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MANUFACTURE OF OPEN SPACE COATED ABRASIVE PAPER BY THE USE OF PARAFFIN AND OTHER HYDROPHOBIC MATERIALS

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Fig. 1.

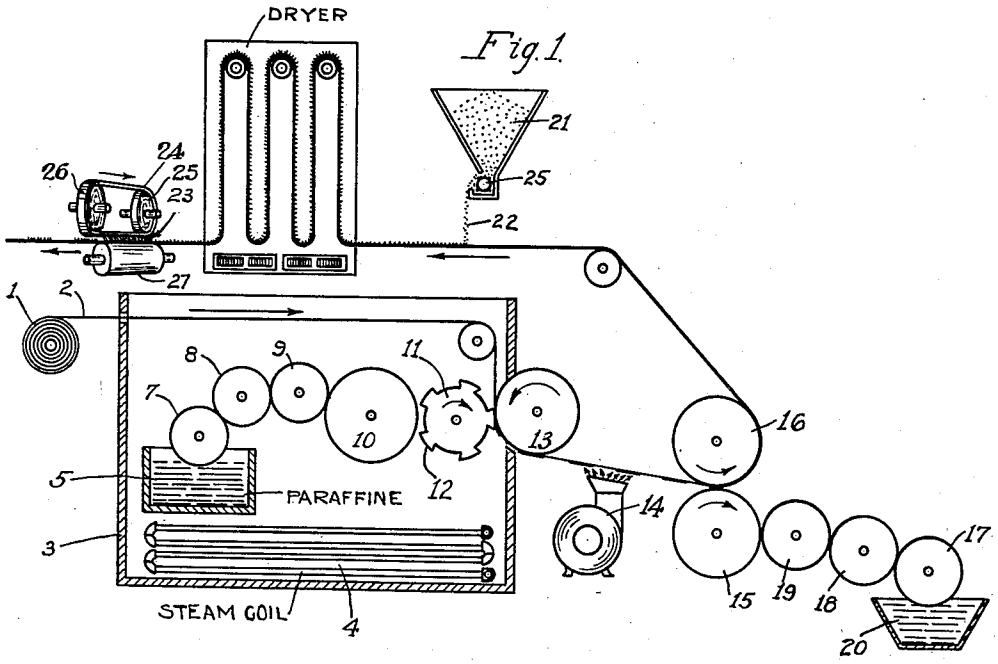


Fig. 2.

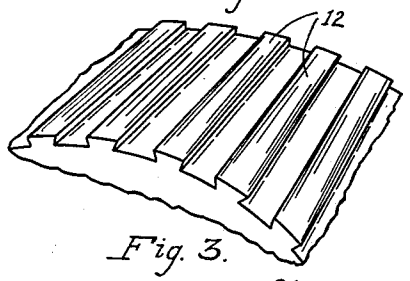
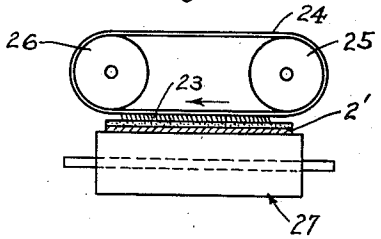


Fig. 3.



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MANUFACTURE OF OPEN SPACE COATED ABRASIVE PAPER BY THE USE OF PARAFFIN AND OTHER HYDROPHOBIC MATERIALS

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4 Claims. (Cl. 91—67.9)

This invention relates to the manufacture of abrasive fabrics, and particularly to a new and improved method of manufacturing open-space coated abrasive fabrics.

In the ordinary and well-known polishing and grinding operations performed with fabrics coated with abrasive grains, such as those of emery or silicon carbide, the materials to be polished or ground are brought into contact with the abrasive face of the fabric when driven at a high speed. As the fabric is used in this manner, particles of the material being ground break off and fill the spaces between the abrasive grains of the fabric and clog them, resulting in a glazed surface on the fabric which causes the fabric to slide over the surface of the material being polished or ground without the desired and proper grinding and polishing operation being performed. Such glazing of the surface materially shortens the life, and decreases the efficiency, of the abrasive fabric.

Heretofore in the art dealing with the manufacture of abrasive fabrics, in order to prevent the deterioration of the abrasive fabric resulting from the above-mentioned glazing of the surface, it has been taught to apply the abrasive coating in such a way that portions of the backing sheet are left free of the abrasive, thus making clearance spaces within which the ground particles of the material may be received and subsequently freed from the working portions of the abrasive fabric. These clearance spaces prevent the glazing action and possibly also allow the abrasive to cut in to a greater extent. In any event, whatever the cause may be, it has been found in practice to be a fact that as much grinding can be done with paper only one-half the surface of which is coated, as is obtained with paper completely covered.

In the prior art, it has been proposed to provide a hopper, or a series of hoppers, from which the grains fall by gravity in a stream or series of streams transversely of the fabric traveling thereunder which is to be coated.

