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DRESSING APPLIANCE

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Fig. 1.

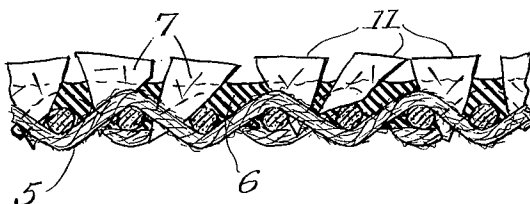
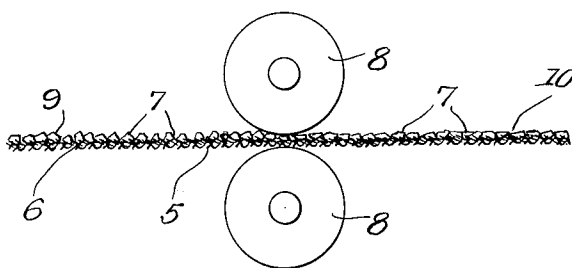


Fig. 2.



Fig. 3.



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3,230,672

DRESSING APPLIANCE

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Continuation of application Ser. No. 660,976, May 22,
1957. This application May 28, 1963, Ser. No. 287,460
3 Claims. (Cl. 51-404)

This application is a continuation of my copending application Serial No. 660,976 filed May 22, 1957, and now abandoned, for Polishing Cloth Sheet.

This invention relates generally to improvements in dressing appliances of the general class which comprise abrasive grits bonded to a backing or support. The invention relates more particularly to an improved dressing appliance of this character wherein the grits are predominantly oriented and cushion-mounted in a new and unique way to plane or polish rather than to abrade a work surface, such as where substantial or effective stock removal is the objective.

Insofar as I am aware, previous articles such as sandpaper, emery cloth, and the like are designed to perform an abrasive cutting action on a work surface. Typical articles of this class, for example, are composed of abrasive grits bonded to a paper or cloth support in such a way that the grits are predominantly oriented to present sharp edges and points to the work surface; and the bonding material is generally relatively hard and non-resilient or non-yieldable when set and thus tends to firmly hold each abrasive grit in a fixed position with respect to the support. If the grits have been mounted in a yielding substance, they have been unoriented and, therefore, presented sharp points or edges to the work. As a consequence, when any of such articles is rubbed across a work surface, each grit performs an abrasive cutting action on the surface. While such articles are suitable for many rough and even relatively fine surface finishing operations, particularly those wherein stock removal is the primary object, they are not suited to more precise, fine surface finishing operations of the kind wherein the primary object is to dress the work surface, i.e., remove a deposit from the surface, or to polish or very lightly plane it, without scratching or otherwise marring the surface.

A general object of the present invention is to provide an improved dressing appliance of the character described which is uniquely designed to dress or polish a work surface in contrast to abrading the surface as do the conventional abrasive dressing appliances.

A more specific object of the invention is to provide an improved dressing appliance of the character described wherein the surface-dressing elements, or grits, are predominantly oriented and bonded in a new and unique way to perform a planing action on a work surface which is effective to remove a deposit from the surface without scratching or otherwise marring the latter as well as to produce a high surface polish.

Other objects, advantages, and features of the invention will become evident to those skilled in the art as the description proceeds.

Briefly, the objects of the invention are attained by providing a dressing appliance composed of grits adhesively bonded, in a cushion-type mounting, to one surface of a backing or support. Available grit, such as flint glass, silicon carbide, garnet, emery, aluminum oxide, and the like, is found to be characterized by plane faces or facets, bounded by sharp edges and points. Thus, each grit has a plurality of plane faces, or facets, which intersect one another to form sharp edges and points on the grit. The grits are predominantly oriented to present their faces or facets toward the work sur-

