Jan. 29, 1935. G. H. BULLARD 1,989,074

ABRASIVE WHEEL

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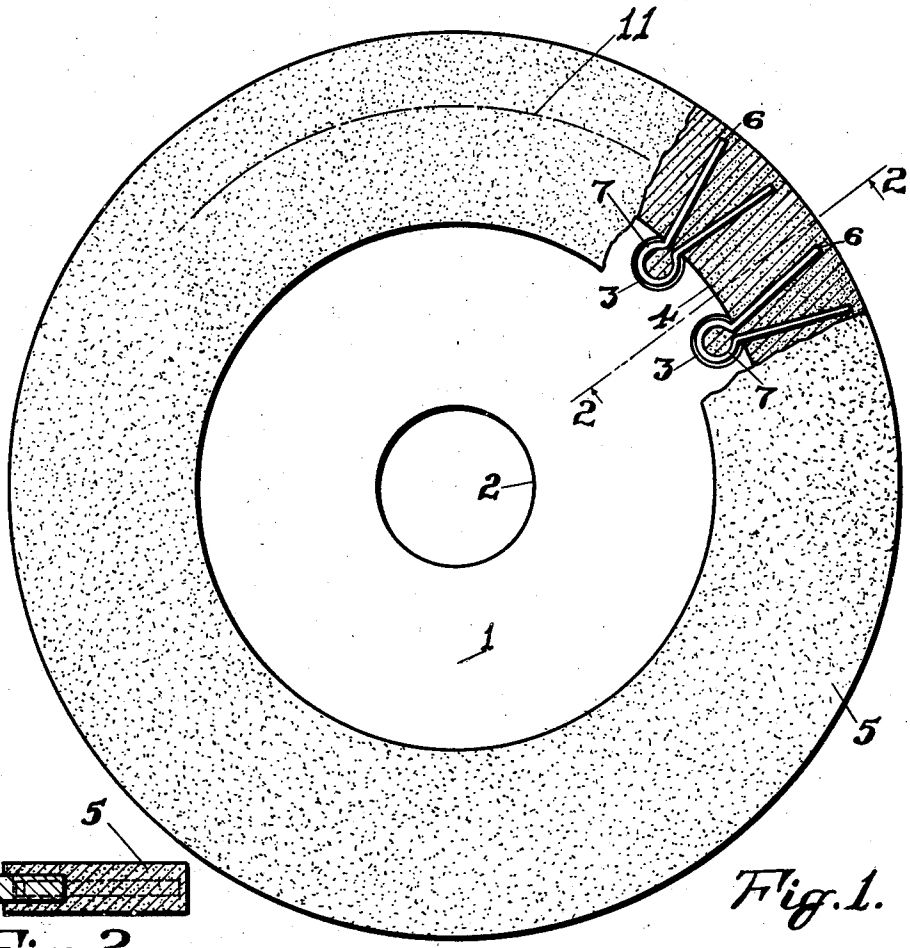

Fig. 1.

Fig. 2.

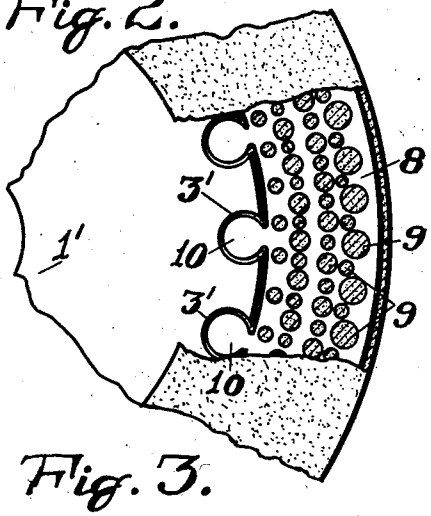

Fig. 3.

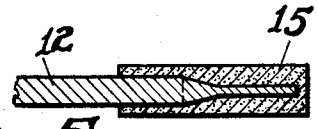

Fig. 5.

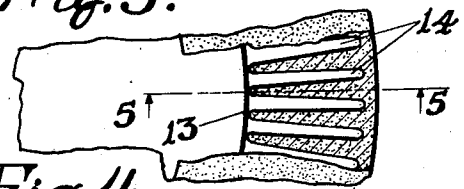

Fig. 4.

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ABRASIVE WHEEL

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10 Claims. (Cl. 51—206)

The present invention relates to abrasive wheels and particularly to thin large-diameter abrasive wheels commonly known as "coping" wheels, for use in sawing stone or similar material.

