

April 3, 1956

A. L. BALL ET AL
FLEXIBLE ABRASIVE PRODUCTS

2,740,239

Filed July 2, 1953

2 Sheets-Sheet 1

Fig. 1.

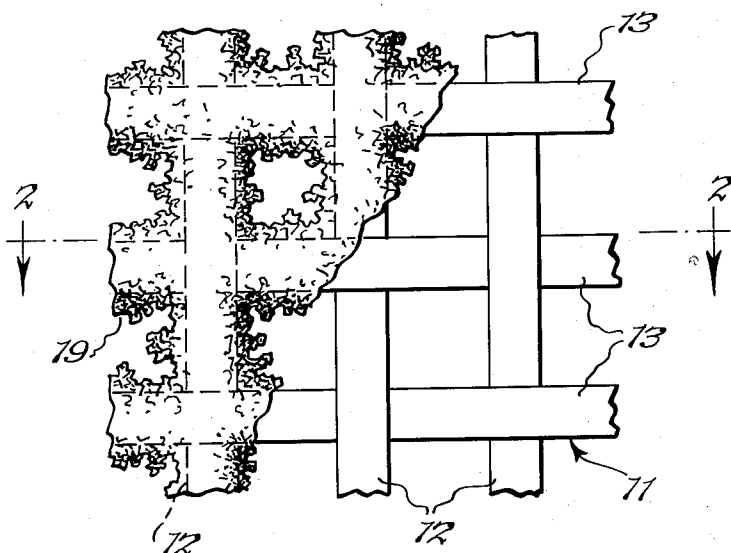


Fig. 2.

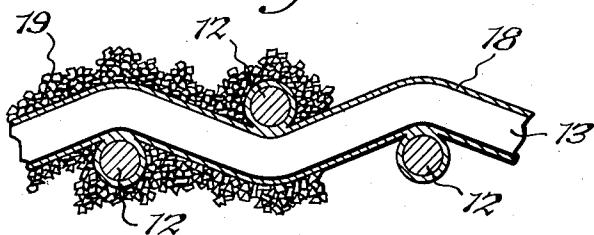


Fig. 3.

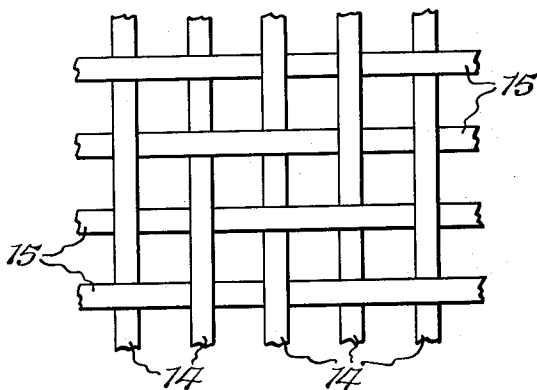
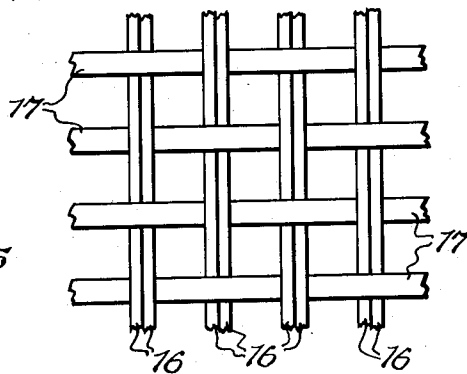


Fig. 4.



