

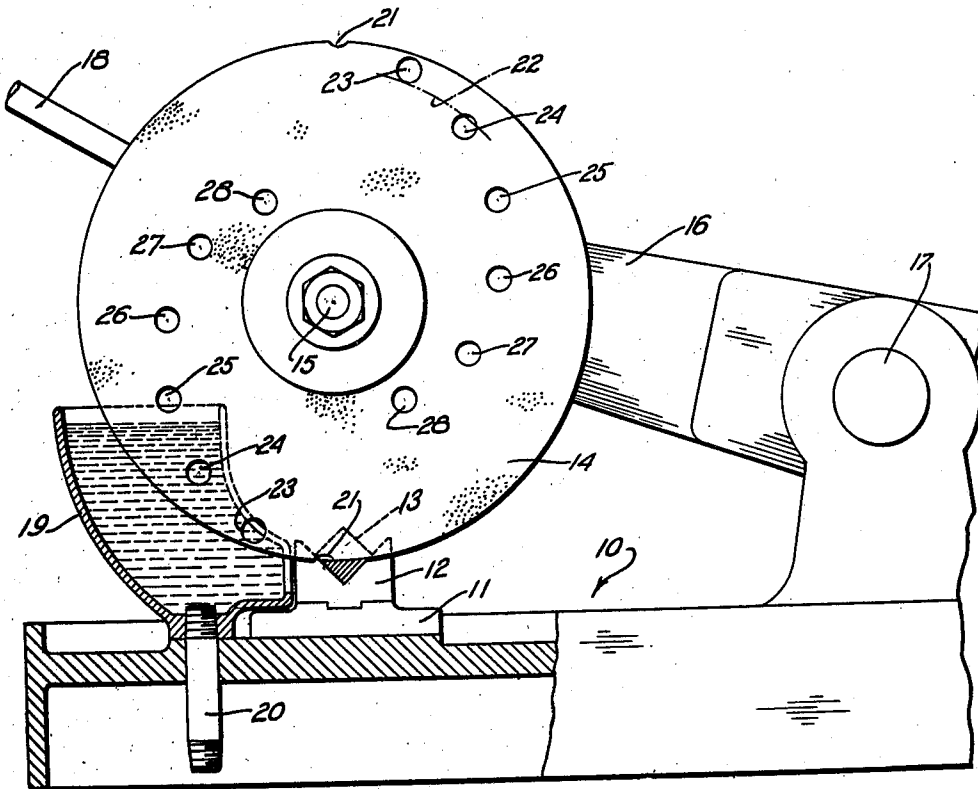
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ABRASIVE WHEEL

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ABRASIVE WHEEL

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8 Claims. (Cl. 51—98)

This invention relates to new and useful improvements in abrasive wheels such as are used in cutting machines.

It has been found that in cutting work with an abrasive wheel it is possible to obtain quicker, smoother and cleaner cutting if a liquid coolant is supplied to the cutting region. In one form of abrasive cutting machines the work is completely submerged in the coolant (see my Patent 1,969,238) while in another form complete submergence is avoided and the coolant is applied in a stream to the cutting region. In the latter form of machine it is a common practice to apply the coolant to opposite sides of the wheel so that the coolant will be carried by the wheel to the cutting region and will be thrown by centrifugal force into the cut.

There is some difficulty in applying sufficient coolant to the cutting region when the wheel is rotated at high speed. This difficulty is present even when the work is submerged because the abrasive wheel tends to drag air into the cut when driven above certain velocities. The resultant insufficiency of coolant at the cutting point causes overheating of the work and glazing of the wheel and vulcanization of the wheel when the latter is rubber bonded. To overcome this difficulty my invention provides a wheel which will carry more of the coolant into the cut than has been possible with wheels as heretofore constructed, and as a result my improved wheel may be driven at a higher velocity, thereby insuring greater cutting speeds.

Another object of the invention is to provide an abrasive wheel with means which serve as pockets to catch a portion of a liquid while passing there-through and carry it into a cut being made.

A more specific object is to provide an abrasive wheel with one or more recesses in the periphery thereof which will serve as pockets to catch liquid and carry it into the cut.

Abrasive wheels wear down in service and obviously any recess formed in the periphery of the wheel would in time be obliterated by the reduction in diameter of the wheel. It is, therefore, a further object of the invention to provide a wheel with a series of holes spaced at successive shorter distances from the wheel center so that as the wheel wears the holes will successively break through and provide recesses in the periphery of the wheel. Preferably the holes are arranged in successive overlapping relation so that before one recess is completely obliterated by wear another recess breaks through the periphery of the wheel.