Abrasive wheels of this type are usually in the form of a thin metallic central hub or disk with a relatively narrow annulus of abrasive material molded thereon to imbed the outer periphery of the disk. Such a wheel in actual use has a relatively short life, owing to the definite limitation placed on the radial width of the abrasive marginal portion, by the extreme thinness thereof; heretofore, all attempts to increase the radial width of the abrasive (to give longer life to such a wheel) have resulted in failure, because of the tendency of the abrasive to fly apart as a result of centrifugal force or to break off under the pressure exerted by the wheel against the material being cut.

According to the present invention, a reinforcing means is imbedded in the annulus of abrasive material, said reinforcing means being attached to and extending outwardly from the rim of the central metallic hub or disk. This provides not only a reinforcement against breaking as a result of the high speeds but also reinforcing the material against crushing. The reinforcing material is such that it wears away at least as fast as the abrasive material is worn away. By this reinforcement, it is possible greatly to increase the length of life of abrasive wheels of this character since a much greater radial width of abrasive material may be built up than in previous constructions. Other and further objects and advantages of the invention will appear with reference to the accompanying drawing in which:—

Fig. 1 is a plan view of an abrasive wheel, parts thereof being broken away, more clearly to show the invention.

Fig. 2 is a section along the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary plan view partly in section showing a modification.

Fig. 4 is a fragmentary plan view partly in section showing another modification.

Fig. 5 is a section along the line 5—5 of Fig. 4.

Like reference characters refer to like parts throughout the drawing.

Referring to the drawing and particularly to Figs. 1 and 2, the abrasive wheel includes a relatively thin hub or disk 1 having an opening 2 centrally thereof for the reception of a shaft on which the abrasive wheel is to be mounted. The material of the disk 1, near its rim, is cut away by a series of substantially circular openings that intersect the outer periphery 4 thereof, forming in effect a series of dovetail cut-outs or recesses 3, 3, each having a relatively narrow throat or opening at the disk's periphery.

The thin ring or annulus 5 of abrasive material which is molded to imbed the rim of disk 1 and to interlock with the dovetails or cut-outs 3, 3, also imbeds, as shown in Fig. 1, a plurality of reinforcing members 6, 6, each of the latter, previous to the molding operation, having been operatively associated with one of the dovetail cut-outs 3 of the central disk. Each reinforcement 6 comprises a wire or the like bent into substantially U-shaped form, with the base 7 of the bend so shaped as to fit with and conform to the substantially circular contour of each of the associated dovetail cut-outs 3 of disk 1. That is to say, each reinforcement 6 has its base 7 interlocked with one of the rim recesses 3, and the two sides or legs of said reinforcement, beyond the narrow throat of said recess 3, are preferably divergent, so as to increase the resistance to fracture or breakage of the abrasive ring 5 that embeds the entire series of reinforcements.

In the embodiment shown in Fig. 3, the central disk 1' is constructed in the same manner as in Fig. 1, and the reinforcing member in this modification consists of a thin plate in the form of a ring 8 having a large number of perforations 9 therein. The inner edge of the ring which is substantially equal in diameter to the diameter of the disk is provided with protruding portions 10 substantially matching the cut-out portions 3' in the disk, said protruding portions being arranged to engage and interlock with the cut-out portions to maintain the perforated plate in position. By reason of the large number of perforations, into which the abrasive material from opposite sides of the plate extends, a substantially solid abrasive ring is provided and the material is firmly interlocked with the reinforcing member on opposite sides thereof. The plate acts in the same way as the reinforcing members shown in Figs. 1 and 2 to support the abrasive material against crushing or flying apart, the material being such that the plate wears away at least as rapidly as the abrasive material.

In the construction shown in Figs. 4 and 5, the central hub or disk 12 is provided at its periphery 13 with thin radially extending fingers 14 substantially in the plane of said disk, which fingers 14 may be either integral with the disk or may be separately formed and permanently secured to said disk to form a functionally integral part thereof. These fingers form radially extending reinforcements which are imbedded in the annulus 15 of abrasive material to support said annulus against breaking, said annulus being similar in construction to that shown in Figs. 1 and 3. The abrasive material extends between the radially extending fingers and overlies the disk adjacent the periphery, whereby said annulus is positively secured to the disk to provide a substantially continuous annulus of abrasive

material extending beyond said disk in the plane thereof. Since the material from which the fingers are formed is such that, when the wheel is in use, the fingers are worn away at least as rapidly as the abrasive material is worn away, a substantially continuous grinding surface is provided on the outer periphery of said annulus, until the abrasive material constituting said annulus is worn away substantially to the point where the fingers connect to the disk or hub. In this construction, as in the other modifications, the reinforcing members embedded and extending through the annulus support said abrasive material against breaking under centrifugal force or under crushing forces so that the radial width of the grinding portion of the wheel may be materially increased.

