ABRASIVE DISC AND COOLANT ARRANGEMENT

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Abrasivé Disc and Coolant Arrangement

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This invention is in the field of grinding discs and is concerned with a grinding disc with an improved coolant flow arrangement.

A primary object of the invention is a grinding disc with a circular coolant chamber that extends outwardly to a point close to the edge of the disc and provides 360° of coolant flow through the disc face.

Another object is a coolant flow pattern which will not cause erosion of the abrasive disc itself.

Another object is a grinding disc having a plurality of grit clearance holes which are automatically cleared.

Another object is a coolant arrangement for a grinding disc which insures that the coolant will come through the face of the disc in as finely a divided form as possible so that the entire area of the disc in engagement with the workpiece will be lubricated.

Another object is a self-feeding coolant arrangement for an abrasive disc.

Other objects will appear from time to time in the ensuing specification and drawings in which:

FIGURE 1 is a perspective of a grinding disc according to the invention; and

FIGURE 2 is a radial section, on an enlarged scale, of half of the disc in FIGURE 1.

In the drawings, a grinding disc 10 includes a round or circular backing or back plate 12 which is suitably mounted on a spindle for rotation in any suitable grinding machine, vertical, horizontal or otherwise, about an axis 14. The backing plate carries an abrasive disc in the form of a ring or annulus 16 having a center hole 18. Coolant is introduced along the axis 14 of the spindle by a suitable connection, not shown, to a water inlet 20. The front face of the backing plate is relieved a suitable amount, for example a few thousandths of an inch, as at 22, except around the edge at 24. This is to say that the relieved area 22 is continuous or extends through 360° circumferentially and extends out radially in all directions to a point closely adjacent to the outer peripheral edge of the backing plate.

An intermediate or closure or manifold plate 26 is mounted on the front face of the backing plate and is positioned between the backing plate and the abrasive disc 16. A plurality of bolts 28 or the like extend through suitable openings 30 in the backing plate and are connected to nuts 32 suitably molded or formed in the abrasive disc.

An abrasive disc 16 of this type normally has a plurality of axially disposed openings 34 for grit clearance which stop in the backing or unmovable portion 36 of the disc. But in this case the openings 34 are extended at 38 through the movable portion 36 so that, in effect, I provide a plurality of passages all the way through the disc.

The intermediate or manifold plate 26 is provided with spray openings or jets 40 aligned with the passages 34—38 through the abrasive disc and the jet openings 40 open into the coolant chamber defined between the backing and manifold plates.

To provide a full support for the entire abrasive disc, I weld or otherwise suitably connect washers 42 around the bolt openings in the backing plate so that each of the bolts will pull the abrasive disc up against a firm solid foundation, the washers 42 being as thick as the amount of relief used in forming the coolant chamber.

The use, operation and function of the invention are as follows:

I provide a grinding disc having an abrasive disc on its front face and a coolant chamber extending outwardly from a centrally located inlet to provide a coolant flow through the grinding face of the disc. The coolant comes out through the front face of the abrasive disc in a finely divided uniform pattern. While I prefer that all of the passages through the abrasive disc be provided with a corresponding jet or spray opening through the manifold plate, nevertheless, certain passages might be closed and others open to provide any desired coolant flow pattern. This is to say that every passage through the abrasive disc does not have to have a corresponding opening into the coolant chamber.

The particular structure shows that the coolant chamber in the backing plate provides full free outward flow of coolant and that at the same time the coolant does not contact or otherwise flow against any part of the abrasive disc itself until it squirts through the jet openings 40. I might provide some sort of a seal between the outer edge 24 of the backing plate and the manifold plate 26, but the bolts 28 will normally draw the parts together sufficiently tightly to provide an adequate seal.

The jet action of the coolant through the abrasive passages will insure that all of the passages are kept clear of foreign matter, grit and the like, and the centrifugal force of the rotating disc also insures that the coolant from each of the abrasive disc passages 34 will move radially outwardly along the disc face so that the entire surface of the disc face will be fully and uniformly lubricated. Also, the rotation of the wheel causes the lubricant to be thrown or forced outwardly in the coolant chamber by centrifugal force. Thus, the system is self-feeding.

While I have shown the coolant chamber formed by relieving the surfaces of the backing plate, and this is the preferred way since the backing plate is heavier and, therefore, easier to work with, nevertheless, the face of the intermediate or manifold plate might be relieved instead. Or both might be relieved somewhat, if desired. In any event, the washers 42 should compensate for the thickness of the coolant chamber so that when the bolts 28 take up on the disc, the nuts 32 will not be pulled out of the disc.

The term "grinding disc" as used herein refers to an abrasive disc and either or both may be used herein and in the claims. While I have stated that the system is self-feeding, a coolant pump could also be used. But, in any event, this particular structure has a self-feeding tendency and may or may not be totally self-sustaining.

While I have shown a center hole 18, the invention could be used with an abrasive disc that does not have a center hole. In short, the center hole in the abrasive disc is not important to the invention.

While I have shown and described the preferred form of my invention, it should be understood that suitable modifications, changes, substitutions and alternations may be made without departing from the invention's fundamental theme. I, therefore, wish that the invention be unrestricted, except as by the appended claims.

I claim:

1. In a grinding machine, a grinding disc adapted to be mounted on the spindle of a grinding machine and having a backing plate with an axially located coolant inlet, the front surface of the backing plate being relieved to provide a coolant chamber extending outwardly in a radial direction from the coolant inlet and having a continuous circumferential outer axially pro-
jecting edge adjacent the peripheral edge of the supporting plate to provide approximately 360° of outward radiation of the coolant from the coolant inlet, a non-abrasive intermediate plate generally coextensive with the backing plate mounted over and closing the relieved area of the backing plate's front surface and abutting the projecting edge to thereby define the coolant chamber therewith, an abrasive disc separate from but mounted on the intermediate plate and having a plurality of openings therethrough, and a plurality of corresponding openings in the intermediate plate aligned with the openings in the abrasive disc to provide communication between the coolant chamber and the disc openings.

2. The structure of claim 1 further characterized by and including a plurality of bolts through the backing plate and intermediate plate and extending into the abrasive disc holding them together, and a plurality of spacing washers in the coolant chamber around at least some of the bolt holes to provide a solid support for the abrasive.

References Cited in the file of this patent

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