July 29, 1924. 1,502,697

F. J. TONE

SECTIONAL GRINDING WHEEL

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Fig.1.

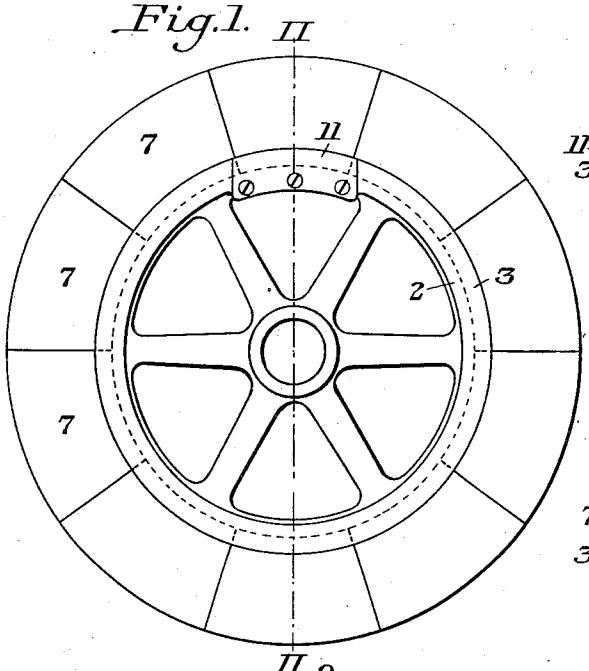


Fig.2.

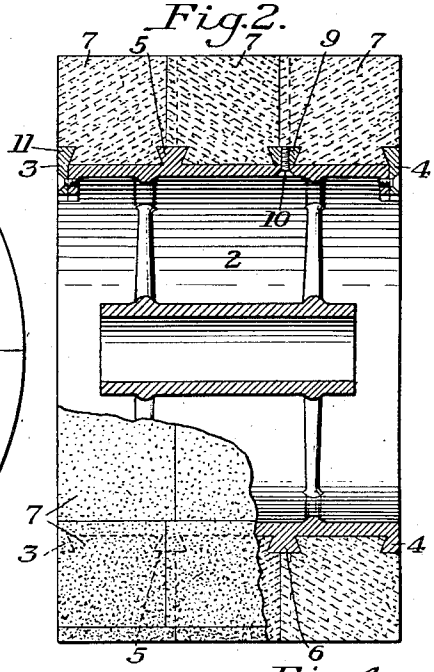


Fig.3.

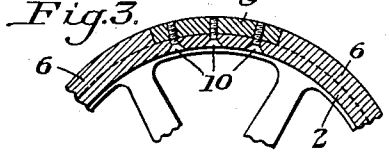


Fig.4.

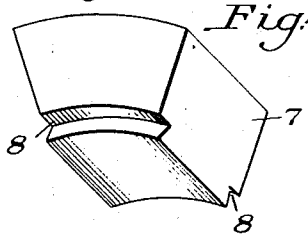


Fig.5.

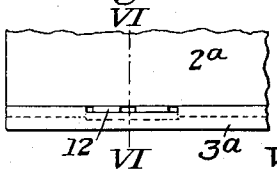


Fig.7.

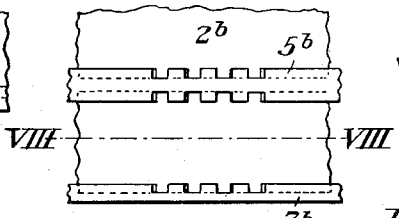


Fig.9.

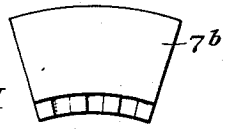


Fig.6.

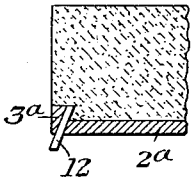


Fig.8.

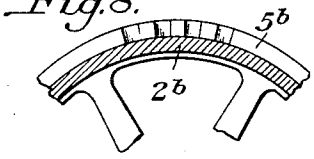


Fig.10.

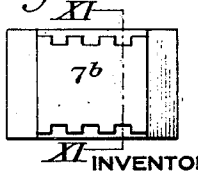
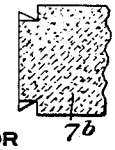


Fig.11.



