;

FIG. 5 shows a partial cross-sectional view of another preferred embodiment of the invention;

FIG. 6 shows a partially schematic side elevation of a heat fusing step in the method of making buffs according to the invention;

FIGS. 7 and 8 show partially schematic, partial side elevations of the forming of dished-shaped buffs according to the invention; and

FIGS. 9 and 10 show schematic exploded cross-sectional views of alternative buff constructions according to the invention.

Generally, buffs according to the invention are formed on a backing disk of fabric material of relatively coarse and open weave. Pile extends from one face of such a backing disk, and the interstices in the opposite face are impregnated with a plastic material to anchor the pile in place and to overlie the back of the disk for stiffening and strengthening the buff. Several laminae of plastic can be used, and a cloth or wire screen reinforcing ring can be bonded to the back of the buff around a central arbor hole by such plastic material. Also, a label or a backing cap of fabric material can be applied to overlie the back of the buff.

Referring to FIGS. 1 and 2, a buff **10** is formed with a fabric backing sheet **11** that is preferably canvas and that is preferably cut into the illustrated disk form. Of course, sheet **11** can be cut in any convenient shape during fabrication of buff **10** and can later be trimmed to the illustrated disk shape. Previous buff construction methods have required a relatively closely woven and expensive canvas disk, but for buffs according to the invention, a relatively open-weave and less expensive canvas is preferred. A suitable material is commonly called scrim cloth.

Pile **12**, preferably of wool, is applied to backing disk **11** to extend from one face thereof as illustrated. Preferably, pile **12** is stitched or tufted on disk **11**, but pile **12** can also be applied by weaving, knitting, or flocking using generally known techniques. Pile **12** can be applied to fabric **11** before or after such fabric is cut into a disk shape.

Particularly in tufting pile onto fabric **11**, it is preferred that fabric **11** be impregnated with plastic material before tufting. Suitable materials for this purpose include many natural and synthetic resins of both thermosetting and thermoplastic types. Suitable plastic materials are preferably unaffected by dry cleaning solvents so that the buff is dry cleanable, and a plastic material having the desirable characteristics and preferred for economy is a linear, low-density, high-melt-index polyethylene.

The application of plastic material to fabric **11** can be before or after the fabric is cut into a disk shape. The impregnating of fabric **11** with plastic material before tufting helps keep the tufted pile fibers from slipping or pulling out during the tufting operation, and helps anchor the pile fibers in place on fabric **11**.

The impregnation of fabric disk **11** with plastic material such as polyethylene makes the tufting of the pile fibers onto the disk more simple and economical than possible with previous buff constructions. The densely woven canvas fabric backing disks of previous buffs were difficult to tuft with pile, and the pile stitching apparatus often cut fibers in such disks during tufting so as to weaken the disk and impair its appearance. Furthermore, tufts of pile are better anchored in the inventive plastic-impregnated disk **11** than is possible with an untreated canvas disk.

Tufting of the inventive buff is accomplished by tufting methods and apparatus that are known per se and comprise generally a sewing machine adapted to stitch pile tufts through the disk and sever outwardly projecting loops of fibers to form a pile projecting from the face of the disk. Knitting, weaving, or flocking of pile **12** onto disk **11** can also be done in generally known ways.

After securing pile **12** to disk **11**, an additional coating or layer **13** of plastic material is applied to the back of disk **11**. It is preferred that such backing layer be the same plastic material impregnating disk **11**, such as polyethylene.

Plastic backing layers **13** can be applied to the buff

in a variety of ways. A preferred method is to use sheets of plastic material that are fused into the back of the buff, and this method is referred to in describing several preferred embodiments of the invention. By such method, a disk of plastic **13** is placed over the back of fabric **11**, and heat and pressure are used to flow the plastic into the interstices in fabric **11** and into and around the pile to anchor such pile securely in fabric **11**, and to stiffen and support the buff to hold it in its general disk shape. However, plastic layer **13** can be applied to the buff in other ways within the spirit of the invention. For example, plastic layer **13** can be applied as a liquid that is sprayed, brushed, rolled or dip coated onto fabric **11** or plastic in a powder form can be fused into the back of fabric **11**.