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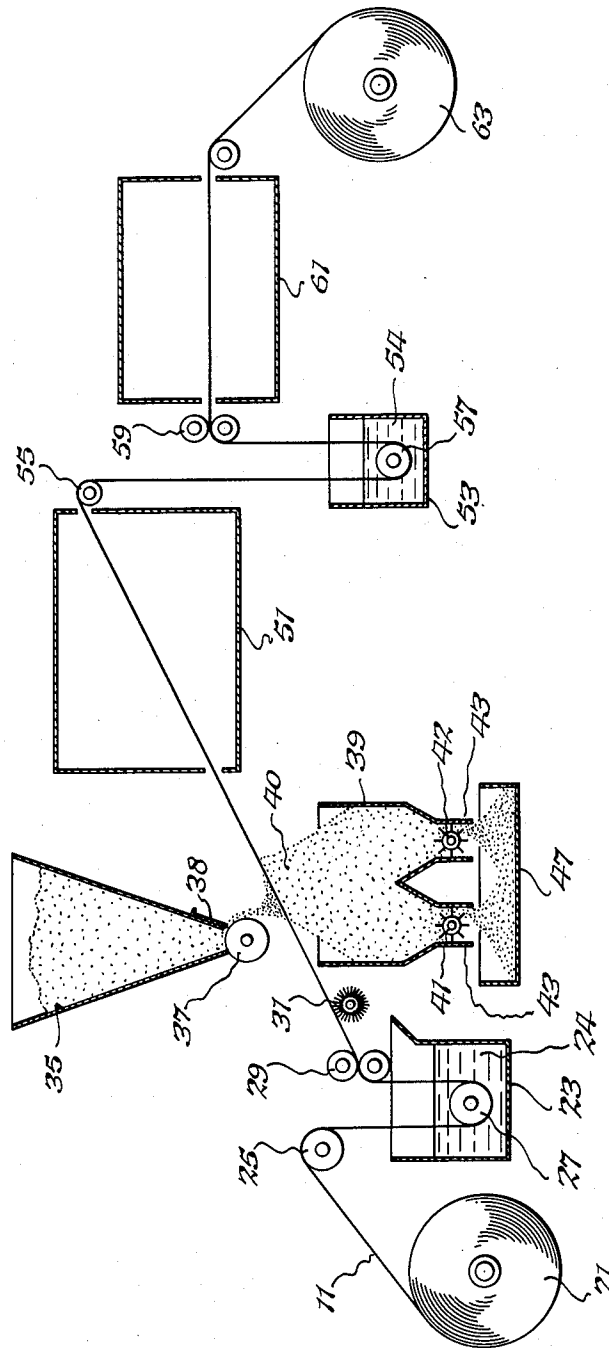
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Fig. 5.



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FLEXIBLE ABRASIVE PRODUCTS

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Application July 2, 1953, Serial No. 365,722

13 Claims. (Cl. 51—185)

This application relates to abrasive products and is particularly concerned with flexible, foraminous abrasive products in which deposits of abrasive granules are provided around the yarns of open mesh fabrics and with a method of forming such products.

It is an object of the invention to provide an extremely flexible abrasive product suitable for sanding or polishing and a method of producing such a product.

Another object of the invention is to provide a product of the character described which is furnished with a deposit of abrasive granules on an open mesh fabric formed from continuous filament yarns so that the product is suitable for use on both sides.

A further object of the invention is to provide an abrasive product of the character described in which an open mesh fabric base having a plain or twill weave is used.

Another object of the invention is to provide a product of the character described in which the entire exposed yarn surfaces of an open mesh fabric base are covered with a deposit of abrasive granules.

A further object of the invention is to provide a flexible abrasive product using an open mesh fabric base which has been impregnated with a flexible material.

A further object of the invention is to provide an abrasive product of the character described which utilizes very fine particles of abrasive and thus permits obtaining a fine polish or finish by its use.

Another object of the invention is to provide an abrasive product of the character described which has a large number of open spaces to provide for rapid elimination of the detritus produced during sanding or polishing.

Still another object of the invention is to provide an abrasive product of the character described which is resistant to disintegration by water, kerosene, mineral spirits and other coolants used in sanding operations.

Other objects and advantages of the present invention will be apparent from the present specification taken in conjunction with the accompanying drawings in which:

Figure 1 is an enlarged plan view of a portion of an abrasive product produced in accordance with the present invention, a portion of the open mesh fabric base being shown without an abrasive deposit;

Figure 2 is a sectional view taken on line 2—2 of Figure 1;

Figures 3 and 4 are enlarged, fragmentary and diagrammatic views of other types of open mesh fabrics suitable for use in making flexible abrasive products according to the present invention; and

Figure 5 is a diagrammatic view illustrating one form of apparatus which may be used in manufacturing the product shown in Figures 1 and 2.

