My invention relates to cast artificial grinder wheels such, for example, as are used in producing pulp stock in paper manufacture. My invention is not limited to grinder wheels of this character, but has specific application thereto because said pulp wheels are of large size, great mass and are subject to severe working conditions.

For many years it was common practice to use natural stone for producing said grinder wheels, but said stone is frequently of varying texture and has faults and provides varying abrasive surfaces and presents an operating hazard of some consequence. To provide stone with uniform grit and of homogenous structure, artificial stone has been provided. The most common form of stone is one in which said grit is bonded in cementitious material. To minimize the working hazard of such stone reinforcing material is placed therein to prevent bursting thereof under centrifugal force and working stresses. Metal loops were commonly provided for providing reinforcement but said loops, being made of metal, had a greater co-efficient of expansion than did the cementitious abrasive material. This greater expansion of the reinforcing material produced tensile strains in the cementitious material which frequently produce fissures and cracks rendering said grinder wheels unserviceable.

I have discovered that reinforcing materials can be imbedded in said grinder stone without subjecting the abrasive material to cracking strains if said reinforcing elements are made of stranded material, such for example, as wire rope. Wire rope does not elongate substantially when subject to tensile stresses but has the inherent characteristics of shortening under compression so that the difference in relative expansion of the materials does not produce rupturing strains in the stone. That is, the stranded wire rope reinforcing shortens itself to accommodate the difference in expansion of the materials under pressures less than sufficient to rupture the abrasive and cementitious body of said wheels. I preferably arrange said reinforcing material in a plurality of loops or grommets spaced laterally throughout a grinder wheel lying in an annular course spaced inwardly from the periphery of said grinder wheel. Said grommets can either be arranged in separate annular loops or may be formed of a single length formed into loops joined to the adjacent ones.

Further details of my invention are hereinafter described with reference to the accompanying drawing in which:

Fig. 1 is a transverse section through a grinder wheel embodying my invention in which the reinforcing material is shown in elevation, to illustrate its structure more definitely.

Fig. 2 is a similar elevation of a grinder wheel showing the reinforcing material as arranged in spaced separated loops and with said grinder wheel shown mounted upon a shaft held between two spaced face plates;

Fig. 3 is a perspective view showing a reinforcing element formed of a single length of wire rope arranged in a plurality of loops, as illustrated in Fig. 1;

Fig. 4 is a fragmentary section of the grinder wheel shown in Figure 2 illustrating how the ends of the reinforcing material can be spliced together to form separated loops;

Fig. 5 is a diagrammatic illustration of one form of wire rope, particularly adapted for my invention illustrating the stranded construction thereof.

A grinder wheel embodying my invention may be cast into any convenient shape and may be used for any grinding purpose. In the drawing I have illustrated a so-called pulp stone used in the manufacture of paper. Said grinder wheel a is provided with a bore b and with a central sleeve c. The central sleeve may be bolted, secured by cap screws or cast in the grinder wheel. In the accompanying drawing it is shown fastened by cap screws d.

Cast into said grinder wheel is a reinforcing element e comprising a single continuous looped strand of wire rope. Said reinforcing element is formed into four loops f joined to each other by sections f' of said reinforcing element leading spirally to the adjacent ones. The loops are preferably truly circular and are maintained into a fixed diameter by tying or binding elements g. All of said loops as well as the intermediate sections f' lie in an annular course having a breadth somewhat less than the width of the face of the grinder stone. Said course is also of smaller diameter than the peripheral diameter of the grinder stone and thus said reinforcing element lies inwardly from the periphery of the stone a substantial distance which corresponds more or less to material of said grinder stone which will be worn away in use.

