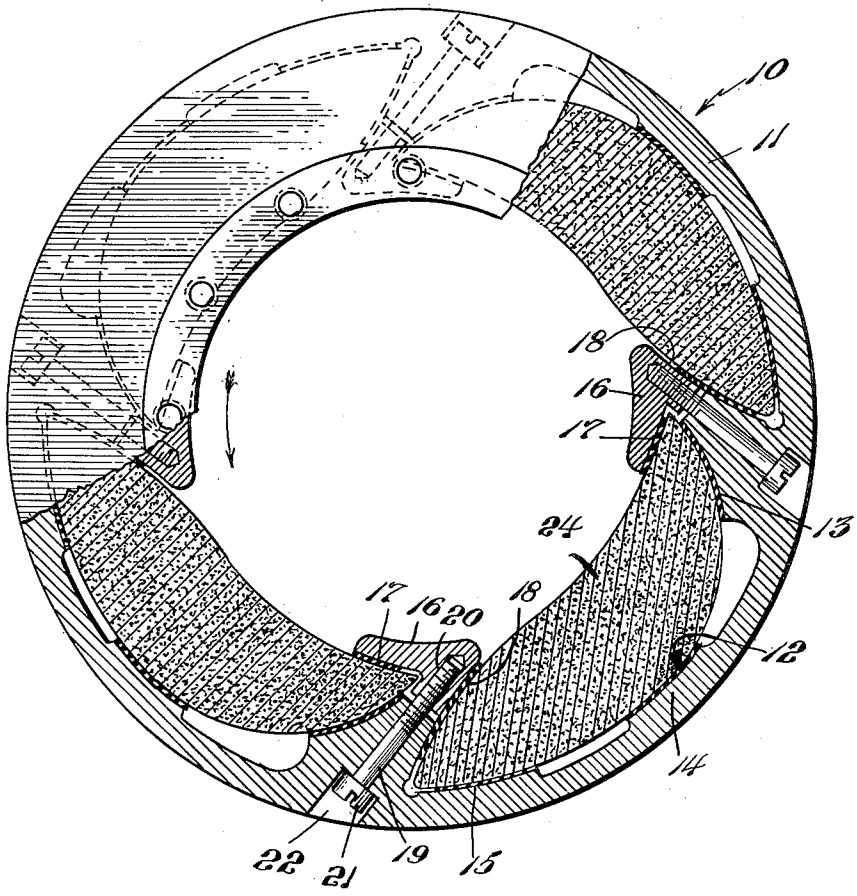
Feb. 1, 1955 A. S. TITCOMB 2,700,853

SEGMENTAL ABRASIVE WHEEL AND SEGMENT BLOCK THEREFOR

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Fig. 1.



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Fig. 2.

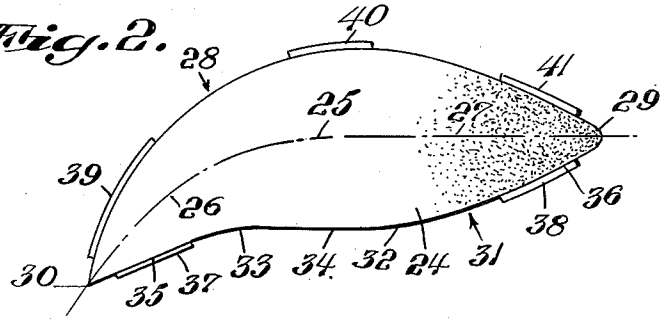


Fig. 3.

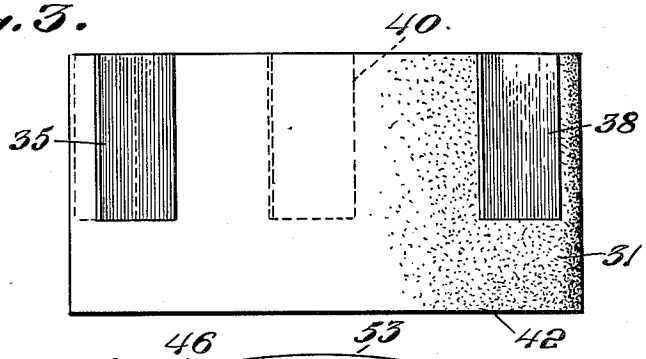


Fig. 4.

