Sept. 14, 1943. K. F. SCHLEGEL, JR 2,329,222

POLISHING DISK

Filed Jan. 6, 1942

Fig. 1

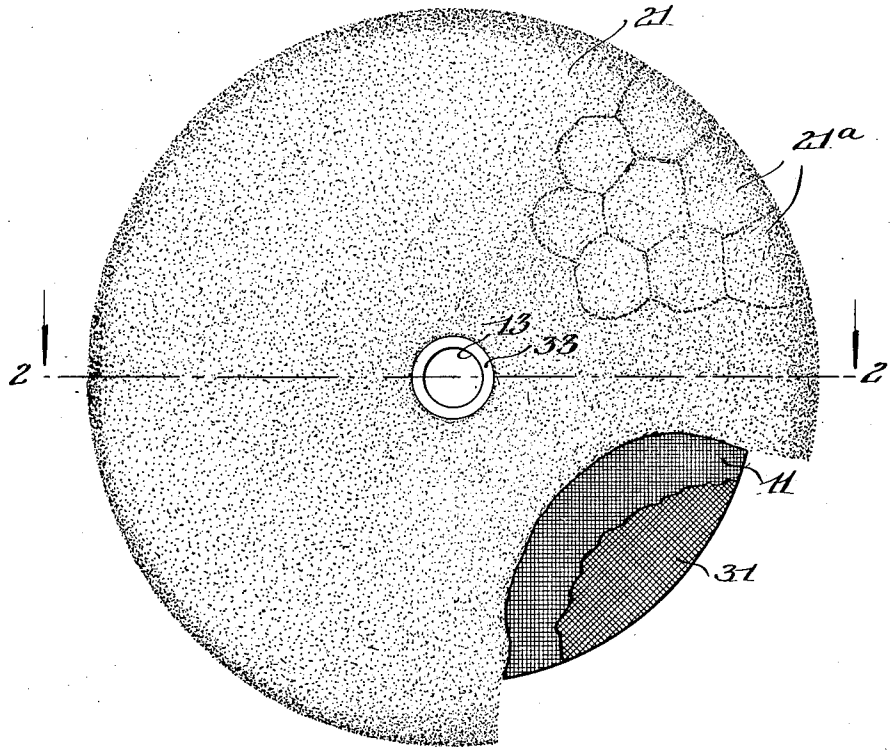
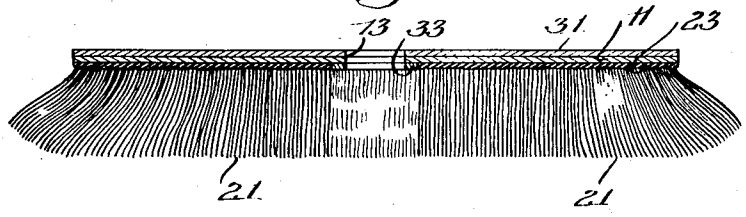


Fig. 2



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POLISHING DISK

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2 Claims. (Cl. 15—230)

This invention relates to a flexible polishing member preferably in the form of a disk adapted to be mounted on a rotating arbor and, while rotating, to be applied against the face of the article to be polished, such as a metal sheet.

For greatest usefulness in polishing curved surfaces (particularly surfaces having concave curvatures) polishing disks should have relatively great flexibility, so that they may readily conform to the curvature of the surface being polished. Among the flexible polishing disks in use are those of natural sheepskin with fleece remaining thereon. Fleece faced sheepskin, when the fleece is of high quality uniformly throughout the entire face area of the disk, forms one of the most satisfactory polishing disks heretofore known, for finishing highly polished metal, enameled, or lacquered surfaces, tile surfaces, and other surfaces generally, either plane or irregular in shape, where a highly polished finish is desired. These natural fleece polishing disks have the serious disadvantage, however, that the quality and other characteristics of the disk can not be controlled. Unavoidably there are great variations in length of wool fiber, quality of fiber, density or closeness of packing of fiber, and strength and flexibility of the skin base or backing, not only among disks cut from the skins of different sheep, and between disks cut from different parts of the same sheepskin, but even on different parts of the same individual disk. Such natural and uncontrollable variations, coupled with the fact that it is not commercially practicable and economically feasible to sort and grade the disks, make it impossible for a user of such polishing disks to obtain a supply of a substantial quantity of disks having the uniform quality and other characteristics best suited to his needs.

It is, accordingly, a primary object of the present invention to retain the advantages and to overcome the foregoing and other defects of natural fleece polishing members, by providing what may be termed an "artificial fleece" or "imitation fleece" polishing member, in which the quality and other characteristics of the member are readily controllable in the manufacturing process, thus enabling the user to be supplied in quantity with members having exactly the fiber quality, length, density, flexibility, and other characteristics desired.

