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V. A. KOLESH

3,420,007

ABRASIVE TOOL

Filed July 11, 1966

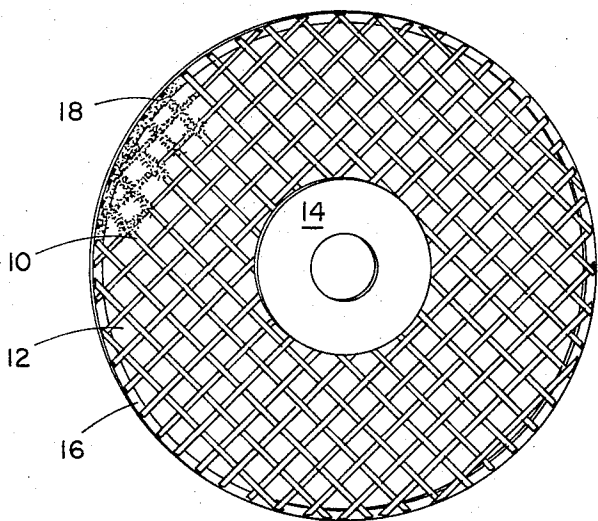


FIG 1

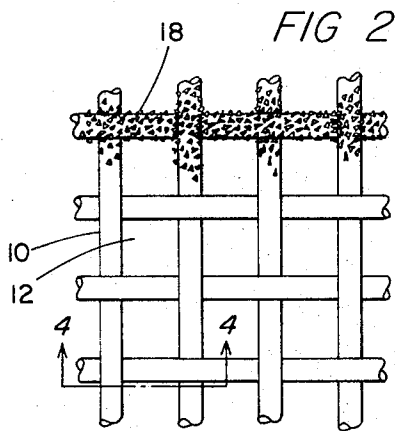


FIG 2

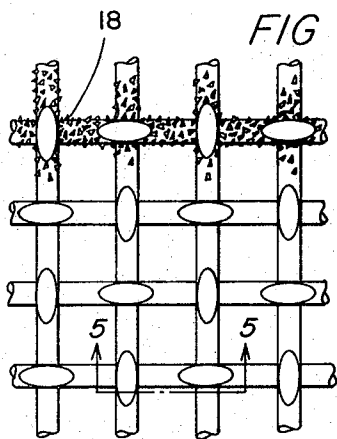


FIG 3

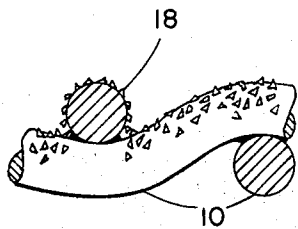


FIG 4

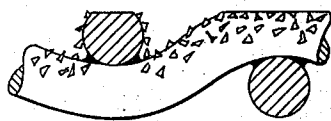


FIG 5

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ABRASIVE TOOL

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7 Claims

ABSTRACT OF THE DISCLOSURE

An abrasive tool comprising a coarse gage, open mesh woven wire screen disk providing a rigidly formed abrasive surface area, with voids extending therethrough, and an abrasive coating of scattered, hard, sharp-edged particles covering the face of the screen wires including their sides extending into the voids, whereby erosion of the abrasive surface area produces successively available abrading surfaces, each consisting of a lower level of firmly attached, and not theretofore used, sharp-edged particles.

The present invention relates to improvements in abrasive articles, and more particularly to a novel abrasive tool for high speed grinding and abrading operations.

It is a principal object of the invention to provide an abrasive tool of novel and improved construction which is fast cutting, durable and well adapted for operating efficiently upon a substantially increased range of materials not readily acted upon by sanding and abrading devices known in the art.

It is a further object of the invention to provide a novel and improved abrasive tool of the general character illustrated which will automatically discharge from the abrading area any waste material produced by the abrading operation.

In accordance with the invention, there is provided an abrasive tool having as the base element thereof a coarse gage open mesh woven wire screen providing an abrasive surface area with voids extending through said base element and an abrasive coating of scattered hard, sharp edged particles covering the exposed face of each said wire, including the side portions extending into said voids, the arrangement being such that as erosion of the abrading surface takes place including the breaking off of particles and wearing down of the wire surface, a new abrading surface is formed consisting of particles adhered to the rounded sides of the wires which are unused. In this manner successively usable unused grit particles are made available at successively lower levels as the abrasive tool of the invention wears.

With the above and other objects in view as may hereinafter appear, the several features of the invention together with the advantages to be obtained thereby will be readily apparent to one skilled in the art from the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a view of one face of a wire mesh abrading wheel embodying therein the several features of the invention;

FIG. 2 is a fragmentary view on an enlarged scale of the coarse open mesh abrading wheel of FIG. 1 before any wear has taken place;

FIG. 3 is a fragmentary view similar to FIG. 2 showing the condition of the wheel after some wear has taken place;

FIG. 4 is a detail sectional view taken on a line 4—4 of FIG. 3; and

FIG. 5 is a detail sectional view taken on a line 5—5 of FIG. 3.