The preferred way of fusing a disk of plastic **13** into fabric layer **11** is illustrated in FIG. 6. Tufted disk **11** is positioned with its pile **12** downward in engagement with work surface **40** and heated platen **41** is pressed down against the back of plastic disk **13** to apply heat and pressure to the back of the buff. After an appropriate time-temperature, platen **41** is raised, and the elements of the buff are fused together in an integral unit.

A disk backed with a layer of plastic such as polyethylene is inert to and undamaged by dry cleaning solvents such is trichlorethylene, carbon tetrachloride, perchlorethylene, etc., and can be dry cleaned. Since dry cleaning of the inventive buff is possible, dirt can be removed from the pile, and the life of the buff can be prolonged by periodic dry cleaning.

Plastic backing layer **13** also protects the back of the buff, preventing injury or damage to the roots of the pile. In addition, plastic layer **13** secures the pile in place and provides body, strength, and the desired degree of stiffness to the inventive buff, and yet the buff retains sufficient flexibility so that it can be rapidly deformed during polishing to conform to the surface being polished. Furthermore, such a plastic-backed buff is lighter in weight than conventional buffs for economy and convenience of use. Moreover, the inventive buff dissipates the heat generated during polishing without injury to the pile or its backing, thus, prolonging the useful life of the buff.

A complete and satisfactory buff can be formed according to the invention by merely applying plastic layer **13** to the back of backing material **11** on which pile **12** has been arranged, as best illustrated in FIG. 5. However, other variations and modifications of the inventive buff have advantages for some applications, and these have been shown in the drawings and will now be described.

It is preferred for many applications that a buff according to the invention have a central arbor hole **31** and a reinforcing washer **30** immediately surrounding arbor hole **31** as partially illustrated in FIGS. 1 and 2. Such a washer can be formed of the same fabric material from which disk **11** is cut, and can be secured in place by plastic as will be described more completely below.

Another variation of the inventive buff illustrated in FIGS. 1 and 2 includes a label **32** preferably formed of stiff paper or other suitable material such as plastic and preferably of smaller radius than disk **11**, and concentric therewith. Label **32** is laid over a plastic disk **13**, and is preferably apertured to surround washer **30**, if such washer is used. A trademark or other information can conveniently be applied to label disk **32**, and disk **32** helps stiffen and support the central portion of buff **10** in the preferred flat configuration. Preferably, another plastic disk **33** is laid over disk **32** and the other elements on the back of disk **11**, and the entire assembly is fused into an integral unit by heat and pressure.

As best shown in FIG. 2, washer **30**, over which label disk **32** can be positioned, is preferably secured in place in buff **10** by plastic projections **34** extending from plastic layer **33** through washer **30** and into bonded engagement with plastic layer **13**. Projections or nubs **34** are preferably formed by projections on the heat and pressure platen used for fusing the plastic together with the other elements of the buff to form a monolithic unit. Projections are disposed on such platen so as to extend into the buff in the area of washer **30** to form rivet-like plastic nubs **34** joining the two plastic layers **13** and **33** together through washer **30** to secure washer **30** in place.

Referring to FIGS. 3 and 4, a buff **20** is formed with a fabric backing sheet **21** similar to backing sheet **11** in that it is also coarsely woven and preferably impregnated with plastic material before being tufted. Pile tufts **22** are stitched through backing sheet **21** in the same manner as described above for buff **10**.

Instead of merely having a plastic backing layer, buff **20** has an additional capping fabric disk **24**. Preferably, a disk **23** of plastic and a fabric disk **24** of material similar to disk **21** are laid over the back of disk **21** and heat and pressure are applied to plasticize disk **23** and flow the plastic into the interstices of the fabric disks **21** and **24** and into the stitching of pile tufts to bond disks **21** and **24** together in a monolithic laminated unit and to secure pile **22** in place.

The addition of capping disk **24** improves the appearance of the inventive buff, and also adds to its stiffness for those applications in which a relatively stiff buff is advantageous. Both fabric disks **21** and **24** can be of relatively inexpensive, open-weave canvas, and buff **20** is equally resistant to dry cleaning solvents, and is more economical to manufacture than prior art buffs. Several plastic disks can be used if desired to increase the thickness of lamina **23**. Also capping fabric disk **24** can be of smaller diameter than disk **22** so as not to extend into the curved edge portion of the buff.