INVENTOR

Frank J. Tone

by his attorneys

Byron, Webb, Burgess & Rounds

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Fig. 12.

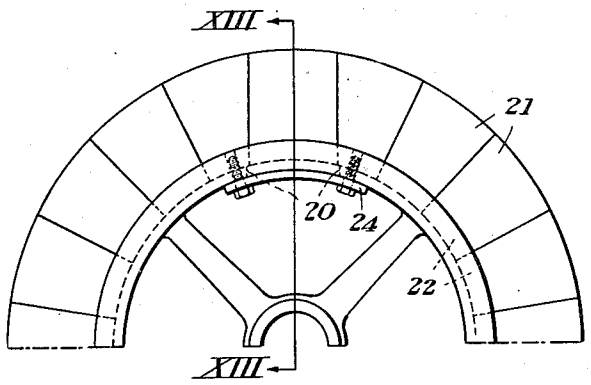


Fig. 13.

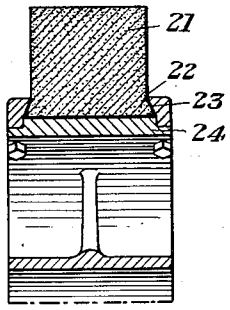


Fig. 14.

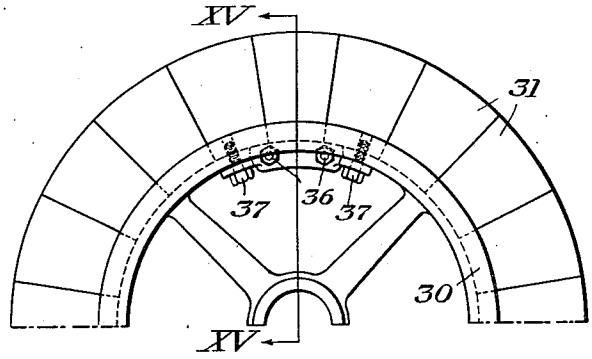
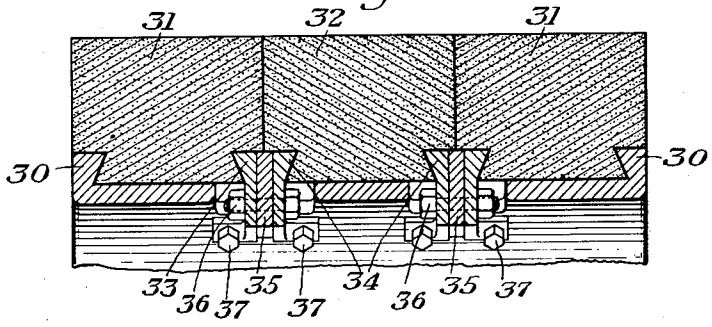


Fig. 15.



INVENTOR

Frank J. Tone

by his attorneys

Byrnes, Kubbins, Burgess & Parmelee

Patented July 29, 1924. 1,502,697

UNITED STATES PATENT OFFICE.

FRANK J. TONE, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO THE CARBORUNDUM COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF PENNSYLVANIA.

SECTIONAL GRINDING WHEEL.

Application filed February 23, 1922. Serial No. 538,823.

To all whom it may concern:

Be it known that I, FRANK J. TONE, residing at Niagara Falls, in the county of Niagara and State of New York, have invented a new and useful Improvement in Sectional Grinding Wheels, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation showing one form of grinding wheel constructed in accordance with my invention;

Figure 2 is a cross section on the line II—II of Figure 1;

Figure 3 is a partial section through the removable portion of an intermediate undercut rib;

Figure 4 is a perspective view of one of the abrasive blocks;

Figures 5 to 11, inclusive, are detail views of modified forms;

Figures 12 and 13 are an end elevation and cross section showing a modified form; and

Figures 14 and 15 are an end elevation and cross section showing another modified form.

My invention relates to sectional grinding wheels, wherein a metal drum holds segmental sections of abrasive material on its periphery. The invention is designed to provide an improved system of mounting the sections on the drum, which is especially designed for grinding wheels used in the manufacture of wood pulp, although it may be used for other purposes.

