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WATER STABILIZED CUTTING WHEEL

Filed Feb. 17, 1960

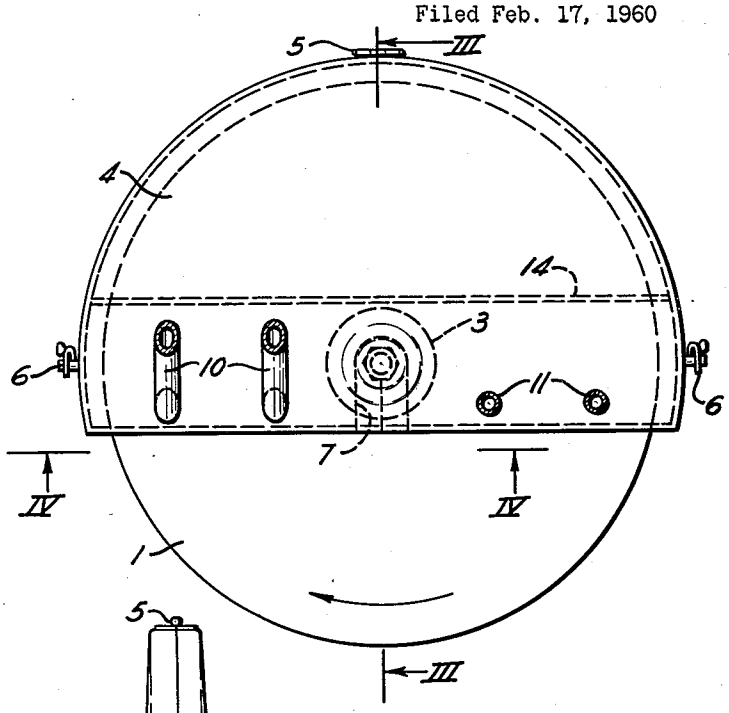



Fig. 1

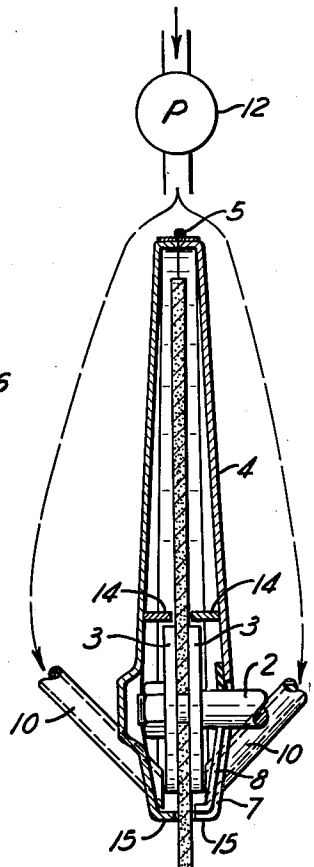



Fig. 3

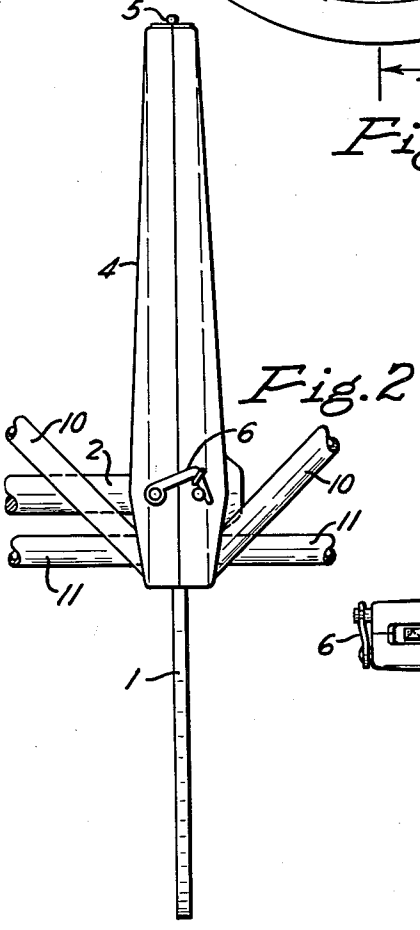



Fig. 2

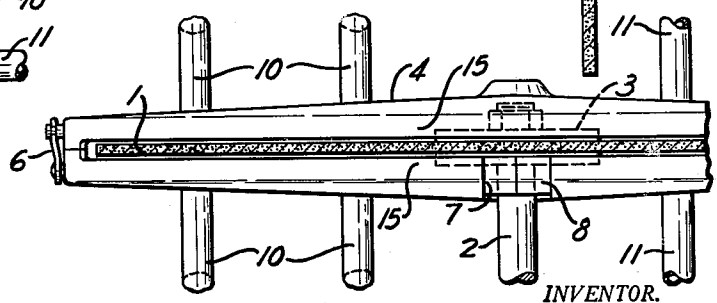



Fig. 4

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# WATER STABILIZED CUTTING WHEEL

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This invention relates to rotary cutters, and more particularly to stabilization of the cutting wheels.

