

June 19, 1934.

M. J. SCHNEIDER

1,963,154

ABRASIVE STRUCTURE

Filed May 2, 1931

2 Sheets-Sheet 1

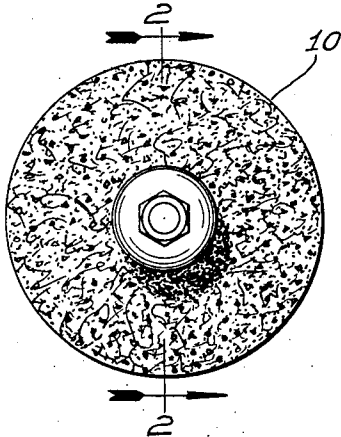


FIG. 1.

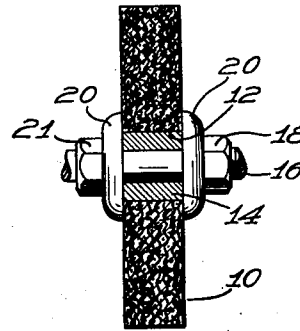


FIG. 2.

FIG. 3.

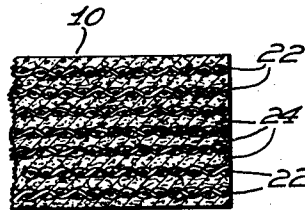
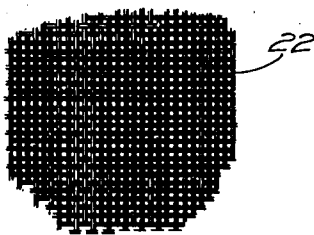


FIG. 4.

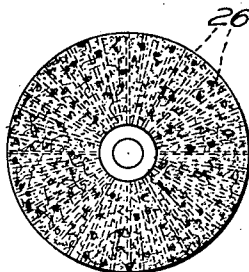


FIG. 7.

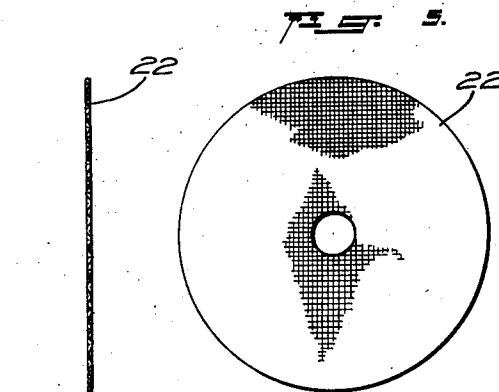


FIG. 5.

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2 Sheets-Sheet 2

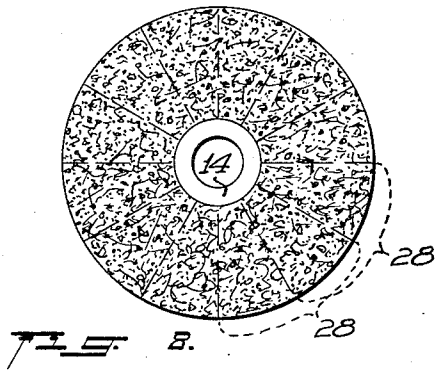
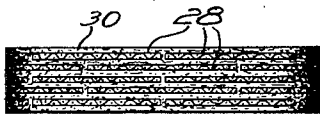


FIG. 9.

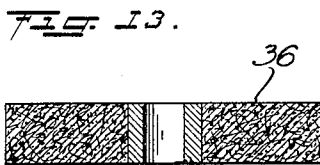
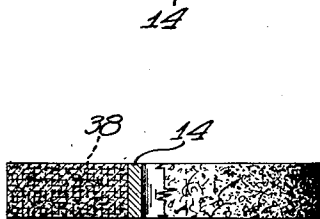


FIG. 14.