These wheels as now used for grinding wood pulp are ordinarily of natural sandstone and vary from 50 inches to 60 inches in diameter when first installed and from 20 inches to 50 inches in width. After the wheel has been worn down so that the diameter is reduced by 16 or 20 inches, the wheel is removed and scrapped.

When it is proposed to increase output, decrease power consumption and obtain other advantages of substituting the artificial abrasive for the natural sandstone, the question of expense of the wheels becomes very important and the loss in discarding grinding material not used is important. It is difficult to mold and manufacture solid walls of artificial abrasive of the size required in pulp grinding, and hence, the segmental construction has many advantages.

In the drawings, referring to the form of Figures 1, 2, 3 and 4, 2 represents the drum of iron or steel having a cylindrical outer surface and provided with circumferential flanges for gripping and holding the abrasive segments. In the form shown, this drum has two other flanges or ribs 3 and 4, and two inner or intermediate flanges or ribs 5 and 6, all of which throughout their major portions are preferably cast or otherwise made integral with the drum. The operative side faces of these flanges are preferably undercut, as shown. The abrasive blocks 7 may be molded from silicon carbide, aluminous abrasive or any other suitable abrasive, the grains of which are bonded together with a vitrified binder, or any other type of bonding material desirable therefor.

These abrasive blocks are in the form of segments and are molded with curved dovetailed recesses 8, 8, extending along the lower edge of both of the sides normal to the drum axis, these recesses engaging the corresponding undercut portions of the flanges. The space between any two flanges forms a channel containing a circular row of segmental blocks. To allow entrance of the molded blocks into these channels, I provide a gate entrance, by removing part of a flange or rib, this gate being of a length slightly greater than the base length of the block and being detachably fastened in place after the blocks are inserted.

It is possible to use a single series of segments, each segment being gripped by the outside flanges. However, in wheels of a desirable width for wood pulp grinding, the blocks in such case would be of excessive length when worn down thin and would not have proper resistance to rupture to withstand the centrifugal force or the pressure from the wood being ground.

For this reason, I prefer to employ at least three rings or segments, thus requiring two intermediate ribs or flanges, one of which is provided with the removable gate portion to allow entrance of the central line of block segments. This removable portion for the rib 6 is shown at 9 in Figure 3, being removably secured by radially extending screws 10. The removable portion 11 for the outer flange 3 is shown in Figures

1 and 2, being held by axial screws passing through an inwardly projecting flange on the drum. The same is the case with a portion of the other outer flange 4.

In mounting the segments, a segment is slid in axially through the gate of an outer detachable flange and through the gate of the inner detachable flange and into the central row. It is then slid circumferentially to its final position, these steps being continued until the central row is complete. The removable gate portion 9 is then secured in place and the outer rows filled in the corresponding manner, after which the outer gate portions are secured in place.

The segments preferably do not fit the drums closely, but space is provided for cement between the blocks and the drum, between the blocks and the flanges and also between the individual blocks. The cement may consist of molten sulphur, Portland cement or any other suitable cement. The blocks may be cemented one at a time as they are brought to place, or they may be cemented all at one time after the assembling.

The circumferential joints between the segmental blocks of the central row are preferably staggered relative to the joints of the adjacent outer rows.

The gate entrance may be formed in other ways, and I show one modification in Figures 5 and 6, Figure 6 being a cross section on the line VI—VI of Figure 5. In this form, a portion of the flange equal in length to one block segment is provided with a dovetailed recess parallel with the recess over the balance of the flange, but set away from the segment a sufficient distance to allow the segment to be inserted readily and brought to its seat on the drum. After the segments are inserted in this particular space and shoved around to position, the space between the flange and last segment may be filled up with cement or wedges, or fillers may be inserted from beneath before cementing, as shown at 12, or cap screws bearing on the segment may be used in conjunction with the cement.

A further modification is shown in Figures 7 to 11, inclusive. Figure 7 is a developed view of a portion of the surface of the drum, including one outside flange 3^b, and an intermediate flange 5^b, Figure 8 being a section on the line VIII—VIII of Figure 7. In this form, the block segments are of the shape shown in Figures 10 and 11, the base portion being formed with a short dovetail, then an equal space without a dovetail, and so on, so that the block can be readily inserted in its channel, these projections merging with the recesses of the flange. After insertion, it is then moved circumferentially to place, as before. In this modification, Figure 9 is a side view of a segment in the direction of the drum axis.