In performing my invention, I first coat the areas of the fabric which are to be left free of abrasive grains with a material to which the adhesive (used to bond the abrasive grains to the fabric), will not stick. One such material that I have found suitable when the grains are being bonded to the fabric with either glue or a varnish (such as is used in making waterproof abrasive paper), is ordinary paraffin. Other materials which may be used with either glue or varnish are ceresin, carnauba, or other waxes; while other substances suitable for use with glue are oils, fats, or greases, and asphalts and pitches of suitable softening point. In general, any substance may be used to which the bond will not adhere, which will not interfere with the use of the paper, and which is not soluble in nor miscible with the bond.

Paraffin is simply used here as a type of material which may be called "hydrophobic", a term which is common in colloid chemistry. Glue is readily absorbed by materials which absorb water and is therefore called "hydrophilic". There is some adhesion between liquid glue and paraffin or between liquid glue and bright tin until the glue dries; then the powerful attraction of the glue particles for each other as they are dehydrated breaks the weak bond between the glue and the paraffin or metal. In the case of paper, on the other hand, the liquid glue penetrates the paper and a portion of it solidifies therein so that the paper is held strongly to the glue by the attraction of the glue outside the paper for the glue inside the paper. Abrasive grains, if clean, may be considered hydrophilic rather than hydrophobic since water or liquid glue runs readily over the surfaces of clean sand, glass, etc.

This hydrophobic material is coated on the fabric by means of a simplified form of printing press and the coated fabric is subsequently coated with adhesive and abrasive grains in the usual and well-known way. The hydrophobic material may either be removed or, if desired, may be left in place provided it does not interfere with the cutting action of the abrasive. The product resulting has, in either case, areas on which there is an absence of abrasive grains.

The following explanation of my invention is made using paraffin as the hydrophobic material and glue as the adhesive, but it is to be understood that other suitable substances may be substituted for the paraffin and glue, and the invention is not to be limited to the materials mentioned in the example.

In the drawing which illustrates my invention:

Fig. 1 is a diagrammatic view showing the application of the paraffin to the fabric, in conjunction with the usual application of glue and abrasive grains to the fabric;

Fig. 2 is a diagrammatic view of the cast wheel showing the raised portions; and

Fig. 3 shows means for removing glue and abrasive from the paraffin-coated areas.

In the drawing, 3 indicates the heating chamber within which are disposed the tank of molten paraffin 5, a series of transfer rolls 7, 8, 9 and 10, and a cast wheel 11. The heating chamber 3

is lined with steam coils 4, or any other suitable means, which act to keep the air therein at a substantially constant temperature slightly above the melting point of paraffin. The maintenance of this constant temperature guards against the solidification of the paraffin during its passage from the tank 5 to the fabric.

The paraffin contained in the tank 5 within the heating chamber 3 may be melted by means of the heat conducted through the steam coils 4, or by the immersion of electrodes into the tank 5, or by any other suitable means. The molten paraffin is transmitted from the tank 5 to the cast wheel 11 by means of the series of transfer rolls 7, 8, 9 and 10, the roll 7 dipping into the tank 5 and passing the paraffin to the roll 8 with which it comes in contact. In like manner, the molten paraffin is passed to and from the rolls 9 and 10. The passage of the molten paraffin over this series of transfer rolls insures a thin and uniform coating of paraffin upon the raised portions of the cast wheel, and in turn, insures a substantially thin and uniform coating upon printed portions of the fabric.

The cast wheel 11 is of the type used in ordinary printing presses and is formed of heavy metal which has been cut out to form the design which it is desired to have upon the finished open-space coated abrasive product. As shown in Fig. 2, the design is formed of raised portions 12, but it is to be understood that the design may be of any pattern desired, or any shape of raised portion may be used, whether it be round, star-shaped, or cross-hatched, etc. As shown in Fig. 1, only the raised portions 12 come in contact with the transfer roll 10, and thus the molten paraffin is transmitted to only the raised portions 12 of the cast wheel 11.

The fabric 2 passes from a roll 1 through the heating chamber 3 slightly above the transfer rolls 7, 8, 9 and 10, to the upper surface of the cast wheel 11, and between the cast wheel and the pressure roll 13 which are driven by any suitable connections in the direction indicated by arrows. As the fabric passes between the cast wheel 11 and the pressure roll 13, the molten paraffin is applied to the fabric at those portions where the raised portions 12 of the cast wheel come in contact with the fabric 2. It will thus be seen that the fabric 2 is coated with a thin coating of molten paraffin in a pattern simulating the design upon the cast wheel 11, leaving uncoated areas on the fabric at those points where the cast wheel 11 did not touch, and at these uncoated areas of the fabric, the glue will adhere tenaciously since there is no paraffin present to weaken its adherence.