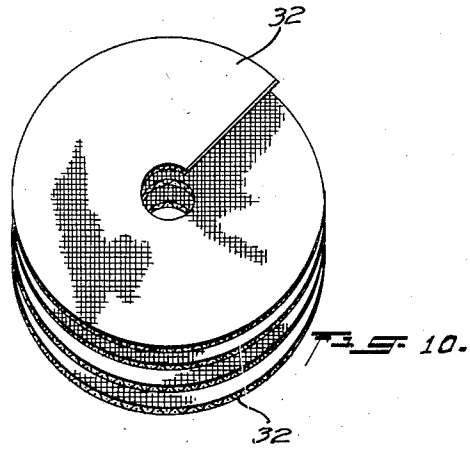
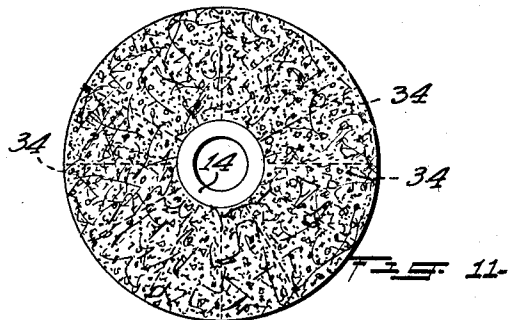
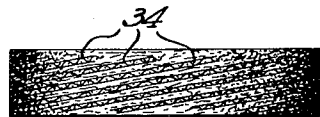


FIG. 12.

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UNITED STATES PATENT OFFICE

1,963,154

ABRASIVE STRUCTURE

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Application May 2, 1931, Serial No. 534,475

1 Claim. (Cl. 51—193)

My invention relates to grinding machinery, and includes among its objects and advantages the provision of an improved abrasive structure.

In the accompanying drawings:

5 Figure 1 is a side elevation of an abrasive wheel according to the invention;

Figure 2 is a sectional view along the line 2—2 of Figure 1;

10 Figure 3 is a diagrammatic view illustrating a method of constructing a wheel;

Figure 4 is a fragmentary diagrammatic view of the fabric employed;

Figure 5 is a diagrammatic side view of a fabric disk;

15 Figure 6 is an edge view;

Figure 7 is a side elevation of a wheel having reinforcing elements radially aligned;

20 Figure 8 is a side elevation of a wheel having a plurality of reinforcing sectors arranged in overlapping relation;

Figure 9 is an edge view of the wheel shown in Figure 8;

Figure 10 is a diagrammatic view of a fabric reinforcing material helically wound;

25 Figure 11 is a side elevation of a wheel embodying pieces of reinforcing fabric arranged in diagonal relation with respect to the sides of the wheel;

30 Figure 12 is an edge view of the wheel shown in Figure 11;

Figure 13 is a sectional view of a wheel embodying shredded reinforcing material intimately mixed with the cement; and

35 Figure 14 is an edge view of a modified form of wheel illustrating a one-piece reinforcing element.

In the embodiment of the invention selected for illustration, the wheel comprises a disk 10 having a central opening 12 lined with a metal sleeve 14. A shaft 16 passes through the sleeve 14 and is fixed to the disk 10 by means of a nut 18 which, when tightened, clamps the disk between flanges 20. The flange 20 opposite the nut 18 may rest against an abutment 21 shaped like a nut, by means of which the shaft 16 may be held against rotation.

40 The disk 10 comprises a fabric matrix having an abrasive filler uniformly incorporated with and mixed through it. The filler comprises in part a synthetic cement material which firmly unites the filler with the matrix. In building up the wheel illustrated in Figures 1 and 2 I take a plurality of fabric disks 22 which are at first separated by thin layers of plastic abrasive 45 filler 24. The disks 22 should be of an open

weave, as indicated diagrammatically in Figure 4. The first step in building up the wheel consists in spreading a thin layer of the abrasive filler upon a supporting structure or within a suitable mold. One of the disks 22 is then placed 60 upon the layer of abrasive, after which a second layer of abrasive filler is placed upon the fabric disk. The alternate addition of the disks 22 and the abrasive filler is continued until a wheel has been built up which will be of the desired 65 thickness after compression.

After the disks and the abrasive filler have been arranged as shown in Figure 3, pressure is applied to the wheel. The layers of abrasive 70 filler should be of such thickness that when pressure is applied to the wheel the abrasive filler will become uniformly incorporated and intimately mixed with the fabric disks. In Figure 2 I have shown the uniform texture which I attain in the finished article. The materials 75 are mixed in such manner that I entirely eliminate definite areas of concentrated abrasive filler or fabric material in the wheel. This feature provides a wheel having uniform abrading characteristics. It also provides a wheel of uniform strength throughout every portion of the disk. 80

The abrasive filler may be incorporated in a fabric matrix by the use of a spray gun in lieu of the procedure illustrated in Figure 3. The 85 spray gun discharges the abrasive filler with sufficient force to thoroughly mix the filler with the fabric. In building up a wheel when a spray gun is used, several disks can be impregnated at one spraying, and repeated sprayings will build 90 up any desired thickness. In either case pressure may be thereafter applied to the wheel to intimately mix the abrasive filler with the fabric matrix.

