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SEGMENTAL GRINDING WHEEL

Filed Jan. 7, 1924

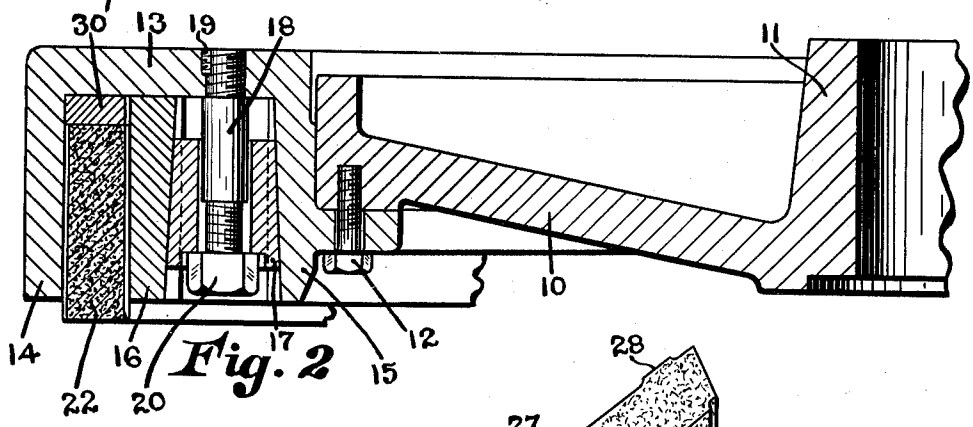



Fig. 2

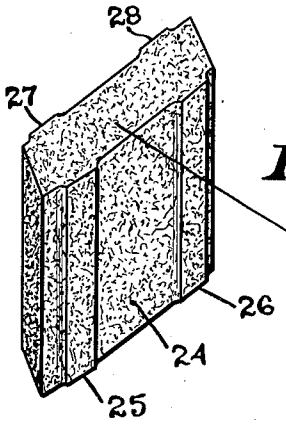
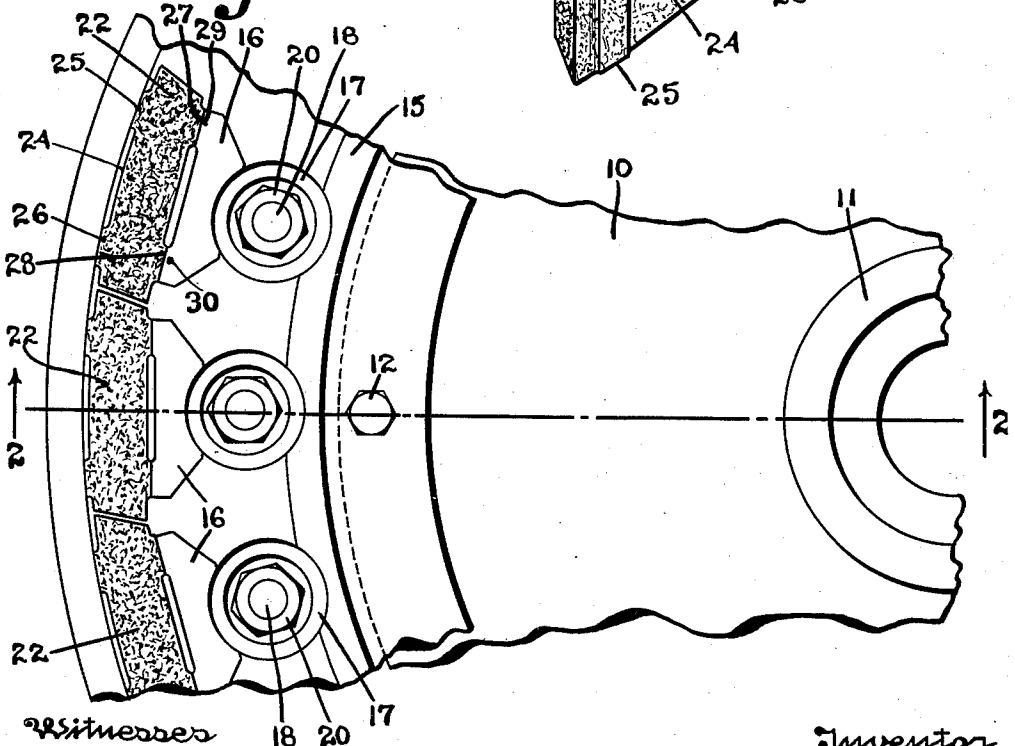



Fig. 3

Fig. 1




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# UNITED STATES PATENT OFFICE.