The base employed for the novel, flexible abrasive product of the present invention is an open mesh fabric woven from continuous filament yarns such as rayon, nylon, glass and the like. The yarns of the fabric are impregnated and coated over their entire exposed sur-

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faces with a flexible, presizing material before receiving a deposit of abrasive granules. Although impregnation of the yarns may take place even before the fabric is woven, it is preferred to carry out the impregnation and coating after the weaving of the fabric. Thus, not only will the yarns themselves be impregnated, but the points of interlacing of the warp and filling yarns will also be cemented by the impregnating material and slipping or shifting of the yarns will be substantially prevented.

While a gauze or leno weave may be employed in producing the open mesh fabric used as a base for the abrasive product herein described, it is preferred to use a simple plain or twill weave, open mesh fabric. Such fabrics are not only less expensive to manufacture, but may be formed with more even surfaces than leno-woven cloth. Consequently, abrasive products having fewer surface irregularities due to unevenness of the base fabric may be produced when using the plain or the twill weave.

In plain weaving each pick or filling yarn passes over and under alternate ends or warp yarns across the width of the cloth, alternate picks passing over the odd and under the even warp yarns and under the odd and over the even warp yarns, respectively. A plain woven fabric 11 is illustrated in Figures 1 and 2 hereof, the warp yarns being designated by the numerals 12 and the filling yarns by the numerals 13.

The twill weave differs from the plain weave principally in that each filling yarn interlaces from two to four warp yarns and on each successive pick the filling yarn moves the design one step to the right or left, thus forming a diagonal. Figure 3 shows a twill fabric in which each filling yarn 15 passes over two ends 14 and then under two ends and repeats this sequence across the width of the fabric. Such a twill is known as a "two and two" twill. It is also classified as an "even" twill since an equal number of warp yarns 14 and filling yarns 15 are shown in the recurring design. "Even" twills, others being "three and three" and "four and four" twills, are alike on both sides and are uniform except for the diagonal that is characteristic of the twill weave. Abrasive products according to the present invention employing a base fabric with an even twill weave have been found to be particularly useful in making abrasive belts, sleeves, and the like and abrasive discs. It appears that in some cases the diagonal pattern of the twill-woven fabric permits obtaining better finishes with such articles than can be obtained with articles in which a plain woven fabric is used as a base.

Open mesh fabrics made with either the plain weave or an even twill weave are preferred as bases for the flexible abrasive products hereinafter described. Uneven twills and satin or sateen weaves are undesirable since they are different on opposite sides. Moreover, satin and sateen woven fabrics are unsatisfactory because of their characteristic long exposed yarns or floats which would make an open mesh fabric extremely flimsy. For reasons which will be obvious from the further description herein, pile fabrics or fancy weaves are also unsatisfactory. It should be noted, however, that fabrics with doubled warp yarns may be employed in some cases. Figure 4 shows a plain weave fabric of this type in which two small, closely adjacent, warp yarns 16, the two together being approximately equal in size to the filling yarn 17 used, are picked as one yarn. This results in a flatter, more uniform fabric.

Preferably, the warp and filling yarns are of the same material since yarns of different materials are likely to cause undesirable differences in strength of the finished fabric. Also, except when using doubled warp yarns in the manner mentioned above, the warp and filling yarns

chosen are preferably of such size that when woven the strand widths will be, as shown, substantially the same.

The impregnation of the open mesh fabric base mentioned above is important to the present invention particularly when a relatively rigid, hard, and brittle bond or adhesive is employed to secure the abrasive granules to the fabric. After impregnation the yarns of the fabric are non-absorbent and are not penetrated by the bond. Thus they remain flexible and permit a much higher degree of flexibility in the final abrasive product than would be possible if the bond impregnated the yarns. Although various flexible materials may be used for such impregnation it is preferred to use a material that is insoluble in water, resists attack by solutions of commonly used detergents as well as non-aqueous coolants, and is substantially insoluble in but nevertheless adherent to the bond or adhesive used to bind the abrasive deposit to the fabric. One material which has been found very satisfactory as an impregnating material is neoprene latex. When roller applied to an open mesh fabric of the type used as a base for the novel product of the present invention and dried, it has been found that the yarns are filled with neoprene. Other synthetic rubber latices, such, for example as those manufactured and sold by B. F. Goodrich Chemical Co. under the names "Geon" and "Hycar" (these being aqueous dispersions of polyvinyl resins and of butadiene-acrylonitrile copolymers, respectively) may likewise be used if desired as may also solutions or emulsions of flexible plastic materials such as polyvinyl butyral resins, polyvinyl acetate, ethyl cellulose and the like. It is preferred to use sufficient impregnating material to leave a film or coating on the surfaces of the yarns and, when the fabric is impregnated after weaving, to cause adherence of the yarns of the warp and filling of the fabric at their points of interlacing. In Figure 2 the film of impregnant left on the surfaces of the yarns 12 and 13 is designated by the reference character 18.