As illustrative of the class of cements including Portland cement, oxychloride and oxysulphate cements, and various plasters which I refer to as synthetic cements as distinguished from agglutinative cements, such as gums and glues, I will now give the exact procedure for an 100 oxysulphate cement.

I mix with a charge of abrasive, magnesium oxide amounting to substantially 50% of the amount of abrasive by weight.

To this I add a magnesium sulphate solution made up as follows: To a given charge of magnesium sulphate add either 1% of sodium citrate 105 or ½% of citric acid and dissolve the entire mass in water to make up a solution having a specific gravity of 28° Baumé or 1.239 absolute. 110

Of this magnesium sulphate solution I add to the dry mixed mass of abrasive and magnesium oxide enough to have the magnesium sulphate from 15 to 100% by weight of the charge of abrasive and magnesium oxide. Where the material is applied to the fabric with a spray gun I have secured good results with 45% of magnesium sulphate, and where it is incorporated by molding or tamping I have secured good results with 80% magnesium sulphate.

After the wheels have been formed, they are permitted to dry, which finally conditions the wheels. I have found that the wheels dry within a short time under normal atmospheric conditions, and that it is unnecessary to subject the wheels to any treatment such as conditioned air.

In Figure 7 I have shown a wheel comprising in part a plurality of fabric members 26 which are radially aligned and embedded in the abrasive filler. This type of wheel is particularly efficient in cases where the work to be ground is applied to the sides of the wheel.

The wheels illustrated in Figures 8 and 9 are constructed from a plurality of fabric sectors 28 arranged in overlapping relation. In viewing Figure 9 it will be noted that the sectors are arranged in the form of disks between layers of abrasive filler 30. The sectors comprising one disk overlap the sectors comprising the adjacent disk. After a wheel has been built up as shown in Figure 9, pressure is applied to the wheel for intimately mixing the abrasive filler with the fabric.

In Figure 10 I have shown an alternative fabric construction. The fabric comprises a strip or ribbon 32 which is helically wound for receiving thin sheets of plastic abrasive filler between the convolutions of the fabric.

The wheel illustrated in Figures 11 and 12 comprises a plurality of fabric sectors 34 which are diagonally arranged with respect to the sides of the wheel. Figure 12 shows a wheel preparatory to receiving pressure for intimately mixing the abrasive filler with the sectors 34.

In Figure 13 I have shown a wheel 36 having the abrasive filler intimately mixed with a shredded material. The shredded material is intimately mixed with the abrasive filler and the

wheel is subsequently formed from the previously mixed material. The shredded material may also be mixed with the abrasive filler during its discharge with the abrasive filler from a spray gun. The spray gun may be adjusted for varying the amounts of the different materials during the spraying process. In cases where the spray gun is employed for building up the wheels I find that the magnesium sulphate may be varied between 15 to 60% by weight of the charge of abrasive and magnesium oxide. 30 to 60% may be used in connection with the spray gun method without necessitating the application of pressure to the wheel. In all cases where the magnesium sulphate content varies between 15 to 30%, pressure in excess of twenty pounds per square inch must be applied.

I have found that the abrasive filler may be incorporated in a fabric matrix comprising a single piece as indicated in Figure 14. In this form the abrasive filler is preferably embedded in the fabric 38 by means of a spray gun. The wheel may also be formed without the use of a spray gun by employing an abrasive filler of a semi-liquid condition so that the fabric will absorb the filler.

A soft or hard wheel may be constructed by respectively decreasing or increasing the proportion of magnesium oxide. Wheels constructed in accordance with the invention are reinforced in such a manner that the wheels may be operated at high speeds without danger of breakage. The wheels also have high abrading properties and do not give off offensive odors of chlorine or other compounds when used for grinding purposes.

Without further elaboration the foregoing will so fully explain my invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

An abrasive structure comprising a reinforcing structure, and an abrasive filler uniformly incorporated in said reinforcing structure, said filler comprising at least in part a binder made up of magnesium oxide, magnesium sulphate, sodium citrate and citric acid.

MATHIAS J. SCHNEIDER.