The abrasive wheel industry has set up safety specifications, according to which manufacturers of abrasive cutters at the present time are supplying equipment in which the flange supports that clamp a cutting wheel on an arbor having a diameter at least ⅓ as great as the diameter of the wheel. Thus, an 18 inch wheel uses flanges of 6 inch minimum diameter, leaving a maximum width of 6 inches of wheel around the flanges. Such large flanges are recommended in order to reinforce and stabilize the abrasive wheels so that they will not flutter or bend and break. An obvious disadvantage of large flange supports is that a large central area of each wheel cannot be used, but must be scrapped when the wheel wears down. Also, in order to make a deep cut, a larger diameter wheel must be used than would be the case if the flanges were smaller.

It is among the objects of this invention to provide an abrasive cutter, in which smaller flange supports can be used than heretofore, in which the cutting wheel is stabilized even though it is supported by small flanges, and in which the wheel and the work being cut are cooled satisfactorily whether the wheel is moved forward or backward across the work.

In accordance with this invention an abrasive cutting wheel has its central portion clamped between circular flange supports mounted on a substantially horizontal arbor so that the wheel will be rotated by the driven arbor. The upper half of the wheel is enclosed by a narrow casing, having directly below the clamping flanges inturned lower edges that are spaced a short distance from the opposite sides of the wheel. At opposite sides of the arbor, each side of the casing is provided with openings that are substantially on the same level as the bottom of the flange supports. Means are connected to those openings for continually directing jets of water directly against opposite sides of the wheel under substantially uniform pressure as it rotates. The water directing means include pipes mounted in the casing openings and preferably adjustable toward and away from the wheel. Also, it is desirable that the pipes adjacent the upwardly traveling portion of the wheel be inclined downwardly toward the wheel. Performance of the wheel is improved if baffle strips are secured to the inside of the casing and extend across the wheel close to it directly above the clamping flanges.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a side view of my cutter;

FIG. 2 is an enlarged end view thereof;

FIG. 3 is an enlarged vertical section taken on the line III—III of FIG. 1; and

FIG. 4 is an enlarged fragmentary horizontal section taken on the line IV—IV of FIG. 1.

Referring to FIGS. 1, 2 and 3 of the drawings, a thin, abrasive cutting wheel **1** is clamped onto the overhanging end of an arbor **2** between a pair of relatively small annular discs **3** called flange supports. This is the conventional mounting, except that the flanges are smaller in relation to the size of the wheel than those commonly in use, whereby the radial distance between the flanges and the periphery of the wheel is materially greater than heretofore. The upper half of the wheel is enclosed by a



narrow casing **4**, which most suitably is made in two parts connected together at the top by a hinge **5** and at front and back by hooks **6**. The two halves are made to fit together as tightly as possible. The upper wall of the casing is closely concentric to the wheel and is located only a short distance from it. The casing extends only a very short distance below the flange supports **3**. If it extended down an appreciable distance below those supports, they might just as well be made longer in the first place, because only the portion of the wheel that projects below the bottom of the case can be used. One side of the casing is provided with a narrow vertical notch **7** (FIG. 3) that receives the arbor and that is closed by a flexible sealing strip **8** of rubber or the like cemented to the inside of the casing. The sealing strip is provided with an opening that snugly receives the arbor, and the strip is slit from that opening down to its lower end so that it can be passed down over the arbor when the casing is fitted over the wheel. The casing is supported by any suitable means (not shown).

An abrasive cutting wheel having flange supports that are so small in relation to the size of the wheel is unstable. That is, the lower portion of the wheel tends to vibrate sideways or flutter, which leads to breakage of the wheel. To prevent such breakage by causing the wheel to run true is the purpose of this invention. Accordingly, the wheel is stabilized by streams or jets of water that are directed against its opposite sides continually. The jets engage each side of the wheel at opposite sides of the arbor at about the same level as the bottom of the flange supports. This is because it is desirable to have the stabilizing water strike the wheel as close to the work as possible, where it is needed most for preventing flutter due to strains on the wheel as it cuts.

The water is delivered to the inside of the case through openings in its opposite sides, the number of openings in each side depending on the diameter and flexibility of the wheel. Four openings are shown in the drawings for the wheel illustrated there. Inserted in the openings are pipes **10** and **11** that preferably are slidable in the opening so that the pipes can be adjusted toward and away from the wheel to obtain the best results. They generally should be from 1/16 to ⅛ inch from the wheel. Water under pressure is delivered to all of the pipes under substantially the same pressure from a pump **12** (FIG. 3) disposed in a suitable location. The equal pressure of water on both sides of the wheel holds it flat and steady and thereby causes it to run true as it cuts.

Since the stabilizing water is also relied upon to cool the cutter and the metal being cut, it is preferred to mount baffles in the casing to help force the water down over the wheel and to break up the air stream that tends to dissipate the water. The baffles are horizontal strips **14** secured to the inside of the case at opposite sides of the wheel and they extend across it. These baffles also help a body of water to build up in the casing between them and the lower edges of the casing, which are turned inward to form flanges **15** that approach closely to the opposite sides of the wheel. If the area of the casing between the baffles and flanges **15** can be kept full of water under pressure, the wheel can be stabilized more effectively.