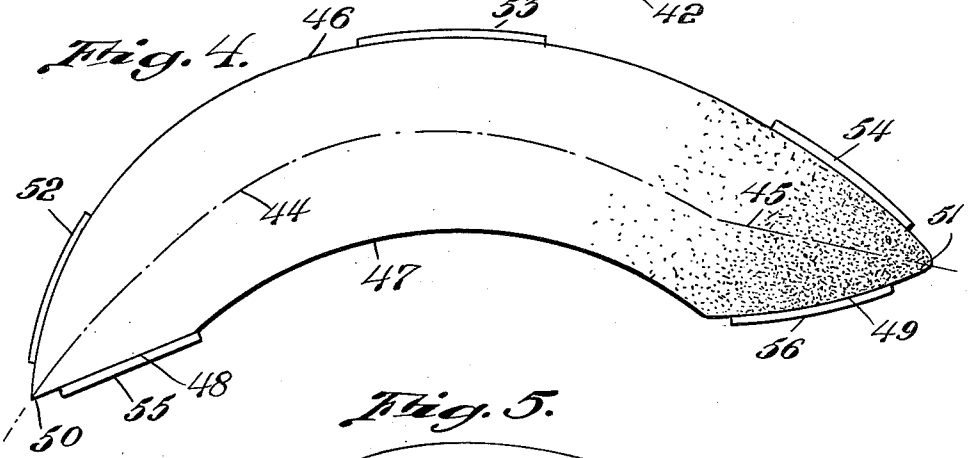
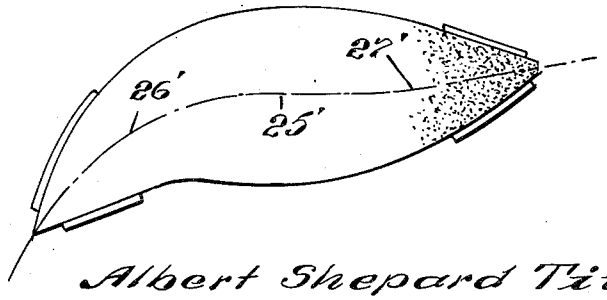


Fig. 5.



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SEGMENTAL ABRASIVE WHEEL AND SEGMENT BLOCK THEREFOR

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Application March 19, 1952, Serial No. 277,433

7 Claims. (Cl. 51—209)

This invention relates to an abrasive grinding wheel which is composed of a plurality of spaced abrasive surfaces and more particularly to the abrasive block or segment which is utilized for such a wheel. The invention is an improvement on the inventions disclosed in my U. S. Patent No. 2,476,334 dated July 19, 1949, and Reissue Patent No. 23,717 dated September 29, 1953. In this latter patent many terms which are herein used are there defined, and I use the terms there defined with the same meaning in this application. In these patents the design of the segment is somewhat crescent shaped and preferred with sharply pointed ends (and is best for maximum plowing action although, if desired, they may be somewhat more blunt to decrease fragility) and flat lands for properly holding the segment in a strategically arranged circular echelon relation. The arrangement provides a method of eliminating the excessive loading which has been experienced with other types of chucks and segments and tends to maintain a clean free-cutting grinding area of each segment forming the wheel or disk by affording a space through which the chips may pass outwardly by a physical plowing action assisted by centrifugal force.

It is to a chuck or wheel of this general type affording such advantages of clearing the chips and debris from the work that this present invention relates.

While accomplishing the desired objects set forth in the above-mentioned patents, an object of this invention is to provide an arrangement of block or segment which will offer at least as little, or even less, resistance to the removal of debris outwardly of the wheel as the blocks or segments of the wheels of the above-mentioned patents, yet permitting closer spacing, affording greater peripheral grinding area, as is desirable with some types of grinding and sizes of the application.

