

Nov. 21, 1967

R. ZANE

3,353,308

FLEXIBLE ABRASIVE DISC

Filed May 8, 1964



Fig. 2

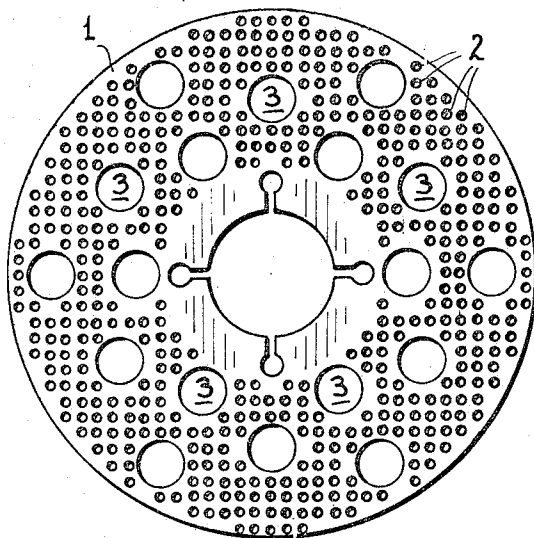


Fig. 1

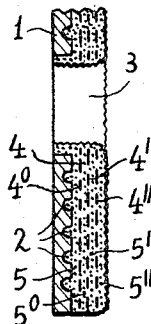


Fig. 5



Fig. 4

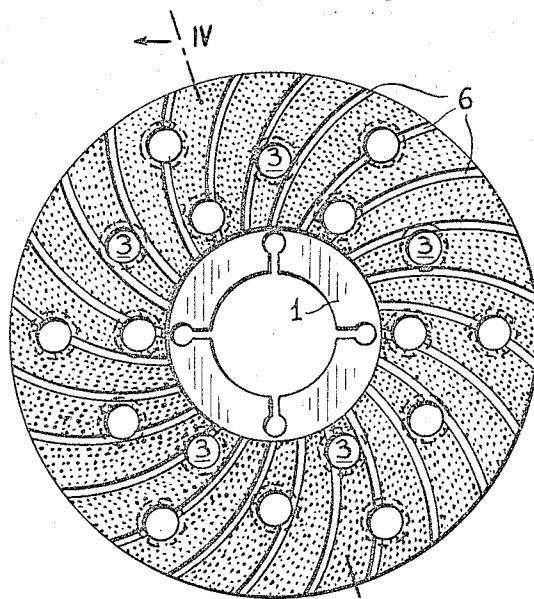


Fig. 3

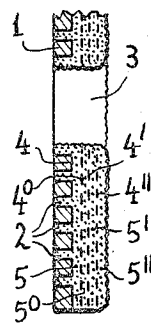


Fig. 6

INVENTOR

*RICCARDO ZANE*

BY

*Young & Thompson*

ATTORNEYS

1

3,353,308

## FLEXIBLE ABRASIVE DISC

Riccardo Zane, Via Carducci 5, Cinisello Balsamo,  
Mailand, Lombardy, Italy

Filed May 8, 1964, Ser. No. 366,119

Claims priority, application Italy, June 4, 1963,  
11,973/63

2 Claims. (Cl. 51—397)

There are known abrasive discs consisting of a round plate of flexible material, e.g. vulcanized fiber or the like, on one face of which is applied a layer of abrasive material. Such abrasive discs are used as front wheels for the honing of surfaces, especially of curved and in any case non-planar surfaces, and the flexibility of the disc enables the performance more easily and thoroughly of said honing operation, inasmuch as the abrasive disc adapts itself to the surface to be machined.

In the known abrasive discs, the flexibility is very imperfect because, although it is very good for the supporting round plate, it is considerably reduced by the abrasive layer applied on it. If the thickness of said layer is substantial, the disc is hard and brittle, whereas, if it is thin enough to accompany to a great extent the flexing of the supporting disc, the life of the abrasive disc is exceedingly shortened.

Furthermore, in the known abrasive discs the adhesion of the abrasive layer to the supporting round plate is very poor, so that the deflections to which the disc is subjected result in said layer falling off, and the disc is used up rapidly.

It should also be added that said discs are subject to overheating which is very harmful to the supporting round plate but still more so to the material that is being machined which, in many instances, e.g. when it is thin plate, may be irredeemably damaged. The object of the present invention is the provision of a flexible abrasive disc which does not suffer from the above mentioned inconveniences and which exhibits a much greater flexibility than the known discs, both owing to its intrinsic structure and on account of the production method: furthermore, it shows an excellent adhesion of the abrasive layer to the supporting round plate, which makes possible a long life, even if the disc is made to perform particularly intense and heavy duty.

Another important advantages of this abrasive disc appears from the fact that, under the same working stress, its heating is very low, compared to the known discs, so that most of the inconvenience arising from said excessive heating of the known discs are eliminated.