The reinforcing element e preferably is made of wire cable having a central core h. Said core can be made of steel, but preferably has some factor of resiliency. Surrounding said central core are stranded wires i arranged in a plurality of strands or bunches j wound helically about said central core h. When such a wire rope is subjected to
compression lengthwise, it tends to twist slightly and be diminished in overall length. Thus, when a grinder wheel is subject to high operating temperatures and tends to elongate at said temperatures, the reinforcing element tends to expand at a faster rate and to a greater degree because of its greater coefficient of expansion. Were it not for the factor of accommodating said difference in expansion by the winding of the cable about its core and the twisting of said strands under relative compression, said grinder wheel would be subject to tensile stresses of sufficient intensity in many instances to cause slight fissures or cracks to form.

Said grinder wheel preferably is made of gritty particles bound together by cementitious material. Said material is adapted to sustain substantial compressive strains, but fractures under any substantial tensile strains. By providing wire rope as the reinforcing material, tensile strains produced by differential expansion are minimized in the grinder wheel. Bursting strains produced by centrifugal force are resisted by the reinforcing material.

In Figures 2 and 4 I illustrate how a grinder wheel c' can be carried between two face plates k upon a threaded shaft l. Said shaft is provided with two threaded sections m—m', one righthand twist, one left-hand twist. The face plates are engaged by said threaded sections and thus when they are rotated oppositely upon said threaded sections, they move towards and from each other. The bore of the central sleeve e also bears upon the shaft l intermediate said threaded section. If the wheel tends to slip within said face plates or said face plates tend to rotate relatively, the opposite hand threads cause said face plates to move towards each other and to bind the grinder wheel more tightly in place.

In said Figs. 2 and 4 I show a slight modification of my invention, namely, that the reinforcing elements are arranged in a plurality of loops or grommets a separated from each other and spaced apart. Said grommets are each formed of a length of cable approximating the size loop to be formed and the ends are spaced as at o. Said grommets are spaced apart distances substantially equal to the loops formed in the reinforcing element shown in Figs. 1 and 3. Said loops, however, being formed of separate pieces of material are not connected one with the other. The splicing of the ends of said grommets eliminates the necessity of tying or binding elements as in the previous modifications and splicing also tends to cause said ends to be tied more tightly together than is possible with tying or binding elements. I thus feel that separate loops are advantageous in this respect. Said loops are made of wire rope, as is illustrated in Fig. 5, and differ only in the manners in which said loops or grommets are formed. Likewise, the grinder wheel d' illustrated in Fig. 1 is adapted to be mounted upon a shaft and between face plates in the same manner as is illustrated in Fig. 2 with the wheel a'.

It is to be noted that the face plates k do not bear in the bore b' of the wheel c', because the inwardly projecting flange portions k' of said face plates are spaced slightly from said bore. This tends to eliminate points of contact between the wheel and the face plate and tends to cause said face plate to engage the sides of the wheel more securely, more definitely and to eliminate the possibility of a mechanical imperfection disturbing the operating plane of said grinder wheel.

I claim:

1. In a cast grinder wheel of the character described, a wire rope tension member comprising a plurality of helically twisted strands, said member being embedded in said wheel in an annular course spaced from the periphery of said wheel.

2. In a cast grinder wheel of the character described, a wire rope tension member embedded in said wheel in an annular course spaced from the periphery of said wheel, said wire rope comprising a plurality of helically twisted strands wound about a central core.

3. In a cast grinder wheel of the character described, a wire rope tension member embedded in said wheel in an annular course spaced from the periphery of said wheel, said wire rope comprising a plurality of helically twisted strands wound about a central core of more or less resilient material.

4. In a cast grinder wheel of the character described, a wire rope tension member comprising a plurality of helically twisted strands, said member being embedded in said wheel in an annular course spaced from the periphery of said wheel, said tension member comprising a plurality of grommets spaced laterally apart, said grommets being formed of a single length of wire rope, said wire rope having a central core of more or less resilient material.

5. In a cast grinder wheel of the character described, a wire rope tension member comprising a plurality of helically twisted strands, said member being embedded in said wheel in an annular course spaced from the periphery of said wheel, said tension member comprising a spirally wound length of material including a plurality of loops spaced apart at equal lateral intervals, said wire rope having a central core of more or less resilient material.

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