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face substantially, or as nearly as possible, in a common plane parallel to the support. The points or sharp edges of those grits which are not so oriented are disposed in or below the generally common plane of the coplanar facets. The adhesive binder for the grits comprises an adhesive substance, such as latex, which is pliable, yieldable or resilient when set. The grits are thus cushion-mounted. Owing to this yieldability or resiliency of the binder, the grits whose plane faces are parallel to the work surface, or substantially so, are individually lightly pressed against the work surface, and can slightly rock or tilt, or recede, to accommodate themselves perfectly to the contour of the work surface. Thus, instead of being held rigidly, or unyieldingly, against the work surface while being rubbed thereover, such as leads inevitably to scratching or digging, they "float" along over the work surface, with each pre-oriented grit accommodating itself absolutely perfectly, by slight shifting in its yielding mounting, to the precise plane of the work surface, and following the work surface precisely notwithstanding curvatures in the latter, or local irregularities, such as high or low spots. It will further be evident that in the event that some of the oriented grits are oriented with their plane faces nearly but not precisely in the common plane, e.g., slightly tilted thereto, such individual grits can rock slightly and undergo other slight movements with respect to the support or backing of the appliance when the latter is applied to the work. Thus, when the appliance of the invention is engaged with a work surface, those grits which are oriented to present facets toward and contact the surface align themselves so that their facets seat absolutely flat against the surface. In other words, any grits whose facets initially parallel the surface inherently seat flat against the surface while any grits whose facets are inclined slightly to the surface rock or otherwise move upon initial contact with the surface until their facets seat flat against the surface. The grits whose facets thus seat against the work surface are hereinafter referred to as effective grits.

When the dressing appliance is rubbed across the surface, the effective grits simply slide along the surface in full surface contact therewith, the leading edges of such grits acting as minute scraping planer edges which lightly scrape or plane the surface, rather than abrade or scratch it. The remaining randomly oriented grits are fewer in number and their points and edges are located at the same level or lower than the coplanar facets of the effective grits. Also, those grits whose points do contact the surface tend, because of the cushion mounting, to yield or rock backwards as the appliance is rubbed across the surface. As a result, the randomly oriented particles produce, at most, only very light, minor, and fine-order scratching and abrasion of a work surface. Deposits may thus be removed from relatively delicate surfaces without marring the latter and superior surface finishes and polishes may be attained.

A better understanding of the invention may be had from the following detailed description taken in connection with the annexed drawing, wherein:

FIG. 1 is a greatly enlarged and fragmentary cross-sectional view of a dressing appliance according to the present invention;

FIG. 2 is a similar view of an alternative form of dressing appliance according to the invention; and

FIG. 3 is a semi-schematic view showing one manner of orienting the grits of the present dressing appliance.

The dressing appliance illustrated in this drawing comprises, generally, a backing or support 5 coated or impregnated with an adhesive binder 6, and grits 7 embedded in the adhesive binder. The backing or support

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5 may be made of various materials. The embodiment illustrated in the drawing, for example, has a fabric or cloth support which is preferably woven of warp and weft yarns so as to be non-stretchable in both the longitudinal and transverse directions. A cloth of approximately 50 by 75 mesh has been found to be suitable because the interstices in such a cloth are of a size which will be readily penetrated by the adhesive binders which are contemplated for use in this invention. Thus, as shown in the drawing, a layer of the adhesive binder 6 is applied to one surface of the fabric support 5 in such a manner that the fabric is impregnated with the binder, the latter thereby filling the interstices of the fabric, but being mainly on one surface of the fabric, whereby to provide a certain thickness of the material above the fabric.

The adhesive binder 6 may comprise latex or other suitable rubber or other thermoplastic compounds which become tacky when heated and which, when fully cooled or set, are resilient or yieldable. It is contemplated, for example, that the adhesive binder may advantageously comprise a coating material of the kind commonly used on pressure-sensitive tapes and sheets and which, while tacky when first applied, dries to a stabilized and uniformly pliable or yieldable, though non-tacky, consistency.

The grits 7 which are used in the present dressing appliance comprise hard granular particles, of the kind commonly used on abrasive articles, such as emery cloth, and which characteristically have a plurality of angularly disposed plane faces, or facets, that meet to define relatively sharp edges and points. Among the different types of grits which are suitable for use on the present dressing appliance are flint glass, silicon carbide, garnet, emery, aluminum oxide, and the like. According to the preferred practice of the invention, the grits 7 are of generally uniform screen-mesh size, such as No. 100 (coarse), or Nos. 300 to 400 (medium), or No. 600 (fine).