One of the advantages of providing a break in the cutting edge of an abrasive wheel is that such interruption reduces the tendency to glaze the cutting edge and thereby retains the sharp cutting points of each particle of grit in the periphery of the wheel. Thus, while a primary object of the invention is to provide a cutting wheel which will carry an extra supply of coolant into the cut, my invention is not limited to such use but may be employed also with dry cutting machines (see my Patent 2,009,859) in which the recesses serve not to carry coolant into the cut but solely to prevent glazing of the cutting edge of the wheel.

Other objects and advantages will become apparent from a consideration of the following description taken in connection with the accompanying drawing wherein there is shown a satisfactory embodiment of the invention. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the accompanying drawing, I show a portion of an abrasive cutting machine partly in section and equipped with an abrasive wheel embodying the invention.

Referring in detail to the drawing the machine shown comprises a bed 10 mounting a support 11 for a V-block work holder 12. A piece of work 13 is shown in the work holder 12 and is held therein in any suitable manner, as by any or the usual clamping means (not shown). Mounted for movement into cutting engagement with the work is an abrasive wheel 14 removably secured to a spindle 15 journaled in an arm 16 pivotally mounted at 17 and adapted to be rocked about such pivot so as to carry the wheel toward and from the work. Spindle 15 is driven in any suitable manner (not shown) and is rotated in a counter-clockwise direction as viewed in the drawing. Arm 16 is moved in any suitable manner as by manual manipulation of a lever 18.

Mounted on the bed 10 adjacent the support 11 is a coolant box 19 into which water or other liquid coolant is pumped or supplied from any desired source through a tube 20. The box 19 is so located that as the wheel rotates it passes through the box, the latter being open at the top and the front side, the opening through the front side being in the form of a slot slightly wider than the thickness of the wheel.

It is noted that the box is on that side of the

wheel which is moving toward the work. Obviously the coolant wets both faces of the wheel and passes out of the box with the wheel to the work 13, being thrown centrifugally into the cut by the rotation of the wheel. The liquid in the box 19 need not be under pressure but the supply should be such that a substantial volume of the liquid is present in the box at all times when the machine is in operation so as to keep the sides of the wheel wet.

In the periphery of the wheel 14, preferable at diametrically opposite points, are recesses 21 which interrupt the circular continuity of the periphery. These recesses form pockets to pick up a quantity of the coolant in addition to that which is obtained by wetting opposite surfaces of the wheel. Therefore, more coolant is thrown into the cut than is possible with a wheel having an uninterrupted periphery. As the wheel wears down to the circle indicated by the broken line 22 the recesses 21 will be completely obliterated.

However, there is a pair of holes 23 which intersect the circle 22 and hence before the recesses 21 are completely obliterated the periphery of the wheel will break through into these holes 23 thus forming new recesses. Similarly holes 24, 25, 26, 27 and 28 are provided at respectively shorter radial distances from the axis of the wheel but in such disposition that as the wheel wears down and obliterates the recesses provided by one pair of holes it will break through into the next inner pair of holes. Thus, no matter to what extent the wheel wears down there will always be a break in the periphery of the wheel until the innermost pair of holes 28 has been obliterated and the wheel will then be too small in diameter to be of further service.

As shown in the drawing, the holes in the wheel are disposed along a pair of spiral lines but obviously this particular pattern of holes may be varied at will, it being merely necessary to dispose the holes in any arrangement comparable with strength. It will be apparent that the number of holes provided in the wheel may be varied in accordance with its diameter and in accordance with the diameters of the holes.

While in the drawing, I have shown the periphery interrupted at two diametrically opposite points, obviously, a single recess could be employed or more than two recesses might be provided. It is desirable, however, that where more than two recesses are provided that they should be symmetrically disposed so as to avoid any unbalanced effect. Also where but a single recess is provided it is preferred that the holes be arranged in spirals at opposite sides of the wheel center but with the holes of the respective spirals so located relatively that as the wheel wears the recesses are formed alternately at opposite edges of the wheel.

I have shown my invention as applied to a wet cutting machine but as explained above the wheel can also be used with a dry cutting machine or with a machine in which the work is completely submerged.