The novel flexible abrasive product of the present invention comprises a structure in which the impregnated and coated yarns of a base fabric have deposited thereon and firmly secured thereto, by a suitable bond or adhesive, a layer or coating of abrasive granules. This product may be used as such for numerous sanding operations and may be formed into various types of abrasive articles such as abrasive discs, belts and the like. The coating of abrasive granules covers the entire exposed surfaces of the warp and filling yarns of the base fabric.

It has been found desirable for many purposes to provide an abrasive coating of considerable thickness. Thus, as shown with the abrasive deposit 19 in Figure 1, the thickness of the coating may be such as to reduce the areas of the fabric mesh openings to about one-half or less of their original areas. It is to be noted, however, that the remaining areas of the mesh openings are clear and unobstructed. Since the reduction in area of the mesh openings is related not only to the actual thickness of the abrasive coating on the yarns but also to the yarn size, the cloth count and the size and nature of abrasive granules employed it is evident that it will be subject to considerable variation. In some cases the abrasive coating may comprise only a substantially single layer of individual abrasive particles. Such coatings are, however, particularly of interest only when using abrasive particles of large size for rough work or when the base fabric used has a twill weave and lining, i. e. production of continuous scratch patterns on the work, is thereby prevented.

In general, the reduction in the size of the mesh openings by the abrasive coating will range from about 15 to about 40 per cent.

The abrasive particles employed may be silicon carbide, alumina or any other desired kind of natural or manufactured abrasive or mixture thereof. In order to obtain thick abrasive deposits of the type described above, it

is convenient and preferred to use as abrasive granules irregular cemented clusters or aggregates of fine abrasive particles. The use of such clusters or aggregates results not only in more easily obtaining a thick deposit of abrasive on the yarns, but also in the production of an abrasive deposit that permits fine finishes to be secured even with rapid removal of stock. Irregular bonded aggregates or clusters of abrasive particles may be formed by any convenient method. The method disclosed in Jackson, U. S. Patent No. 2,194,472, for example, produces quite satisfactory aggregates. Any suitable bonding material may be used in the production of the abrasive aggregates. Suitability of the bond will depend primarily, as hereinafter explained, upon the type of binder used in holding the abrasive aggregates on the yarns of the base fabric although other factors such as the kind of abrasive particles used, their size, and the type of abrading or polishing action desired from the flexible abrasive product to be produced may at times require consideration. For example, if a very soft abrading action were desired a bond weaker than might otherwise be desirable would perhaps be employed.

The adhesive preferred for securing the abrasive granules to the yarns of the base fabric is a liquid phenolic resin such as an "A-stage" phenol-formaldehyde condensation product. Consequently, the bond used in forming abrasive aggregates for use herewith should not be softened by such resins or by whatever other adhesive is employed. Furthermore, the strength of the bond of such abrasive aggregates should not be materially different from that of the cured adhesive if the rapid stock removal and fine finish desired are to be obtained. If the aggregate bond is materially weaker than the adhesive the individual abrasive particles will be too quickly broken out and lost while if the bond is too hard the aggregates will not break down at all. In either case, efficiency of the abrasive product will be reduced. It has been found desirable in general to use as a bond for the abrasive particles in the abrasive aggregates a material very similar or identical in nature to the bond to be used in attaching the aggregates to the open mesh fabric base.

It is obvious that the abrasive granules used, whether single particles or aggregates, must be smaller in size than the mesh openings of the base fabric. The size of the granules may vary considerably, however, and so may the particles of abrasive bound or cemented together as aggregates. It will be understood that some range of granule size will be employed and that even when using abrasive aggregates, some individual particles will be admixed therewith.