According to one method of making the illustrated dressing appliance, the adhesive binder 6 is first applied to one surface of the backing or support 5 in such manner that the binder impregnates and fills the interstices in the backing, as shown in FIG. 1. The grits 7 are then sprinkled onto, or otherwise uniformly distributed over, the binder in sufficient quantity to provide a particle concentration on the order of that shown in FIG. 1. At this stage in the method, the grits 7 have a random orientation with respect to the support 5, as illustrated on the left-hand portion of the backing 5 in FIG. 3.

In the next step of the method, the backing member 5 with the grits 7 thereon is fed between a pair of heated pressure rolls 8, as shown in FIG. 3. These rolls may be fabricated of steel, or other suitably hard metal, and are heated to a temperature which softens the adhesive binder 6 sufficiently to enable the grits to be firmly embedded therein by the pressure of the rolls. In the case of an adhesive binder composed of latex or other similar rubber compound, the rolls are typically heated to a temperature on the order of 150° F.

The grits 7, being relatively hard and of such a nature that they do not break or fracture under the relatively low magnitude of pressure necessary to force them into the softened binder 6, are firmly embedded in the binder as they pass between the pressure rolls 8. The pressure rolls perform the additional function of orienting a majority of the grits 7 so that plane faces or relatively flat facets 11 thereof are presented upwardly, away from the support 5, as the appliance is viewed in FIG. 3, and such facets are disposed generally in a common plane parallel to the support. The edges and points of the grits are disposed laterally of the fabric, and downwardly into the interstices thereof. This orientation of the grits may be readily observed at the right end of the dressing appliance in FIG. 3 as well as in FIG. 1. Thus, the upper pressure roll in FIG. 3 tends to rock each grit contacted thereby to a position in which a facet of the grit seats against the

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surface of the roll. Accordingly, a majority of the grits emerging from the roll are oriented as described above. The remaining grits, which constitute a minority of the total number of grits on the appliance, have a random orientation as they emerge from the pressure rolls 8. Many of these remaining grits, therefore, may present sharp points or edges toward the common facet plane of the oriented or effective grits. Since the spacing between the pressure rolls determines the height of the grits, however, the outwardly presented points and sharp edges of the randomly oriented grits are located in or below the common facet plane of the effective grits.

FIG. 1 illustrates a section of a present dressing appliance which has been made according to the method described above. As may be best observed in this figure, the effective grits 7 are firmly embedded in the adhesive binder, and, in addition, points and edges of many of the effective grits enter the interstices of the backing or support 5. Thus, the adhesive binder, and, in the case of many grits, also the support, firmly stabilizes the grits against being dislodged.

As noted earlier, the invention contemplates the use of an adhesive binder, such as latex or other equivalent rubber or rubber-like compound, which, when fully set upon cooling after removal from the heated rolls, is elastic, that is, resilient, yieldable, or pliable, whereby the individual grits 7 can rock to a limited extent and undergo other limited movements relative to one another and to the support 5 when the grits are engaged with a work surface.

The present dressing appliance is used in the usual way by engaging its plane face grit side with a work surface, and rubbing the appliance across the surface or the surface across the appliance. Those grits 7 which present facets toward and contact the work surface tend, by virtue of their yieldable mounting, to align themselves in positions wherein their facets seat flat against the surface. In other words, any facets which initially precisely parallel the work surface when the appliance is placed in contact therewith inherently seat flat against the surface. Other grits which present facets toward the work surface but are not initially oriented with such facets exactly parallel to the surface yield or rock upon contact with the surface until their facets seat flat against the surface. As a consequence, when the appliance is placed in contact with a work surface, most of the grits 7 are aligned with the facets thereof flat against the surface.

When the appliance is rubbed across the surface, the work-engaging grit facets obviously remain seated flat against the surface, and float or slide thereon, the yieldability of the binder permitting the individual grits to yield as they move over contours or irregularities in the surface, so that the facets remain in full, float seating contact with the surface.

Each work-engaging facet on an individual grit is bounded by sharp edges. As a consequence, when the work-engaging facets slide along the work surface, the sharp, leading edge of each such facet scrapes or planes the surface, rather than scratching or abrading it. In other words, the effective grits 7 act as minute scraping or planing blades, producing a predominantly scraping or planing action on a work surface, as contrasted to the scratching or abrading action produced by conventional abrasive products. Thus surface deposits and surface irregularities are scraped or planed away rather than abraded away. Actual stock removal is minimal.