The following description is made with reference to the attached drawings illustrating diagrammatically the abrasive disc.

FIG. 1 shows the flexible round plate acting as a support, seen frontally.

FIG. 2 is its diametral section.

FIGS. 3 and 4 are similar views of the disc formed by said round plate coated with abrasive material.

FIG. 5 is a greatly enlarged fragment of a section of the disc.

FIG. 6 is a variant of FIG. 5.

With reference to the above listed drawings:

2

For the manufacture of the abrasive disc according to the invention, there is initially used a flexible plate 1 which may be made up of various materials, depending on the application requirements, e.g. vulcanized fiber or other materials in lamellar form, more or less similar to one another: the plate is obtained by a shearing of the laminate, and is subjected to a checking or punching 2 following which its surface to be covered with abrasive material is deeply knurled with a beehivelike pattern (FIG. 5) and possibly presents also very small diameter holes 2' (FIG. 6) going from one face of the plate 1 to the opposite one. This punching forms a multiplicity of indentations confronting said abrasive material and serves essentially the purpose of increasing and better shaping the surface to which must adhere the abrasive material which, in the case of FIG. 6, penetrates into the small holes.

This plate receives also larger diameter perforations 3, e.g. of 5 to 30 mm. and, moreover, a subsequent sand-blasting of the surface on which the abrasive will be applied.

The plates so shaped are covered, on the face so prepared, with a layer 4 of adhesive material, preferably a liquid synthetic resin, and over the adhesive layer is spread the abrasive 5.

The excess of abrasive is removed, the plate is again covered with the adhesive material, which forms a new layer 40, then again with abrasive 50, and so on till a predetermined number of abrasive layers: 5-50-5'-5'' . . . separated from one another by as many very thin layers of adhesive material: 4-40-4'-4'' . . . is formed.

At this point the plate with its layers of adhesive is subjected to a slight impression in order to conform its surface to more or less spiral radial grooves 6. In some special cases, however, this compression may be a real pressing, when it is deemed necessary to compress the whole abrasive layer. Subsequently the abrasive disc is placed in an oven for the drying and polymerizing of the resin that constitutes the adhesive material.

It should be noted that the perforations 3, in addition to improving the adhesion of the abrasive layers to the plate, with the penetration of said layers against their edges, make the disc much more flexible.

It should also be borne in mind that these perforations, with their contour—as, for that matter, also the spiral groovings—6 increase the number of rakes and therefore the abrasive effectiveness of the disc.

Moreover, these holes and groovings present an advantage in that they act as passages for the disposal of waste particles, and in that they provide a ventilation which cools the machining area, thereby improving the effectiveness of the machining and the possibility of its being accelerated without the risk of an overheating of the piece.

I claim:

1. A flexible abrasive disc comprising a known lamellar, flexible, nonmetallic supporting round plate, and a substantial layer of abrasive material supported by said round plate, said abrasive layer being made of a plurality of thin and uniform alternately superposed coatings of adhesive material and abrasive granules, said round plate

3

having a multiplicity of indentations on its side confronting said abrasive material.

2. A flexible abrasive disc as claimed in claim 1, wherein each said coating of abrasive granules comprises substantially all the abrasive granules that can be held on said round plate by the underlying coating of adhesive material.

References Cited

UNITED STATES PATENTS

|           |         |               |        |   |
|-----------|---------|---------------|--------|---|
| 2,426,441 | 8/1947  | Dronsfield    | 51—407 | X |
| 2,838,890 | 6/1958  | McIntyre      | 51—395 |   |
| 163,880   | 6/1875  | Morrison      | 125—15 |   |
| 2,065,942 | 12/1936 | Lane          | 51—209 |   |
| 2,277,520 | 3/1942  | Martin et al. | 51—407 |   |

10

4

|           |         |               |         |   |
|-----------|---------|---------------|---------|---|
| 2,653,428 | 9/1953  | Fuller        | 51—395  |   |
| 2,749,681 | 6/1956  | Reidenbach    | 51—395  |   |
| 2,804,733 | 9/1957  | Hurst         | 51—397  | X |
| 2,907,146 | 10/1959 | Dyar          | 51—397  |   |
| 2,952,951 | 9/1960  | Simpson       | 51—397  |   |
| 2,225,937 | 12/1940 | Williamson    | 51—293  |   |
| 2,899,288 | 8/1959  | Barclay       | 51—293  |   |
| 2,255,294 | 9/1941  | Melton et al. | 118—308 |   |
| 2,943,599 | 7/1960  | Heck          | 118—308 |   |

FOREIGN PATENTS

|           |        |         |
|-----------|--------|---------|
| 1,030,890 | 3/1953 | France. |
|-----------|--------|---------|

ROBERT C. RIORDON, *Primary Examiner.*

15 D. G. KELLY, L. S. SELMAN, *Assistant Examiners.*