In Figure 5 there is diagrammatically illustrated apparatus by means of which novel flexible abrasive products of the present invention may be produced. The base fabric 11, which previously has been treated with a suitable impregnant as above described, is supplied from the roll 21 and passes successively through the adhesive tank 23, which has associated therewith guide rollers 25 and 27, a cooperating pair of squeeze rolls 29, and over a rotating brush 31. The apparatus for supplying abrasive granules to form the abrasive deposit on the adhesive covered fabric comprises a hopper 35 and a feed roller 37. Below the hopper 35 is a bin 39 that is elongated in the direction of travel of the web and is provided adjacent its ends with rotating gates 41, 42 for withdrawing abrasive granules from the bin. Granules thus withdrawn pass through the spouts 43 into another bin or receptacle 47.

The numeral 51 designates a drying oven in which the bond for the abrasive deposit is cured or hardened prior to application of the sizing adhesive. The reservoir or tank for the sizing adhesive is identified by the reference character 53 and has associated therewith guide rollers 55 and 57 and a pair of squeeze rolls 59. The sizing adhesive coating on the abrasive web is hardened in the oven 61 and the product is then wound up on the roll 63.

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The manufacture of novel abrasive products according to the present invention with the apparatus illustrated in Figure 5 will be easily understood. The open mesh base fabric 11 impregnated with a suitable cured flexible material is unwound from the roll 21 and is fed through the adhesive tank 23 in which there is maintained a bath of suitable adhesive or bond 24 such as a liquid, "A-stage" phenol-formaldehyde condensation product. The web of adhesive coated fabric then passes between the squeeze rolls 29. The latter are adjusted to leave the desired amount of adhesive 24 on the fabric which is then carried over the rotating brush 31. The brush 31, which rotates at such a rate that its peripheral speed is substantially the same as the speed of the coated web, extends transversely of the web for the full width thereof and is provided with a large number of short, stiff bristles that serve to unblind the mesh openings of the fabric by puncturing any films of adhesive which extend across or fill the meshes.

After unbinding the mesh openings in the adhesive coated web, abrasive granules are applied to the web. The abrasive granules are fed evenly across the width of the web from the grain hopper 35 by the feed roller 37. An adjustable gate 38 regulates the amount of abrasive granules fed. Of course much of the abrasive passes through the mesh openings of the fabric and these granules are caught in the bin 39. Sufficient abrasive is maintained in the bin 39 to provide a mound 40 of abrasive granules upon which the web drags as it passes beneath the hopper 35. Thus, abrasive granules are brought into contact with both the top and bottom of the adhesive coated base fabric and the abrasive in the mound 40 is agitated or stirred by the web so that all exposed portions of the yarns of the fabric will receive a deposit of abrasive granules. The mound of abrasive granules 40 is kept in proper location and at the desired height within the bin 39 by continuously or periodically withdrawing abrasive from the ends of the bin through the spaced rotary gates 41 and 42. By regulating the proportion of abrasive granules withdrawn from the bin through each of the two gates the position of the top of the pile or mound 40 may be adjusted and maintained as desired. The abrasive passing from the bin 39 through the gates 41, 42 and spouts 43 may be collected in another bin or other receptacle 47 and periodically returned to the hopper 35 either manually or by suitable mechanical means such as a conveyor.

After an abrasive deposit is provided on the yarns of the adhesive coated web, the web is carried into the drying oven 51 in which it is heated to harden the adhesive or bond and thus prevent the abrasive granules on the web from becoming dislodged as the sizing adhesive is applied thereto. From the oven 51 the web passes through the tank or vat 53 in which a bath of sizing adhesive or bond 54 is maintained. This bond is preferably also a liquid phenol-formaldehyde condensation product resin and may be either the same as the adhesive 24 first applied to the web from the tank 23 or of similar composition. It is also preferred to have the sizing adhesive 54 of somewhat less viscosity than the adhesive or bond applied in the first coat. Consequently, the adhesive 54 in the tank 53 may if necessary be thinned with any suitable solvent or thinning agent to lower its viscosity. The web in passing from the sizing tank 53 is carried between squeeze rolls 59 which preferably are provided with absorbent surfaces to prevent the carrying over of excess adhesive and is then led into a second drying oven 61 in which the sizing adhesive coat is hardened and the entire bond content of the product is adequately cured. Upon leaving the oven 61 the product is dry and firm and may be handled without danger of dislodging the abrasive granules. It is then wound on the roll 63 and is ready to be cut into smaller sheets or formed into abrasive articles for use.