Another object is the provision of an "artificial fleece" polishing member which possesses all of the advantages without the defects of the natural article, and which is superior to the natural fleece members, not only in the controllability of the aforementioned characteristics, but also in being lighter as well as stronger than the natural article and in having, if desired, a fiber density greater than that available in the most dense natural product.

A further object is the provision of an "artificial fleece" polishing disk so designed and constructed that, in use, the fibers forming the polishing face of the disk have a greater tendency to stand up in a desirable nap or pile than is the case with the wool fibers of a natural fleece disk.

A still further object is the provision of a disk which, because of the controllability of the various characteristics, is better balanced for high speed rotation than natural fleece disks.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawing:

Fig. 1 is a face view of a polishing disk in accordance with a preferred embodiment of the invention, with parts broken away to show the construction beneath, and

Fig. 2 is a diametrical section substantially on the line 2—2 of Fig. 1.

The same reference numerals throughout the several views indicate the same parts.

Referring now to the drawing, the improved polishing member of the present invention, preferably in the form of a disk, comprises a suitable flexible backing sheet 11 of fibrous material, preferably in the form of woven textile material of a kind having great strength and lightness, such as canvas or duck or the heavy woven cloth frequently known in the trade as "sheeting." This backing sheet is cut to a circular outline of the diameter desired for the polishing disk, and is provided with a central arbor hole 13 to receive a rotary arbor on which the disk may be mounted.

Applied to one face of this flexible fibrous backing sheet 11 and covering substantially the entire surface of such face (except for the arbor hole 13 and a small clamping margin around the hole) is a mass of wool fibers 21 in their combed but unspun and unwoven state, placed in close lateral or side by side relationship to each other, and in endwise abutting relationship to the backing member 11. The ends of the fibers which abut against the backing sheet are secured thereto by a layer 23 of permanently flexible adhe-

sive material, preferably a latex composition of a kind (well known in itself) which remains flexible after it dries or sets. This latex penetrates the spaces between adjacent fibers, for a short distance at their ends next to the backing sheet **11**, and serves to anchor one end of each individual fiber firmly to the backing sheet. The latex also penetrates and impregnates the fibrous backing sheet, cementing the individual fibers thereof to each other, strengthening the backing sheet and forming a very strong bond between the backing sheet and the facing fibers **21**. By varying the thickness of the latex layer, it can be made to grip any desired length of the inner end of each fiber, to hold the fibers to the backing sheet with the desired degree of strength. Outwardly beyond the surface of the layer of latex, the remainder of the length of each fiber is preferably unconfined and unrestrained except by its contact with the adjacent fibers surrounding it. The fibers may be of any desired length, a length of from half an inch to an inch and a half being found satisfactory, depending on the diameter of the polishing disk and the character of service required therefrom. The fibers are cut so as to be of as nearly the same length as practicable, so that the outer or working face of the mass of fibers is substantially flat or plane, except, of course, at the marginal edges of the mass, where the internal lateral pressure of the fibers against each other will cause the fibers near the marginal edges to bend over, as diagrammatically illustrated in the drawing.

Conveniently, the fibers **21** are fibers of the kind known as "wool tops," which ordinarily are available on the market in the form of unspun strands or ropes having a diameter of about half an inch. A considerable number of such strands or ropes of "wool tops" may be used to make up the fibrous face of the polishing disk, the strands being cut off to the desired length either before or, preferably, after they have been imbedded in the latex layer **23**. The short cut-off length of a "wool tops" strand forms what may be called an individual tuft or bunch of fibers. By varying the number of "wool tops" strands or tufts which are used to cover a given unit area of the disk, varying the spacing between adjacent strands or tufts, and also to some extent varying the density of each tuft by varying the lateral compressive force applied thereto, the density of the fibrous mass on the disk may be varied and controlled, and it may be made even more dense than the most dense natural product, if desired. When a disk face of less than maximum density is desired, the inner ends of the individual tufts may be applied to the backing sheet in laterally spaced relation to each other, but the outer or free ends of the tufts will spread out laterally substantially into contact with each other, usually producing an almost continuous unbroken appearance of the face of the disk. However, the appearance of the face of the disk frequently shows traces of the sub-division of the fibrous mass into individual tufts, and the tufted arrangement is indicated diagrammatically on a portion of Fig. 1, at **21***a*.

"Wool tops" are available on the market in several carefully graded varieties. The quality of the fibrous faces of the disks may be varied and controlled by using various grades of "tops," while the quality may be kept uniform throughout the entire area of the face of any one disk by using only tops of a given single grade in the construction of such disk. Thus it is possible to attain a degree of uniformity in any one disk, and a degree of selective control over the characteristics of the disk, far superior to those of the natural product. Because of the easily attainable uniformity throughout the entire area of the artificial fleece disk, it is perfectly balanced for high speed rotation, whereas natural fleece disks frequently are not properly balanced.