In a wet cutting machine and also to some extent in a submerged type cutting machine the holes which have not yet cut through the periphery play an important part, because these holes also form pockets and pick up liquid as they pass through the coolant and due to centrifugal force such liquid is compelled to flow toward the periphery of the wheel, thus keeping the periphery and also the sides of a cut plentifully supplied with coolant,

It will therefore be apparent that certain desirable results will be obtained if the holes are spaced radially a distance such that they do not overlap. Although it is preferred that the holes be arranged in overlapping relation, if they are not a solid periphery will be presented to the work when one recess is obliterated and before the next hole breaks through. However, it will be apparent that the unbroken holes will function to supply coolant to the periphery of the wheel and in addition should the periphery of the wheel glaze it will be cleaned when the next hole breaks through. This is true since as each hole breaks through it provides a point at which the wheel starts cleaning itself and the wheel is therefore maintained with a clean straight across edge.

Having thus set forth the nature of my invention, what I claim is:—

1. A cutting wheel of the character described, comprising a thin cutting disc of not over three-eighths inches in thickness and of abrasive material of substantially uniform thickness having a peripheral cutting edge adapted to be worn down during use, said disc having a recess formed in the periphery thereof and having also a series of holes extending transversely therethrough, the recess and the holes being disposed at different radial distances from the center of the disc and each radial distance differing by less than a hole diameter from the next larger radial distance.

2. A cutting wheel of the character described, comprising a thin cutting disc of not over three-eighths inches in thickness and of abrasive material of substantially uniform thickness having a peripheral cutting edge adapted to be worn down during use, said disc having a recess form in the periphery thereof and having also a series of holes extending transversely therethrough, the recess and the holes being disposed at different radial distances from the center of the disc, each radial distance differing by less than a hole diameter from the next larger radial distance, the holes being arranged in a spiral series.

3. A cutting wheel of the character described, comprising a thin cutting disc of not over three-eighths inches in thickness and of abrasive material of substantially uniform thickness and having a peripheral cutting edge adapted to be worn down during use, said disc having a pair of diametrically opposed recesses formed in its periphery, the disc having also pairs of diametrically opposed holes extending transversely therethrough, the holes of each pair being at the same radial distance from the center of the disc but the radial distances of the pairs of the holes and of the pair of recesses differing from each other successively by less than the hole diameters.

4. A cutting wheel of the character described, comprising a thin cutting disc of not over three-eighths inches in thickness and of abrasive material of substantially uniform thickness having a plurality of recesses symmetrically disposed in its periphery and having sets of symmetrically disposed holes extending transversely through it at different radial distances from its center, such radial distances of the holes of the sets and of the recess and the holes being disposed at different less than the hole diameters.

5. In a machine of the character described, 70 means for supporting a piece of work to be cut, a thin abrasive wheel not over three-eighths inches thick having a peripheral cutting edge adapted to be worn down during use, means for rotating the same, means for causing 75

relative bodily movement of the wheel and work to cut the work, and means for supplying the wheel with a liquid coolant, the wheel being formed with a peripheral recess and with a hole
5 extending transversely therethrough to carry the liquid into the cut.

6. In a machine of the character described, means for supporting a piece of work to be cut, a thin abrasive wheel not over three-eighths
10 inches in thickness and having a peripheral cutting edge adapted to be worn down during use, means for rotating the same, means for causing relative bodily movement of the wheel and work to cut the work, and means for submerging
15 the wheel in part in a liquid coolant, the wheel being formed with a peripheral recess and with a hole extending transversely therethrough to carry the liquid into the cut.

7. In a machine of the character described,
20 means for supporting a piece of work to be cut, a thin abrasive wheel not over three-eighths inches in thickness and having a peripheral cutting edge adapted to be worn down during use,

means for rotating the wheel, means for causing relative bodily movement of the wheel and work in the plane of rotation of the wheel to cut the work, and means for supplying the wheel with a liquid coolant, the wheel being formed
5 with peripheral recesses and with holes extending transversely therethrough to carry the liquid into the cut, the holes being in such position that in service the periphery of the wheel will wear through into said holes to form new
10 peripheral recesses before the first-named recesses are obliterated.

8. A cutting wheel of the character described, comprising a thin cutting disc of not over three-eighths inches in thickness and of abrasive ma-
15 terial of substantially uniform thickness having a peripheral cutting edge adapted to be worn down during use, said disc having a recess formed in the periphery thereof and a hole extending transversely therethrough in such position that
20 in service the periphery of the disc will wear through into said hole to form a new recess.

HARRY G. ROBINSON.

CERTIFICATE OF CORRECTION.

Patent No. 2,047,649.

July 14, 1936.

HARRY G. ROBINSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 68, claim 4, strike out the words "recess and the holes being disposed at different" and insert instead recesses differing from each other successively by; line 73, claim 5, strike out "recesses differing from each other successively by" and insert instead the words and syllable inches in thickness and having a peripheral cut-; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of December A. D. 1936.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.