As pointed out above, it is preferred to use as a base

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fabric for manufacturing the improved flexible abrasive product above described, an open mesh fabric woven of continuous filament yarns. Fabrics formed of rayon, nylon, and other synthetic organic fibres have been found suitable and it is also of course possible to use continuous filament glass yarn fabrics. Spun yarns formed from staple fibers such as cotton, wool, and certain types of rayon, nylon and glass are not suitable for making a fabric base for the novel product of the present invention since the fuzz or fiber ends that project from staple or spun yarns tend to blind or obstruct the mesh openings in the fabric and thus prevent obtaining the desired relatively uniform, unbroken deposit of abrasive on the yarns.

Preferably the warp and filling yarns of the fabric used are of substantially the same final width as viewed perpendicularly to the plane of the fabric. The size of the yarns employed will, of course, depend upon several factors such as the size of the abrasive granules to be used, the strength of the yarns and the thread or cloth count desired in the fabric. A balanced fabric, that is, one having the same cloth count in each direction and in which the warp and filling yarns have substantially equal widths, is desirable since directional effects in the resulting flexible abrasive product will be lessened. However, in some cases where a directional effect is not objectionable or is desired, the fabric may be somewhat unbalanced. Care must be taken, of course, to avoid having the cloth count so high in one direction or the other that, when the yarns of the woven web are given their coating, the mesh openings are substantially blocked. For many purposes a fabric having a cloth count of 24 x 24, that is, 24 meshes per inch in each direction, is suitable. In weaving such a fabric yarns of approximately 300 denier may be used quite satisfactorily to produce the desired open mesh weave. In general, heavier yarns will be used for products with larger mesh or for particularly heavy duty. Thus for a base fabric having, for example, a cloth count of 14 x 14, 900 denier yarns might be used while for products with still larger mesh even heavier yarns may be used. On the other hand, where the product is to be used for very fine polishing, finer yarns may be preferred.

Although the yarns employed in weaving the open-mesh fabrics used in the manufacture of the novel abrasive products of the present invention may comprise only a single filament, multifilament yarns are usually preferred because of the greater flexibility and smoothness of fabrics woven therefrom. Likewise such yarns should generally be only moderately twisted in order to permit substantial flattening of the yarns at their points of interlacing. Thus, the smoothness and flatness of the fabric are improved and the final flexible abrasive article will be more uniform. It will be evident that fabrics with complicated weaves will be objectionable in many cases because the lack of surface uniformity in such weaves is reflected by a lack of uniformity in the abrasive deposits and in the abrading action of products formed therefrom. Moreover, fabrics with complicated weaves are in most cases more expensive.

As set forth above, the base fabric of the novel, flexible abrasive product of the present invention is impregnated with a flexible, insoluble impregnant. This is preferably done after the fabric is woven since, as also pointed out above, the warp and filling yarns, whether single filament or multi-filament, will thereby be coated and caused to adhere at their points of interlacing. Thus, slipping of the fabric will be substantially prevented and the finished web will be smoother as the respective warp and filling yarns are maintained substantially parallel. Obviously, they are not truly parallel since the yarns are interwoven. Consequently by "substantially parallel" is meant that when the warp and filling yarns are projected onto a plane which is parallel to the plane of the fabric they will, respectively, appear substantially parallel. The impregnating material may be applied to the fabric

by any suitable means. It is important, however, that the method employed be such that no substantial uneven shrinkage of the fabric takes place either in the application of the impregnant or in the drying or cure by which it is rendered insoluble so as to cause the mesh openings of the fabric to be irregular in size. The amount of impregnating material required will, of course, vary with the size and character of the yarns but it is generally sufficient when using moderately twisted rayon yarns, for example, to use an amount of impregnating material which when dry will increase the weight of the fabric in an amount between about 10 per cent and 25 per cent of its unimpregnated weight. The amount used in any particular case will, of course, also depend upon the type of impregnating material used and the solids content of the solution or suspension in which it is applied.