The dot-dash line 11 of Fig. 1 indicates generally the maximum radial width to which abrasive material can be built up on the central disk without the use of reinforcements. That is to say, when there is no reinforcement of the abrasive material beyond the rim of the disk 1, such material cannot safely be extended beyond the circumference indicated at 11, because the bonding substance which unites the abrasive particles is not strong enough to withstand the greatly increased centrifugal force which becomes effective with any increase in diameter of the wheel. Consequently, it is not possible to make the wheel much larger than the disk 1, except by providing reinforcements which aid in supporting the abrasive material against flying apart by centrifugal force or crushing under the pressure between the wheel and work. Especially in coping wheels, used for cutting stone, the reinforcing metallic members will wear away at least as rapidly as the abrasive material and by the use of reinforcing members in the manner shown in the drawing, the effective diameter of the coping wheel can be substantially increased, thereby providing a wheel which can cut for a much greater time before replacement is necessary.

I claim,

1. An abrasive wheel comprising a central hub having cut-out portions in its periphery, the openings to said portions being narrower than the remainder of said portions, an annulus of abrasive material extending beyond the hub and in substantially the same plane, and reinforcing means interlocking with said cut-out portion of said hub and imbedded in said annulus.

2. An abrasive wheel comprising a central metallic disk, an outer annulus of abrasive material, said disk being provided with cut-out portions adjacent the periphery into which the abrasive material extends to maintain the abrasive material in place, and a reinforcing member adapted to be embedded in the annulus, portions of said reinforcing member engaging and interlocking with the cut-out portions.

3. An abrasive wheel comprising a central metallic disk and an outer annulus of abrasive material, said disk having cut-out portions adjacent the periphery into which the abrasive material extends to retain the abrasive material in position, the openings from the periphery to said cut-out portions being narrower than the remainder of the cut-out portions and a reinforcing member adapted to be embedded in the annulus, portions of the reinforcing member engaging and interlocking with the cut-out portions.

4. In an abrasive wheel, the combination with a metallic supporting disk having a series of cut-out portions adjacent the periphery thereof and an annulus of abrasive material secured to the periphery of the disk and extending outwardly therefrom, of a reinforcing member embedded in the abrasive material, portions of said member engaging and interlocking with the cut-out portions.

5. An abrasive wheel comprising a central metallic disk, the outer edge of which is provided with recesses having narrow openings, an outer ring of abrasive material extending beyond the edges of the disk, portions of the abrasive material extending into the recesses to retain the material in connection with the disk, and reinforcing elements embedded in the abrasive material having portions extending into and interlocking with the recesses to prevent radial withdrawal movement therefrom, said reinforcing elements extending substantially to the outer edge of the ring of abrasive material.

6. An abrasive wheel comprising a central metallic disk, the outer edge of which is provided with recesses having narrow openings, an outer ring of abrasive material extending beyond the outer edge of the disk, and in substantially the plane of the disk, portions of the abrasive material extending into the recesses to retain the material in position on the disk, and reinforcing elements embedded in the abrasive material having portions extending into and interlocking with the recesses to prevent radial withdrawal movement therefrom, said reinforcing elements extending substantially to the outer edge of the ring of abrasive material.

7. An abrasive wheel comprising a central metallic disk, the outer edge of which is provided with recesses having narrow openings, an outer ring of abrasive material extending beyond the edges of the disk, portions of the abrasive material extending into the recesses to retain the recesses on the disk, and a reinforcing element comprising a perforated plate embedded in the ring, said plate having portions thereof engaging in the recesses of the disk.

8. An abrasive wheel comprising a central metallic disk, the outer edge of which is provided with substantially circular openings, an outer ring of abrasive material extending beyond the edges of the disk and in substantially the plane of the disk, portions of the abrasive material extending into the openings to maintain the abrasive material in position on the disk and a reinforcing plate embedded in the ring, portions of the plate engaging in the openings in the disk.

9. An abrasive wheel of the class described, comprising a central supporting disk, a continuous annulus of abrasive material imbedding the rim of said disk and providing a cutting portion of substantial radial width beyond said rim, and reinforcing means imbedded in and adapted to be worn down progressively with said cutting portion, said reinforcing means being secured to said rim.

10. An abrasive wheel of the class described, comprising a central supporting disk, a continuous annulus of abrasive material imbedding the rim of said disk and providing a cutting portion of substantial radial width beyond said rim, and a series of pairs of divergent reinforcing elements imbedded in and adapted to be worn down progressively with said cutting portion, each pair being interlocked with said rim.

GEORGE H. BULLARD.