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## SEGMENTAL GRINDING WHEEL.

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*To all whom it may concern:*

Be it known that I, HUGO W. H. BETH, a citizen of the United States of America, residing at Worcester, in the county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Segmental Grinding Wheels, of which the following is a full, clear, and exact specification.

My invention relates to the art of abrading and more particularly to a grinding wheel made up of abrasive segments supported in a chuck to form an annular, plane grinding surface.

One type of grinding wheel, known as a ring wheel, comprises a metal chuck which has abrasive segments held between an outer annular ring or flange and inner clamping or wedging blocks. Heretofore, each segment has been made with an outer curved surface intended to fit snugly against the inner wall of the flange of the chuck, and an inner surface which is engaged throughout its extent by the adjustable wedging block. Since the abrasive segments are frequently warped during manufacture, they may not fit properly between the flange and the clamping blocks, so that they will be subjected to uneven strains when wedged in place and consequently broken. Even if not broken when initially assembled, these fragile blocks may later break during the grinding operation when the wheel is momentarily required to take a deep cut. Such breakage may mean a considerable loss to the user, hence every effort has been made to make the curved surfaces of the abrasive segments correct in shape, but due to difficulties inherent in the processes of manufacture, it has not been found possible to do so at all times.

It is accordingly an object of my invention to provide a ring wheel construction which overcomes these difficulties and particularly to so shape the abrasive segments and cooperating parts of the chuck that the forces caused by the clamping action will be transmitted directly through the segments and will not serve to break them. Further objects will be apparent in the following disclosure.

Referring to the drawings in which like reference numerals indicate like parts, I have there illustrated one embodiment of my invention, in which:

Fig. 1 is a fragmentary front elevation of a chuck carrying my abrasive segments;

Fig. 2 is a fragmentary sectional view taken approximately on line 2—2 of Fig. 1 showing how the segments are fastened in place; and

Fig. 3 is a perspective view of one of my segmental blocks.

In accordance with my invention, I propose to so form each segmental block of abrasive that compressional forces set up by clamping the block in the chuck will be transmitted directly through the block and will not break it. To this end, I propose to form lands on the segmental block which are spaced apart and will engage the inner periphery of the chuck ring, and I so form the parts that the wedging block may contact only with portions of the abrasive segment opposite such lands.

A chuck of the general type employed in connection with this invention, as illustrated in the drawings, comprises a wheel or plate 10, substantially disk shaped, which has a suitable hub 11 arranged for mounting the disk on a spindle, all of which may be constructed as is well known in the art. To the outer portion of the plate 10 is fixed by means of screws 12 a ring 13 which is so shaped as to carry the abrasive segments. This ring 13 is preferably formed with outer and inner flanges 14 and 15 projecting therefrom. The abrasive blocks are held in position against the inner periphery of the outer flange 14 by means of a set of clamping blocks 16.

Frusto-conical members 17 engaging partial conical surfaces on the blocks 16 and the inner flange 15 are provided to wedge the blocks 16 in place. These wedging members 17 are adjustably held in position

by means of studs 18 which are screw-threaded into the annular ring 13 and are locked against rotation by means of locking screws 19. The outer end of each stud 18 is threaded and provided with a nut 20, the under face of which engages a countersunk portion of the member 17. As the nut 20 is turned, the frusto-conical member 17 will be forced inwardly to wedge the block 16 against the abrasive segment 22 and clamp the latter against the annular flange 14. The central opening in each member 17 is slightly larger than the stud 18 to permit the former to shift slightly as the nut 20 is tightened.