The wheel and arbor are rotated continuously in only one direction, and generally are mounted so that they can be moved back and forth across the work being cut. As the wheel is moved forward, which is to the right in FIG. 1, the water in the casing readily pours down into the front end of the cut because the downwardly moving front portion of the wheel aids the downward flow of water. However, when the wheel is moving in the opposite direction, the wheel's upwardly moving portion, which now leads,

tends to carry the water up into the case and thereby reduce its flow down into the cut. To help compensate for this condition the pipes **10** beside the up-going portion of the wheel may be inclined downwardly toward the wheel. A 45° angle is satisfactory but not necessary. The water issuing from these inclined pipes will be directed down out of the casing so that the wheel will not be able to carry much of it up past baffles **14**. Consequently, the hottest part of the cut will be flooded with water on both the forward stroke and back stroke of the wheel. Of course, all of the water escaping from the casing through the narrow slots at its bottom flows down over the opposite sides of the wheel to help cool it.

An abrasive cutter as disclosed herein enables cutting to be done more cheaply than heretofore, because any given cutting wheel can be used longer and can cut more deeply due to the small size of the flange supports. Such small flanges can be employed, because the wheel is stabilized by water. It also is suported better and more evenly. On account of the greater life of the wheel, less time is lost in replacing worn or broken wheels.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An abrasive cutter comprising a rotatable substantially horizontal arbor, spaced circular flange supports mounted on the arbor, an abrasive cutting wheel mounted on the arbor and having only its central portion clamped between said flange supports for rotation with the arbor, a narrow casing enclosing the upper half of the wheel and having directly below said flanges inturned lower edges spaced a short distance from the opposite sides of the wheel, each side of the casing being provided with openings at opposite sides of said arbor substantially on a level with the bottom of said flanges, and means connected with said openings for continually directing jets of water directly against the opposite sides of the wheel under substantially uniform pressure to stabilize the wheel.

2. An abrasive cutter comprising a rotatable substantially horizontal arbor, spaced circular flange supports mounted on the arbor, an abrasive cutting wheel mounted on the arbor and having only its central portion clamped between said flange supports for rotation with the arbor, a narrow casing enclosing the upper half of the wheel and having directly below said flanges inturned lower edges spaced a short distance from the opposite sides of the wheel, baffle strips secured to the inside of the casing and extending across the wheel close to it directly above said flanges, each side of the casing being provided below said baffles with openings at opposite sides of said arbor substantially on a level with the bottom of said flanges, and means connected with said openings for continually directing jets of water directly against the opposite sides of the wheel under substantially uniform pressure to stabilize the wheel.

3. An abrasive cutter comprising a substantially horizontal arbor rotatable in one direction, spaced circular flange supports mounted on the arbor, an abrasive cutting wheel mounted on the arbor and having only its central portion clamped between said flange supports for rotation with the arbor, means for moving the arbor and wheel back and forth in the plane of the wheel, a narrow casing enclosing the upper half of the wheel and having directly below said flanges inturned lower edges spaced a short distance from the opposite sides of the wheel, each side of the casing being provided with openings at opposite sides of said arbor substantially on a level with the bottom of said flanges, and means connected with said openings for continually directing jets of water directly against the opposite sides of the wheel under substantially uniform pressure to stabilize the wheel, said means including pipes mounted in said openings, the pipes adjacent the upwardly traveling portion of the wheel being inclined downwardly toward the wheel.



4. An abrasive cutter comprising a substantially horizontal rotatable arbor, spaced circular flange supports mounted on the arbor, an abrasive cutting wheel mounted on the arbor and having only its central portion clamped between said flange supports for rotation with the arbor, a narrow casing enclosing the upper half of the wheel and having directly below said flanges inturned lower edges spaced a short distance from the opposite sides of the wheel, each side of the casing being provided with openings at opposite sides of said arbor substantially on a level with the bottom of said flanges, and means connected with said openings for continually directing jets of water directly against the opposite sides of the wheel under substantially uniform pressure to stabilize the wheel, said means including pipes slidably mounted in said openings for adjustment toward and away from the wheel.

5. An abrasive cutter comprising a substantially horizontal rotatable arbor, spaced circular flange supports mounted on the arbor, an abrasive cutting wheel mounted on the arbor and having only its central portion clamped between said flange supports for rotation with the arbor, a narrow casing enclosing the upper half of the wheel and having directly below said flanges inturned lower edges spaced a short distance from the opposite sides of the wheel, each side of the casing being provided with openings at opposite sides of said arbor substantially on a level with the bottom of said flanges, and means connected with said openings for continually directing jets of water directly against the opposite sides of the wheel under substantially uniform pressure to stabilize the wheel, said means including pipes slidably mounted in said openings, the pipes adjacent the upwardly traveling portion of the wheel directing downwardly inclined jets toward it, and the pipes at the opposite side of the arbor directing substantially horizontal jets against the wheel.

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