The inventive plastic-backed buff can be conveniently formed into a generally dished shape as shown in the cross section views of FIGS. 2, 4, and 5, and in such dished shape, the peripheral edge of the buff **10** is curled or bent rearwardly to make a rounded edge. Such a rounded edge helps to interpose pile between the surface being polished and the buff's backing element formed of fabric **11** and plastic. Any contact of the backing element with the surface to be polished would burn or mar said surface rather than polish it, hence, it is desirable to have pile around the edges of the buff and disposed between the surface being polished and the backing element of the buff.

The heat and pressure used to fuse plastic into other lamina of the inventive buff as described above and illustrated in FIG. 6 can also be used to form the buff into the desired dished shape in a single operation, but it is preferred that the parts of the buff be fused together in a generally flat configuration and that the periphery of the buff be trimmed before it is formed into a dished shape.

A dished shape is preferably obtained by heating and compressing the buff near its peripheral edge in an annular area concentric with the buff. At the same time such compression and heat are applied, it is preferred that the peripheral edge of the buff be forced rearward to curl back the edge of the buff in a dished shape. After removal of heat, compression, and bending forces from the buff, its plastic lamina sets and retains the buff in a dished shape. Shrinkage of plastic and canvas at the periphery of the buff tends to increase the rearward curl of the buff and accentuate its dished configuration.

To form the curved edge buff preferred for many applications, one of the methods illustrated in FIGS. 7 and 8 is preferred. Generally, the methods include placing the buff pile-downward in a preferably concave support member **40** and pressing the buff into support member **40** while compressing the buff to a greater extent a short distance away from its peripheral edge to force an upward curl into the buff periphery and to urge some plastic outward toward the periphery of the buff.

In FIG. 7, a wire ring is shown disposed on the upper surface of buff **10** which is positioned with its pile **12** in engagement with support member **40**, and platen **41** is shown as having driven wire ring **42** into the upper surface of buff **10** to compress it more in the area of ring **42**. Ring **42**, for purposes of illustration, is merely shown in cross section, but preferably comprises a ring of somewhat smaller radius than disk **11** and arranged concentrically with disk **11** to be evenly spaced from the periphery thereof. Ring **42** can be carried by platen **41**, or disposed on the upper surface of buff **10** as a separate unit, but it is preferred that ring **42** be metal or other heat conducting material so as to transmit heat from platen **41** to plastic **13** in buff **10**.

Forcing of ring **42** down into the back surface of buff **10** in cooperation with the concave form of support **40** forms the periphery of buff **10** in an upward curvature to produce the desired dished shape. Also, some of the plastic **13** is squeezed radially outward toward the periphery of buff **10** and the thickness of plastic layer **13** is reduced under wire **42** so that any shrinkage of plastic **13** and canvas **11** tends to accentuate the rearward curl of buff **10** at its periphery, and such curling is not transmitted past the zone of wire **42** toward inner, flat areas of the buff. A depression **43**, best shown in FIG. 5, is formed in the back of a buff that is dished by compression from ring **42**.

In the method shown in FIG. 8, a solid disk **44** is substituted for the ring **42** and provides greater compression of the buff **20** in the central portion than at its periphery. This forces some molten plastic radially outward toward the periphery of buff **20**, and in cooperation with concave support **40**, curls the periphery of buff **20** upward.

The methods illustrated in FIGS. 7 and 8 are each applicable to any of the preferred embodiments of buffs illustrated in FIGS. 1–5, and other methods of forming the inventive buff into a dished shape can be used within the spirit of the invention. Thus, platen **41** can be replaced by a male die member shaped to give the buff a dished shape when the buff is compressed between such male die member and concave female support member **40**.

Another function of the methods illustrated in FIGS. 6–8 is to force molten plastic radially outward toward and beyond the periphery of the buff and through fabric layers at the buff periphery to engage portions of the pile bent back and extending outward at the periphery **45** of the buff. As platen **41** forces buff **10** downward, the peripheral pile fibers of the buff are forced radially outward from the edge of the buff, and molten plastic that is squeezed out to and adjacent the periphery **45** of the fabric disks **11** or **21** engages portions of the pile fibers at that point and bonds them to the edge of the fabric backing disk so that such fibers are bent around and secured to the outer edge of the disk to be disposed between the fabric backing and a surface being polished by the buff. This prevents burning or marring of the polished surface from engagement directly with the backing element of the buff and insures that pile is always disposed between such polished surface and the buff backing elements.