The abrasive wheel illustrated in the drawing as em-

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bodying in a preferred form the several features of the invention is made up of a coarse open mesh wire to which is brazed a grit of small sharp edge particles of a very hard material such as tungsten carbide. These particles are spread over the top and adjacent rounded side portions of the screen wires providing an abrading material of substantial thickness. Under normal operating conditions the abrasive wheel will be driven at high speed. As wear takes place the particles of the top layer become worn or are broken off. The screen mesh, being of softer material, erodes exposing a new layer or fringe of particles clinging to the rounded surfaces of the screen wires at a lower level. The particles are liberally scattered over the surface of the rapidly moving wheel to insure a uniform, even cutting action of the wheel upon a work surface as each successive level of particles is exposed by continued wear of the wheel. Waste material accumulated carbide particles is automatically discharged through the interstices of the rotating wheel thereby avoiding clogging of the cutting surface of the wheel and insuring a maximum efficiency of operation during the entire life of the wheel.

The abrasive disc in the drawing comprises a heavy gage coarse mesh wire screen 10, of which the voids provided by the interstices 12 are in excess of the wire area, although this is not essential. The wire screen 10 is fitted at one side thereof with a central annular flange or collar 14 to be fitted to a suitable driving spindle, not shown. A circumferential wire support 16 is preferably attached to the under side of the screen 10 to further support the outer peripheral area thereof, although it may be attached in the same plane or on the upper side if the wire screen is dish.

The upper face of the woven wire screen is covered with particles of tungsten carbide 18 crushed and graded for size. The particles are brazed onto the wire surface with copper, nickel, or other suitable metallic material acting as a flux. Simultaneously, the various wires in the woven wire mesh are joined into a single mass. In the preferred embodiment of the invention shown, a wire mesh of 6 x 6 per inch is used. The wire size is 16 gage and the grit is 20-30 or 30-40 mesh. The wire is preferably double crimped, and the carbide chips are copper brazed to the screen. While in the illustrated embodiment of the invention a heavy gage open mesh wire which is self supporting is employed, it will be understood that other grades of wire may be substituted therefore including grades which are not self supporting and for which suitable supporting structure may be required. Wire size may vary from No. 5 to No. 22, the wire mesh may vary from 1 x 1 to 16 x 16, and the grit size will be 100 mesh, or coarser, but not finer than 100 mesh depending upon the requirements of the particular job. In no case should the openings be closed completely. In the embodiment of the invention shown, the wire gage and mesh are chosen to the particular job. In no case should the openings be closed completely. In the embodiment of the invention shown the wire gage and mesh are chosen to produce an abrasive wheel suitable for a wide variety of uses. The substantial voids provided by the wide mesh woven wire extending through the abrading surface of the tool are of great importance to provide a means for clearing the cutting surfaces by the discharge of waste material therethrough.

The coarse mesh wire abrading wheel above described is normally made up from wire screening, the circular wire support 16 and collar 14 being secured thereto, and thereafter only those surfaces required for cutting are coated. The abrading wheels made up in this manner are primarily intended to be used on power driven equipment at fairly high velocity, preferably in the order of 4,000 to 12,000 surface feet per minute. It will be understood that

abrading tools in accordance with the invention may be made up in a variety of forms which will include grinding pads, sanding discs, abrasive drums, and combination sander-saws.

The abrading tool above described has certain unique qualities which adapt the tool for the more efficient performance of many operations heretofore considered impractical for normally available sanding and abrading equipment. Highly efficient results may be obtained for example, during operation upon materials which are of soft texture, gummy or dirty, or are heat sensitive, or which may be compositions of one or more hard-to-sand materials, or which may contain harsh foreign matter such as nails. Examples of such materials would include painted wood and metal surfaces, rubber, plastic and other materials of comparable texture, and concrete surfaces whether wet or fully cured. Material is removed in the form of chips which are driven off by the cutting edges and forced outwardly through the interstices of the wire mesh. The removal of waste is further assisted by the flow of air, or other lubricant which may be present induced by the rapid movement of the wire mesh wheel.

The invention having been described, what is claimed is:

1. An abrasive tool having, in combination, a base element comprising a rigid coarse gage, open mesh woven wire screen disk having its woven wires bonded together providing a rigidly formed abrasive surface area with voids extending through said base element, and an abrasive coating of scattered hard, sharp edged particles covering the face of each said wire exposed within said surface area including the side portions extending into said voids, whereby erosion of the abrasive surface area produces successively available abrading surfaces each consisting of a lower level of firmly attached and not theretofore used, sharp edged particles.

2. The combination of claim 1 in which the coating of particles and the wires of said woven screen are brazed together into a rigid unyielding unit.

3. The combination of claim 2 in which the particles are tungsten carbide chips.

4. The combination of claim 1 in which the woven wire screen disc has a centrally attached hub, and an annular rim attached to the periphery of said disc.

5. The combination of claim 1 in which the screen has a wire mesh of about 6 x 6 per inch and a wire size of 16 gauge and an abrasive grit of 20-30 to 30-40 mesh.

6. The combination of claim 1 in which the screen has a wire mesh of between 1 x 1 and 16 x 16, a wire size of between 5 gauge and 22 gauge and an abrasive grit of 100 mesh or coarser.

7. A rotary abrasive disc having, in combination, with an annular hub, a base element comprising a disc shaped, coarse gage, open mesh woven wire screen attached to said hub providing an abrasive surface area with voids extending through said base element, and an abrasive coating of scattered hard, sharp edged particles covering the face of each said wire exposed within said abrasive surface area including the side portions extending into said voids, and means brazing said particles and the wires of said screen into a rigid self supporting unit, whereby erosion of the abrasive surface area including the exposed top portions of said wires and particles brazed thereto produces successively available abrading surfaces each consisting of a lower level of firmly attached and not theretofore used, sharp edged particles.

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