In Figures 12 and 13 is shown another modified form, in which the invention is illustrated as applied to a wheel having one circumferential row of abrasive blocks. A gate opening 20 is formed through the drum, so that the blocks 21 may be inserted from the interior of the drum through the gate opening. The blocks are pushed into place and slid around into position, being retained by the dovetailed base 22 of the blocks cooperating with the undercut flanges 23. After the blocks are inserted, the gate opening 20 is closed by the plate 24 bolted to the drum. The blocks after being put into place are cemented.

In Figures 14 and 15, is illustrated another modification in which the blocks are inserted radially from the outside of the drum. In the modification, the flanges 30 at the edge of the wheel are continuous. The intermediate flanges have cut-away portions to permit of the insertion of the blocks, being provided at these places with removable flanged sections. The blocks are inserted at the cut-away portions and are slid into place until the two opposite rows of blocks 31 are filled up. Then the blocks are inserted and the center row 32 is filled. After the rows of blocks are filled, the removable segments are inserted. Each of these removable segments comprises three parts, namely, undercut oppositely facing ribs 33 and 34, and a key 35, inserted between them. The outer undercut ribs 33 and 34 are first inserted and fitted into the dovetailed portions of the blocks. Then the key 35 is inserted and the three parts secured together by the bolts 36. The entire assembly of the flanged segment is then bolted to the drum by the bolts 37, extending through wings on the flanged sections 33 and 34. The blocks are then cemented in the usual way.

All these modifications involve a construction which will allow the insertion of the block segment to its line position and then moving the segment circumferentially to a position between the fixed flange portions where the dovetailed portions are engaged, the segment then being secured as by cementing.

The blocks are cemented in their position on the drum. In the construction shown, when the flanges are cast integrally with or permanently fastened to the drum and where the segments loosely fit the recesses or channels so as to allow their being slid around to the proper position, the cement performs an important function. When set, it causes equalizing and distributing of the stresses from centrifugal force and insures a proper fit between the segment and the drum to give support under the great pressures to which the segment is subjected on grinding. The surfaces of these blocks are more or less rough and this cementing makes it unneces-

sary for close fitting and saves considerable expense in fitting.

While my construction has been described in several forms, particularly applicable for wood pulp grinding, it may, of course, be used for any form of grinding. Furthermore, while I have shown and described undercut or dovetailed arrangements of the flanges and segments, equivalents thereof may be used. For example, I may use a square lug engaging a square recess on the segment block, or may employ lugs or flanges or curved or or other sections to engage corresponding molded recesses in the blocks. Any number of rows of blocks may be used, other means of gating or insertion may be employed, different forms of abrasives and binders may be used in forming the blocks, and other changes may be made without departing from my invention.

I claim:

1. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, and means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon.

2. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, the circumferential joints between adjacent rows being staggered, and means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon.

3. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, and dovetail means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon.

4. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, and dovetail means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon, the blocks projecting to varying distances from said means.

5. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon, the circumferential joints between adjacent rows being staggered, and means whereby blocks may be introduced at one point on the drum and slid therearound into position, said means holding the last block in the wheel after it has been introduced.

6. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows on said drum, retaining flanges at the ends of said drum for engaging the end faces of the blocks at the ends of the wheel, and an intermediate retaining flange extending circumferentially of the drum and engageable with the blocks of adjacent rows.

7. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows on said drum, retaining flanges at the ends of said drum for engaging the end faces of the blocks at the ends of the wheel, and an intermediate retaining flange extending circumferentially of the drum and engageable with the blocks of adjacent rows, at least a portion of said intermediate flange being removable to facilitate assembly of the grinding blocks on the drum.

8. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows on said drum, retaining flanges at the ends of said drum for engaging the end faces of the blocks at the ends of the wheel, and an intermediate retaining flange extending circumferentially of the drum and engageable with the blocks of adjacent rows, at least a portion of each of the retaining flanges at the ends of the drum being removable to facilitate assembly of the grinding blocks on the drum.

In testimony whereof I have hereunto set my hand.

FRANK J. TONE.