After having received the paraffin in a design or open-spaced pattern on its under-face, the fabric passes from the heating chamber 3 and the paraffin is then caused to be cooled and solidified. One way of doing this is by the use of a cold air blast as shown at 14 in Fig. 1 while another method is to pass the fabric over or through refrigerator units.

The fabric, with the paraffin coated areas upon its under-face in the desired solidified state, passes to the upper surface of the glue roll 15 and between the pressure roll 16 and the glue roll 15, which are driven by any suitable connections in the directions indicated by arrows. In order that a uniform coating of glue upon the surface of the glue roll 15 may be secured, a series of transfer rolls 17, 18 and 19 is provided. The roll 17 dips into dissolved or melted glue contained in the glue tank 20 and transfers the glue, by means of the rolls 18 and 19, to the glue roll 15. On the upward movement of travel of the glue roll 15, glue is applied to the fabric, the amount of glue being governed by the pressure roll 16.

The fabric then travels beneath the hopper 21 which contains abrasive grains to be applied to the fabric. This hopper has a roller control feed 25 which causes a thin sheet of grains, indicated at 22, to fall by gravity upon the fabric passing therebeneath.

In my improved process, in order to secure the open-space coated abrasive product which is desired in the art, I subject the fabric with its coating of paraffin, adhesive and abrasive grains, to an operation whereby the paraffin coated areas are removed from the fabric leaving intermediate abrasive-coated portions and uncoated portions. Various means may be employed to accomplish this result, but in my process I propose to subject the fabric to a brushing or scraping operation after the usual sizing and drying, although it is to be understood that such an operation may be carried out before the sizing is performed. Should the paraffin be removed before the sizing operation, care must be exercised, when removing the paraffin coating and the abrasive grains thereon, to take away all abrasive grains which are attached to the paraffin coated areas, and in such a case, it may be desirable to again subject the fabric to a second brushing or scraping action in order to remove all the size from the uncoated abrasive areas of the fabric.

The brushing or scraping operation can be performed in several ways, one of which is by the provision of a mechanical draw brush or scraper 23 operated synchronously with the fabric. As shown in Figs. 1 and 3, this brush 23 is mounted upon a portion of the belt 24 which travels across the fabric by means of the pulleys 25 and 26 which lie above and parallel to the supporting roller 27. Due to the fact that only a portion of the belt contains the brush, only that portion of the belt will come in contact with the fabric and have a brushing or scraping effect upon the fabric. Therefore, in order to remove the paraffin and abrasive grains from only those areas which have been coated with paraffin, the movement of the belt must be synchronized with the movement of the fabric so as to allow only the brush portion of the belt to come in contact with the paraffin coated areas of the fabric, and to insure that the remaining portion of the belt passes over only those portions which are not coated with paraffin.

It will be appreciated that the angle at which the pulleys, brush and roller are set is entirely dependent upon the angle of the pattern used upon the fabric, and also that the length of brush, together with the speed of travel of the belt across the fabric, is an important factor in the determination of the width and number of the brushed or scraped portions. Since only a thin film of paraffin is coated upon the fabric by means of the cast wheel 11, the brushing or scraping action will effectively remove all paraffin adhering to the fabric and leave the scraped areas substantially free from any particle of paraffin; moreover, since th glue does not adhere tightly to the paraffin coated portions, it can be easily removed from the paraffin coated portions, taking with it the coating of abrasive grains.

It will thus be seen that my improved method offers a novel and efficient process of making

open-space coated abrasive paper or cloth which is of a very durable nature.

It will be understood that various modifications and additions may be made with respect to this invention without departing from the spirit and scope of my invention as defined in the appended claims.

I claim:

1. In the method of making abrasive sheets, the steps comprising the coating of certain areas of the fabric with a hydrophobic material, applying an adhesive coating and abrasive grains to both coated and uncoated areas of the fabric, and thereafter removing the abrasive grains and the adhesive coating from the first hydrophobic coated areas of the fabric by means of a brushing or scraping action.

2. In the method of making abrasive sheets, the steps comprising the coating of certain areas of the fabric with wax, applying an adhesive coating and abrasive grains to both coated and uncoated areas of the fabric, and thereafter removing the abrasive grains and adhesive coating from the wax coated areas of the fabric by means of a brushing or scraping action.

3. In the method of making abrasive sheets, the steps comprising the coating of certain areas of the fabric with grease, applying an adhesive coating and abrasive grains to both coated and uncoated areas of the fabric, and thereafter removing the abrasive grains and adhesive coating from the grease coated areas of the fabric by means of a brushing or scaping action.

4. In the method of making abrasive sheets, the steps comprising the coating of certain areas of the fabric with pitch, applying an adhesive coating and abrasive grains to both coated and uncoated areas of the fabric, and thereafter removing the abrasive grains and adhesive coating from the pitch coated areas of the fabric by means of a brushing or scraping action.

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