Another object of the invention is to provide a larger grinding area in each of the segments relative to their maximum length and thickness while maintaining ample or greater and more frequent clearance space between the segments when in the grinding wheel.

Another object of the invention is to provide a better resting of the segments in the chuck or holder or shoe for retaining the segments in the wheel and to improve the wheel generally and extend its scope.

With reference to the drawings, Figure 1 is a top plan view of a grinding wheel partly in section showing the arrangement of my segments or blocks therein;

Figure 2 is a plan view of one of the segments alone;

Figure 3 is an elevational view thereof;

Figure 4 is a plan view of a segment of modified shape; and

Figure 5 is a plan view of a segment similar to Figure 2 but of modified shape.

In proceeding with this invention, I have provided a segment or abrasive block which instead of being generally crescent shaped with characteristic flat inner lands immediately adjacent to the sharp ends, as shown in my above-mentioned patents, is modified so that while the leading portion of the block may be substantially the same as that disclosed in the above-mentioned patents, the trailing portion of the block departs from the arcuate median line which is a counter-part of the arcuate median line of the forward or leading portion and becomes straighter, may even become straight, or even become of reverse curvature to form with the median of the leading portion an hysteresis curvature. Thus the median of the trailing portion of the segment or block will extend

outwardly of a circumference with a constant radius when the segments are assembled therein, while the outer contour of said trailing portion more nearly conforms to the periphery of the wheel when used in the smaller and intermediate sizes requiring three, four or five segments, and there is provided a greater space between the trailing end and the leading end of the adjacent segment, thus providing an easier path and greater clearance between segments for the movement of debris outwardly of the wheel both under the physical action of the plowing of the leading edge of a segment and under the action of centrifugal force. While it is recognized that the best way to accomplish maximum plowing action is through the use of segments having their side surfaces converging at an acute angle as far toward a sharply pointed tip as is practical with abrasive materials, it is also recognized that with these materials, especially in the soft grades often used in segments of these shapes, such sharp point or leading edge is by nature fragile, and therefore some manufacturers will consider it more practical to round or square off or otherwise determine as best suits them the exact tip of either the leading or trailing extremity of these segments, all such forms coming within the purview of this invention.

With reference to the drawings the chuck is designated generally **10** and comprises a circular or cylindrical body **11** having a plurality of recesses **12**, each with arcuate lands **13**, **14**, and **15** against which the outside curved area of the block or segment may rest, while a clamp jaw **16** has one surface **17** thereof to fit the inner surface of the leading end of the block and another portion **18** to engage the inner surface adjacent the trailing end of the block. A screw **19** has threaded engagement as at **20** with this clamp jaw so that when its head **21** located against a shoulder in the recess **22** of the chuck is turned, this clamp jaw is drawn into position to hold segments or blocks designated generally **24** in the chuck. The chuck may be constructed with individual demountable clamp bodies as shown in my U. S. Patent No. 2,541,844 dated February 13, 1951.

The abrasive segment or block **24** has a median line **25** (see Fig. 2) which is arcuate at the leading portion thereof **26** and substantially straight along its trailing portion **27**. The outer surface **28** is substantially arcuate throughout its extent meeting the flat plane of the median line at the trailing end **29** and intersecting the plane of the median **25** at an acute angle at the leading end **30** of the segment. The shape of this outer arcuate surface is generally convex throughout its extent. The inner arcuate surface **31** changes from outwardly convex as at **32** to outwardly concave as at **33** at substantially the location **34** along the mid portion of the segment, while this inner arcuate surface is substantially flat adjacent the leading end as at **35** and with surfaces flatter or with less curvature than the outer curvature of the leading portion forming with the trailing inner and outer surfaces as they approach the trailing end of the segment, a somewhat complementary curvature on said inner and outer surfaces. These flat portions provide an advantageous location for pads **37** and **38** which support the segment in the chuck or holder as shown in Figure 1.