The flexibility and strength of the backing sheet may be controlled by appropriate variations in the sheet, to secure just the right characteristics most advantageous for the work in hand. For example, the backing sheet may be made of two or more plies of material rather than a single ply, when greater strength and less flexibility are appropriate, and thus can be made stronger than natural sheepskin. The drawing of the illustrative embodiment shows a second ply **31** of the same material as the ply **11**, cemented to the back of the first ply **11** by means of a permanently flexible adhesive, preferably a latex composition (of a kind well known in itself) which remains flexible after it dries or sets. The second ply **31**, as indicated diagrammatically in the broken-away portion of Fig. 1, is cemented to the first ply **11** in such position that the weft and warp strands of the second ply lie at 45° to the weft and warp strands of the first ply, thus greatly strengthening the composite backing sheet by providing strands adapted to resist tension forces in practically any direction in the plane of the disk. The material is further strengthened by the adhesive used to cement the two plies to each other, which adhesive is preferably so applied as to impregnate or penetrate through part of the thickness of each ply, at least partly cementing the warp strands and the weft strands of each ply to each other at each crossing, substantially increasing the strength of the ply.

Whether one or a plurality of plies is used to form the backing of the disk, in either event the arbor hole is preferably strengthened and reinforced by an annular member **33** having an outside diameter relatively small in comparison to the diameter of the plies **11** and **31**, and made of material having some degree of flexibility but nevertheless harder and less flexible than the sheets **11** and **31**, such as a thin board made from compressed sisal hemp fibers.

This reinforcing ply **33** is cemented in position around the arbor hole, preferably to the front face of the sheet **11**, by suitable flexible adhesive, preferably the same flexible latex composition above mentioned. It provides a somewhat firmer clamping margin around the arbor hole, for mounting the polishing disk more securely between the clamping nuts on the arbor; yet the reinforcing ply **33** is of such small diameter in comparison to that of the backing members **11** and **31** that it does not substantially interfere with the flexibility of the polishing disk as a whole, by far the greater part of the area of the polishing disk lying radially outside of the margin of the reinforcing ply **33**.

Variations in weight, strength, and flexibility of the complete article may be attained readily by varying the character, thickness, and number of the plies, the diameter of the reinforcing ply **33**, and the thickness and other characteristics of the flexible adhesive employed to secure the plies to each other.

The construction above described is found in

practice to provide a particularly satisfactory and efficient polishing disk, capable of production in large quantities to meet exact specifications and standards, thus overcoming previous drawbacks of inability to secure substantial numbers of natural fleece polishing disks conforming to desired standards. Moreover, in the foregoing construction the wool tops fibers forming the polishing face are found to stand up in an erect pile or nap noticeably better than the natural fleece of natural sheepskin, which has a greater tendency, in use, to flatten down undesirably.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is therefore not to be limited to the precise details described, but is intended to cover all variations and modifications thereof falling within the scope of the appended claims.

I claim:

1. A flexible polishing disk comprising a circular backing sheet of relatively thin, strong, flexible material having a central opening for the reception of means for attachment to a rotary driving arbor, a multiplicity of sections of wool tops assembled in approximately parallel, closely adjacent relation to one another and endwise to said sheet, each of said sections comprising a portion of the length of one or more slivers or rovings of wool fibers forming one of said tops, said sections being of substantial length with the fibers thereof arranged in endwise abutting relation to one face of said backing sheet, said fibers having free outer ends in lateral supporting contact with one another to form a dense polishing face, and a relatively thin layer of flexible adhesive on the same side of said sheet as said fibers and tenaciously bonding the ends thereof to said sheet, said sheet and adhering fibers having substantially the characteristics of a natural fleece-covered sheepskin.

2. A flexible polishing disk comprising a circular backing sheet of strong, flexible, woven material having a central opening therein, a multiplicity of sections of wool tops assembled in approximately parallel, closely adjacent relation to one another and endwise to said sheet in spaced relation to said opening so as to leave an untufted clamping margin about said opening, each of said sections comprising a portion of the length of one or more slivers or rovings of wool fibers forming one of said tops, said sections being of substantial length with the fibers thereof arranged in endwise abutting relation to one face of said backing sheet, said fibers having free outer ends in lateral supporting contact with one another to form a dense polishing face, a relatively thin layer of flexible adhesive on the same side of said top as said fibers and tenaciously bonding the ends thereof to said sheet, said sheet and adhering fibers having substantially the characteristics of a natural fleece-covered sheepskin, and an annular ply of flexible, reinforcing material secured to said sheet by said adhesive in the space between said sections and said opening and concentrically with said opening for the reception of means for attachment to a rotary driving arbor.

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