FIGS. 9 and 10 show exploded views of alternative buff laminates according to the invention. In FIG. 9, a scrim cloth backing sheet **50** is provided with a dense woolen pile **51** extending from one face thereof. Disk **50** is preferably impregnated with plastic before pile **51** is applied thereto. Next, a layer of plastic material **52** is applied to overlie the back of disc **50**, and pile **51**. Then a disk of metal screening **53** having a central arbor hole concentric with the arbor hole in disk **50**, is laid over the back of the buff. Plastic layers **54** and **55** are laid over reinforcing screen **53** and finally, a capping fabric disk **56**, is laid over the back of plastic layer **55**. A single plastic layer can be substituted for plastic layers **54** and **55**, or additional plastic layers can be used to build up the plastic thickness desired.

All the layers illustrated in FIG. 9 are secured together into an integral buff, and the peripheral edge of the buff is bent back in a dished configuration as illustrated and held in such shape by the set plastic material to provide a curved edge buff. Peripheral pile elements or fibers are preferably bent back and secured to backing plastic layers to turn pile **51** radially outward around the curved edge of the buff for greater protection.

FIG. 10 shows an exploded view of an alternative buff laminate according to the invention with a scrim cloth fabric disk **60** provided with pile **61**, and backed with a plastic layer **62**. Additional backing layers include an apertured scrim cloth disk **63** concentric with the arbor hole in disk **60**, a preferably aluminum wire screening disk **64** having a central aperture concentric with the arbor hole in disk **60**, plastic layers **65** and **66** above screening disk **64**, a paper label disk **67**, and a final plastic layer **68**. All these layers are bonded securely together to form an integral buff, and the upper plastic layer is preferably clear so that label **67** can be read on the back of the buff. Again, plastic layers can be increased in thickness or number as desired, and applied in a variety of ways.

Other features, advantages, and other specific embodiments of this invention will be apparent to those exercising ordinary skill in the pertinent art after considering the foregoing disclosure. In this regard while specific preferred embodiments have been described in detail, such disclosure is intended as illustrative, rather than limiting, and other embodiments, variations, and modifications can be effected within the spirit and scope of the invention as disclosed and claimed. Furthermore, the following claimed subject matter is intended to cover fully all the aspects of the disclosed invention that are unobvious over prior art, including all equivalent embodiments.

We claim:

1. A polishing buff comprising:
(a) a scrim cloth disk of relatively coarse, open weave;
(b) pile material secured to said disk and extending from one face of said disk; and
(c) polyethylene impregnating the interstices of said disk at the back thereof, so that a substantial volume of said polyethylene penetrates into said scrim cloth, said polyethylene also overlying the back of said disk to stiffen and support said buff in a generally disk-shape.

2. The buff of claim **1** formed into a generally dished configuration and supported in said dished configuration by said polyethylene.

3. The buff of claim **2** wherein said pile material around the periphery of said disk is oriented radially outward and secured in said orientation by said polyethylene.

4. The buff of claim **1** including a backing cap of scrim cloth overlying said polyethylene.

5. The buff of claim **4** formed into a generally dished configuration and supported in said configuration by said polyethylene.

6. The buff of claim **1** formed with a central arbor hole and including a reinforcing washer of smaller diameter than said disk surrounding said arbor hole.

7. The buff of claim **6** wherein said reinforcing washer is formed of scrim cloth.

8. The buff of claim **6** wherein projections of said polyethylene extend through said reinforcing washer to secure said reinforcing washer in place.

9. The buff of claim **6** wherein said reinforcing washer is formed of metal screen material.

10. The buff of claim **9** including a backing cap of scrim cloth and wherein said buff is formed into a generally dished configuration and supported in said dished configuration by said polyethylene.

11. The buff of claim **10** wherein said pile material around the periphery of said disk is oriented radially outward and secured in said orientation by said polyethylene.

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