As noted earlier, of course, some of the grits 7 present edges and points toward the work surface. These points and edges, however, are located in or below the common facet plane of the oriented effective grits. Moreover, any grits whose points or edges do contact the work surface tend to yield or rock when initially engaged with and subsequently moved along the surface. It is obvious, therefore, that the latter grits merely lightly brush the work surface, and produce, at most, only slight or fine scratch-

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ing or abrading of the work surface, such as is compatible with the polished finish that is sought.

Owing to the unique, predominantly scraping or planing action produced by the present dressing appliance, the latter is capable of removing deposits from surfaces, particularly delicate or relatively soft surfaces, without scratching or otherwise marring the latter, and producing highly superior surface polishes and finishes. The type of surface finish will vary to some extent, of course, depending upon the coarseness of the grit used on the appliance.

A unique advantage is that the grits remain sharp and effective for a substantially longer period of time than the abrasive grits of conventional abrasive devices. The work-engaging edges and points of the abrasive grits of such conventional abrasive devices tend to break off or become quickly dulled in use. There is no appreciable tendency for the effective grits of the article of the invention to break off owing to their surface or facet contact with the work surface. Moreover, rubbing of these facets against a work surface produces, in effect, a stropping action on the individual grits which constantly sharpens their planing edges. Thus, the majority of the grits of the present appliance are self-sharpening, whereby the latter has a substantially longer life than the conventional abrasive devices.

Another distinct advantage of the present dressing appliance is that there is substantially less tendency for the spaces between grits to become clogged by the material removed from the work surface. Further, any such material which does accumulate between the grits can be easily removed by shaking the appliance or slapping it against an object. These advantages stem from the fact that the grits move slightly relative to one another in use and when the article is shaken or slapped against an object. As a consequence, work material which does enter between the grits tends to be constantly dislodged by the relative movement of the grits when the article is in use and is easily dislodged when the article is shaken.

Finer grits may be applied in such quantity as to substantially fully cover over the binder 6. Medium and coarser grits, on the other hand, may be applied in smaller quantities to leave spaces between the particles, primarily because said particles vary considerably in shape, the shapes being, in addition, quite uneven. In order to seal off the backing or support 5 and keep the same from attrition during prolonged use, a coarse or medium grit appliance according to the invention may be provided with a second application of fine grit of a size to largely fill in among the coarser grits. This is suggested in FIG. 2 wherein it will be seen that the fine grit 7a fills in between the coarser grit 7 and effects a total isolation of the binder 6,

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It will be realized from the foregoing that the objects of the present invention have been fulfilled in the two embodiments thereof that are illustrated and that the dressing appliance thus provided has a hard, yet scratchless, surface that enables surface cleaning and polishing without the danger of marring.

While the foregoing has illustrated and described what are now contemplated to be the best modes of carrying out my invention, the constructions are, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular forms of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

I claim:

1. A dressing appliance comprising: a backing member having a grit supporting surface; a layer of yieldable adhesive binding material on said surface, one side of said layer being exposed for presentation toward a work surface; and a multiplicity of grits embedded in said layer and yieldably supported thereby, said grits being characterized by relatively flat facets bounded by relatively sharp edges, a preponderance of said grits being oriented in said layer of yieldable binding material with said facets thereof exposed at said one side of said layer and generally coplanarly disposed in a plane parallel to said supporting surface for contact with the work surface, said plane defining the outermost limit of projection of a preponderance of the grits from said support.

2. The subject matter of claim 1, wherein said adhesive binding material comprises latex rubber.

3. A polishing sheet comprising a mesh fabric having interstices, a layer of stabilized latex bonding material on one side of said fabric and partly in the interstices of said fabric and grit particles embedded in said bonding material and yieldingly supported thereby, the particles being preponderantly characterized by having flat plane facets thereon and by being oriented to present said flat plane facets substantially in a common plane parallel to the fabric, corners and edges thereof disposed laterally of the fabric and downward toward and into said interstices.

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