In some cases the shape of the segment may be as shown in Figure 5 which is similar to Figure 2 but in which the median line **25'** is arcuate at **26'** the same as Figure 2 but has the trailing portion **27'** of its median line curved to be oppositely concaved or arched from the median portion **26'** to provide more of an hysteresis curvature.

Also pads **39**, **40**, and **41** are provided along the portions of the segment which engage the lands **13**, **14**, and **15** as shown in Figure 1.

Both the inner arcuate surface **31** and the outer arcuate surface **28** are substantially perpendicular to the flat grinding edge surface **42** which is shown in Figure 3.

In some cases a segment of somewhat different shape may be desired, and I have shown in Figure 4 a segment having a median **44** with a longer extent of arc but which at its trailing end meets a substantially straight median **45** to provide for greater clearance between similar segments when arranged in a wheel in circular echelon as

shown in Figure 1. The outer arcuate surface in the form shown in Figure 4 is designated **46** and is substantially convex throughout its extent, while the inner arcuate surface **47** of this segment is substantially concave throughout its major extent while substantially straight portions **48** at the leading end and **49** at the trailing end break into this arcuate inner surface and connect it with the sharp leading end **50** and less sharp trailing end **51**. It will be noted that the surface **49** is a little convex rather than perfectly flat in a single plane. Supporting pads are provided on this segment along the outer convex surface as at **52**, **53**, and **54**, while pads are provided along the straight portion **48** as at **55** and along the substantially straight but slightly convex surface **49** as at **56** to engage the portions of the chuck as above described.

I claim:

1. A bonded abrasive block having a bottom grinding surface with side surfaces perpendicular thereto shaped to provide between them a median which is arcuate at one end of the block which is the leading end and is of a dissimilar shape at the other end, one of said side surfaces presenting a convex outer surface and the other or inner side surface being concave and merging with a substantially flat surface carried to the leading arcuate extremity of said median and forming a substantially sharp end, the portion with said dissimilar median being formed by a substantially smooth continuation of the outer convex surface carried to the median, the inner surface of said portion being formed by a reverse from said concave surface into a convex surface substantially oppositely complementary to the outer surface to determine with said opposite outer surface the dissimilar median.

2. A bonded abrasive block as in claim 1 wherein the dissimilar median is substantially straight.

3. A bonded abrasive block as in claim 1 wherein one extremity is a substantially sharp end and wherein the dissimilar median is arcuate on a greater radius than the median of said other end portion.

4. A bonded abrasive block as in claim 1 wherein one extremity is a substantially sharp end and the other extremity is a substanttially sharp end.

5. A bonded abrasive block of pseudo hysteresis shape having a bottom grinding surface with side surfaces perpendicular thereto shaped to provide between them a median which is of hysteresis curvature, one of said side surfaces presenting a convex outer surface and the other side surface being concave and merging with a flat plane carried to an end of said median and forming a substantially sharp edge, said other end being formed by a substantially smooth continuation of the outer convex surface carried to the median, the inner surface of said other end being formed by a reverse from said concave surface into a convex surface to determine said hysteresis median.

6. A bonded abrasive block as in claim 5 wherein one extremity is a substantially sharp end and the other extremity is a substantially sharp end.

7. An abrasive disc comprising a wheel body for rotation about an axis and having a plurality of bonded abrasive projections, each of said abrasive projections being of relatively long extent in the general direction of its travel around said axis and cooperatively located, said projections being positioned in circular echelon and disposed with one end of one projection radially inward of the adjacent end of the next projection, said inward ends being directionally the leading ends and the outward ends being the trailing ends of each of the projections; the median of the leading portion of each projection extending from the position of widest divergence of the arcuate side surfaces of said projection to the leading end of said projection being arcuate in the direction of travel and inclined toward the axis of said disc establishing thereby said circular echelon relation and merging at said position of widest divergence into a flatter median in said trailing portion whereby to provide substantial clearance between the projections for the centrifugal clearance of debris incident to grinding.

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