The adhesive or bond 24 applied to the impregnated web from the tank or vat 23, shown diagrammatically in Figure 5 of the drawings is preferably, as pointed out above, a liquid phenol-formaldehyde condensation product resin which is comparatively hard and somewhat brittle after curing. Other adhesive materials, such as oil-modified phenolic resin varnishes, oleo resin varnishes, urea formaldehyde condensation product resins and the like, may be used as bonds but it has been found that the strength and other physical properties obtainable with phenolic resins after suitable curing are important factors in providing the excellent results obtained with the present novel, flexible, abrasive product. The phenolic resin adhesive is preferably applied to the web at room temperature and a liquid resin having suitable viscosity for proper application within the normal range of such temperatures is chosen. There are, of course, many resins of this character and although there are some differences in composition in such resins, a number of suitable ones in the desired viscosity range are available. In passing from the adhesive tank 23 between the squeeze rollers 29 the excess resinous adhesive is removed from the web. Sufficient adhesive is left, however, to permit the adherence of a thick, dense coat of abrasive granules to all the exposed surfaces of the yarns. The amount of resin actually applied in any particular case will vary of course with the size of the yarns employed, the thread count of the fabric, and the size of the abrasive granules to be applied.

The rotating brush 31 shown in Figure 5 is used, as pointed out above, to unblind or open up the mesh openings of the fabric so that they will not be blocked by dried adhesive films. The short stiff bristles of the brush puncture any films of adhesive that extend across the openings in the fabric without, however, harming the film of adhesive which covers the yarns.

As shown in Figure 5 and described above, the abrasive granules should be applied to the adhesive coated web from both sides of the web. Therefore, the abrasive particles falling on the upper surface of the fabric from the hopper 35 are given a chance to adhere to the upper surfaces of the adhesive covered yarns which form the fabric while any abrasive granules that do not adhere thereto pass into the mesh openings of the fabric and are given an opportunity to adhere to the sides of the yarns within the mesh openings. The mound or pile 40 of abrasive granules maintained in the bin 39 and over which the web is dragged in its passage through the apparatus is, of course, stirred and agitated by the passage of the web. Thus, abrasive particles are repeatedly brought into contact with all exposed surfaces of the yarns thereby permitting the yarns to pick up a substantially uniform, thick deposit of abrasive granules. The position of the top of the mound 40 of abrasive granules and the height thereof are controlled by operation of the rotary gates 41 and 42 which are located at the bottom of the bin 39 adjacent the respective ends thereof. It will be obvious that if more abrasive is withdrawn from the bin through the rotary gate 41 than through the gate

42 the top of the mound 40 will tend to move toward the drier 51 while if more abrasive is removed through the gate 42 than through the gate 41 the top of the mound will tend to move toward the front of the bin. Thus, the mound 40 may be adjusted in height and position in order that the desired deposit of abrasive granules may be formed on the adhesive coated web without excessive drag or resistance.

It is desirable to avoid disturbing the abrasive deposit on the web before the adhesive has been hardened so that the abrasive granules will not be displaced. Consequently, since the web has an abrasive deposit on both sides, the curing of the bonding adhesive to harden it is preferably carried out as quickly as possible and without any support for the web during drying other than that provided by the mound of abrasive grain 40 in the bin 39 and by the guide roller 55 on the exit side of the drying oven. As a consequence, the drying oven 51 is preferably short in length and is heated to a temperature at which the bond will be quickly cured or hardened sufficiently so that the web may be passed over the roller 55 and through the sizing adhesive without damage. The oven 51 may be heated in any desired manner although, since rapid cure of the adhesive is desired, the heating should be carried out in such way as to facilitate this. For example, when using a liquid phenolic resin adhesive the oven may be heated with hot air at a temperature of about 280° F. and in addition radiant heating may be employed at the entrance to the oven to assist in quickly raising the temperature of the web.