The abrasive segments 22, which are so arranged in the chuck as to grind on their radial faces 23, are preferably formed substantially in the shape shown in Fig. 3, the outer faces 24 being preferably curved to conform substantially to the inner peripheral surface of the flange 14. The surface 24 is held out of contact with such flange by means of lands 25 and 26 formed as raised ridges on the abrasive blocks. The tops of the lands are preferably given a cylindrical curvature of such a radius as to fit the inner surface of the flange 14 so that the lands will contact therewith throughout an extensive area.

A similar set of lands or projections 27 and 28 are preferably formed on the other side of the segment directly opposite the lands 25 and 26, so that the clamping blocks 16 may contact therewith only in areas opposite those which contact with the flange 14, whereby any force applied to clamp the segment in place will be transmitted in a direct line through the segment. If desired, the clamping block 16 may be cut away centrally and provided with lands 29 and 30 which will contact with the abrasive segment only opposite the lands 25 and 26, it being understood that whether the lands are on the abrasive segments or on the blocks is immaterial so far as this invention is concerned. As illustrated, I have shown both the blocks and the abrasive segments provided with lands, but only one set is ordinarily intended to be used. The segments are otherwise so shaped that they will form a substantially continuous ring when assembled, which presents a plane face for grinding. If desired the segments may be spaced apart to form separate abrading teeth.

The manner of assembling and using this wheel will be apparent from the above disclosure. When the segments have become worn, a ring 30′ of a suitable height may be inserted to raise them sufficiently above the adjacent faces of the flange and clamping members. In order to replace one or all of the segments, it is merely necessary to loosen the wedging members 17.

It will, therefore, be seen that in accordance with this invention I so construct and arrange the parts of the wheel that the wedging pressure transmitted from the frusto-conical member 17 through the block 16 directly to the outer set of lands and to the annular flange 14 cannot crack or break the block, as might happen if the pressure were applied opposite an unsupported portion of the segment. There is no pressure against the segment throughout its middle portion and therefore no forces are applied which can break the block medially. Hence, it is immaterial whether the blocks are accurately made and whether the flanges and clamping blocks are accurately positioned, since the forces which hold the abrasive segments in place are properly localized to care for the necessary stresses set up in the ring type of wheel by clamping the abrasive segments in place.

A ring wheel of this type has many distinct advantages over solid wheels of cylindrical shape, among which may be mentioned economy and efficiency. There is more usable abrasive in the segments than in a solid wheel and the segments can be manufactured at a lower cost than a solid wheel of the same size. If a segment is accidentally broken it may be easily and cheaply replaced, whereas a solid wheel, if broken, must be discarded. By so constructing such a wheel as to prevent serious losses due to breakage, I have made it feasible to use the ring wheel to a greater extent and more efficiently than heretofore.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An abrasive segment having a plane grinding face and opposed sides adapted to be clamped in a chuck, one of said opposed sides having spaced projecting lands arranged to contact with an adjacent chuck surface.

2. An abrasive segment for use in a chuck, having a plane grinding surface and opposed sides adapted to be clamped in a chuck, one side having a set of lands projecting above the main surface thereof and the other side having a further set of projecting lands opposite to those first named, whereby the lands only will contact with opposed clamping portions of the chuck.

3. A grinding wheel comprising a disk having an annular flange thereon, a plurality of plane faced abrasive segments having projecting lands which alone contact with the flange and means including adjustable blocks to clamp said segments against the flange, said parts being so constructed and arranged that the blocks contact with the segments only opposite said lands.

4. A grinding wheel comprising a disk

having an annular flange thereon, a set of abrasive segments having projecting lands contacting with the periphery of the flange and means including an adjustable clamping block to wedge each segment against the flange, each of said segments having lands opposite those engaging the flange which alone contact with the clamping block whereby a compressional force will be transmitted directly and normally from the clamping block through the segment to the flange.

Signed at Worcester, Massachusetts, this 3rd day of Jan., 1924.

HUGO W. H. BETH.