As set forth above, the sizing adhesive or bond used is preferably of the same character as that employed for causing the adherence of abrasive granules. It is also preferably of somewhat lower viscosity so that it will flow more readily over the irregular surface of the abrasive coating. In passing from the sizing adhesive bath 54 contained in the tank 53 the web is brought through the squeeze rolls 59. These rolls are preferably covered with absorbent material and remove excess adhesive, leaving a film on the abrasive surface but preventing the formation of drops of adhesive. Consequently, the abrasive granules of the cured product will be left with sharp, well braced points, thereby to perform more efficiently. Drying and curing of the sizing coat is carried out in the oven 61. This oven may also be heated in any desired manner to a temperature at which the sizing adhesive will be rapidly cured to a point at which it is no longer sticky. To complete the cure of the first adhesive coating as well as that of the sizing adhesive the abrasive coated web, after it is not longer sticky, may be retained in the oven 61 by the use of festooners or the like (not shown) for the required time. Such curing may be in the same chamber in which the preliminary cure is given or may be in a separate chamber or section (not shown) in which the temperature and atmosphere may be independently controlled. It will be understood that, if desired, the final curing or hardening of the bond coatings may be carried out in other apparatus according to known procedures used in curing other resin bonded abrasive coated articles.

From the foregoing description and explanation it will be evident that the present invention provides a novel and highly useful flexible abrasive product. The entire surface of this product may be covered with a thick, substantially uniform deposit of abrasive granules. Consequently, the novel product may be conveniently used in sanding, polishing or grinding operations with a hitherto unobtainable convenience and efficiency. Added efficiency results from the use of abrasive aggregates for obtaining a thick abrasive deposit and from the use of an adhesive or bond for the abrasive which is relatively rigid and brittle and is so insoluble as to be unaffected by water, solvents and common detergents.

Flexibility, strength and durability are lent the novel product by, respectively, the use of a flexible yarn im-

pregnant, the use of continuous filament yarns in the base fabric, the use of a dense, complete abrasive coating over the exposed yarn surfaces and a hard bonding adhesive. The novel flexible abrasive product of the invention is useful in flat, sheet, or crumpled form for many sanding, scouring or rubbing operations and is particularly useful when formed into abrasive discs, abrasive belts, abrasive pads and other abrasive articles.

We claim:

1. A flexible, foraminous abrasive product comprising a base of an open mesh, woven fabric, both the warp and filling yarns forming said fabric being continuous filament yarns and having a coating thereon of a flexible, presizing material, said coating securing said yarns together at their points of interlacing and maintaining the respective warp and filling yarns substantially parallel; a coating of hardened bonding adhesive over the pre-coated yarns, and a layer of abrasive granules held on said yarns by said adhesive.

2. A flexible abrasive product as set forth in claim 1 in which said open mesh fabric has a twill weave.

3. A flexible abrasive product as set forth in claim 1 in which said flexible, presizing material is a synthetic rubber.

4. A flexible abrasive product as set forth in claim 1 in which said warp and filling yarns are continuous, multi-filament yarns and said yarns are impregnated with said flexible, presizing material.

5. A flexible abrasive product as set forth in claim 1 in which said adhesive is a thermosetting resin.

6. A flexible abrasive product as set forth in claim 1 in which said adhesive is a phenolic resin.

7. A flexible abrasive product as set forth in claim 1 in which the layer of abrasive granules is of such thickness as to make the mesh openings in the completed product from 60%-85% as large as the mesh openings of the base fabric.

8. A flexible abrasive product as set forth in claim 1 in which said abrasive granules include a substantial por-

tion of aggregates each of which comprises a plurality of abrasive particles cemented together.

9. The method of forming a flexible, foraminous abrasive product from a base of an open mesh fabric woven from continuous filament yarns, said yarns having a coating of a flexible material thereon by which they are secured together at their points of interlacing, which comprises: applying a coating of adhesive to said fabric in such manner as to cover the entire exposed surfaces of said yarns, said adhesive being different from said flexible material, coating the entire surface of the adhesive coated fabric with abrasive granules thereby to provide an abrasive layer over the entire exposed surfaces of said yarns, and thereafter, without disturbing said abrasive layer, hardening said adhesive.

10. A process as set forth in claim 9 in which a sizing adhesive coating is applied over said abrasive layer and is subsequently hardened.

11. A flexible abrasive product as set forth in claim 1 in which said coating of flexible presizing material is water-insoluble.

12. A flexible abrasive product as set forth in claim 1 in which said adhesive is water-insoluble.

13. A flexible abrasive product as set forth in claim 1 in which said coating of flexible presizing material and said adhesive are water-insoluble.

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