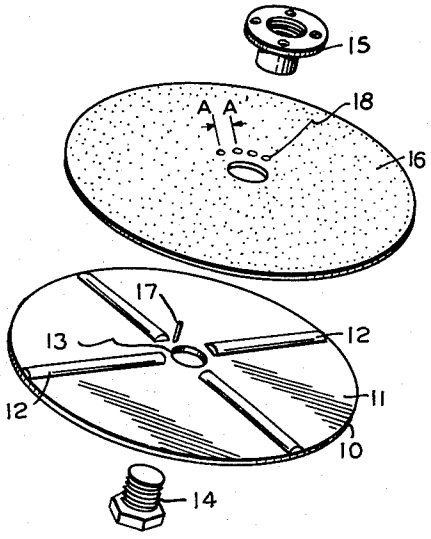
Aug. 29, 1961 E. C. SCHACHT 2,997,819

ABRASIVE DISC

Filed Sept. 20, 1960

FIG.1



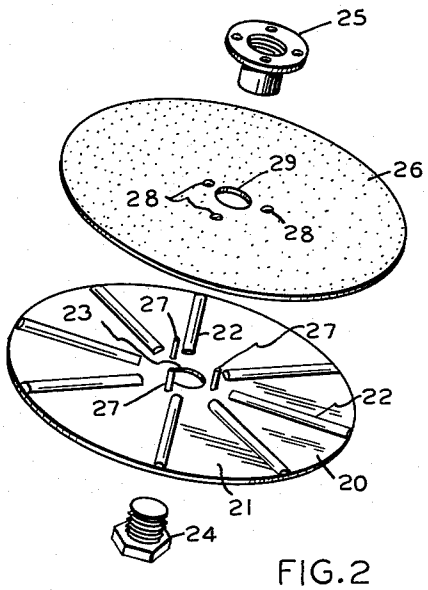


FIG.2

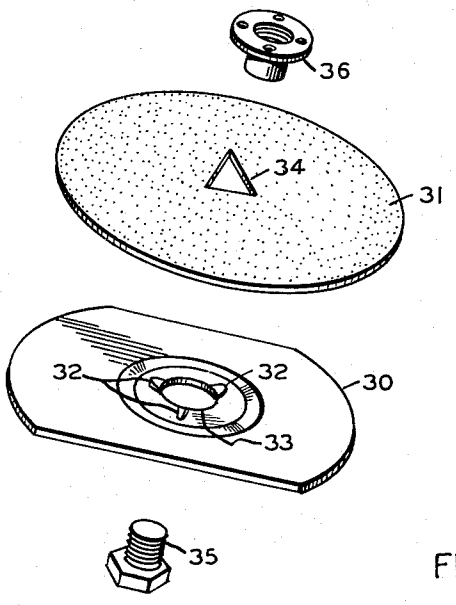


FIG.3

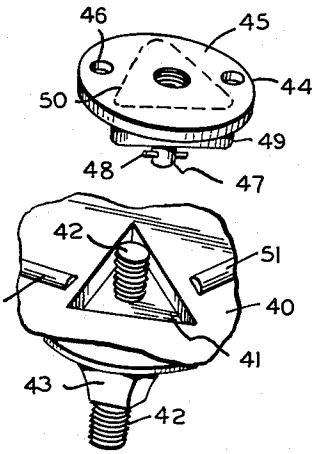


FIG.4

INVENTOR.
ELMER C. SCHACHT
BY Hugh E. Smith
ATTORNEY

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ABRASIVE DISC

Elmer C. Schacht, Troy, N.Y., assignor to Norton Company, Troy, N.Y., a corporation of Massachusetts

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6 Claims. (Cl. 51—195)

The present invention relates in general to abrasive disc grinding and more specifically to an improved method and apparatus for such grinding.

Heretofore, in commercial practice, most abrasive disc grinding has consisted in mounting a circular coated abrasive disc (which may be defined as a disc, the backing of which comprises paper or other non-woven cellulose material and/or cloth, which disc is provided with a coating of abrasive grains and is relatively stiff and rigid in its own plane and has the capacity of resisting torsional and buckling strains and of flexing under lateral pressure), upon a back-up pad of substantially the same configuration, holding such disc to the pad by a locking device at the center thereof, and applying such combination in a rotary fashion to the workpiece to be abraded. A recent development in this art is described and claimed in the copending application of Howard R. Wright and Dwight R. Lowther, Serial No. 57,226 filed September 20, 1960, wherein the circular disc is supported by a back-up pad of different configuration than the disc and of lesser area than the disc. The structure described in the Wright and Lowther application results in wear of the abrasive disc at spaced points only. Prior art usage of circular discs mounted on circular back-up pads having various types of raised, spaced projections, ridges, bosses, lands and grooves or the like on the face of such pad have also produced these spaced areas of wear on the abrasive disc. Suggestions have been made in the art that when such wear has occurred the disc should be rotated so as to place an unworn portion of the disc over the projections or the like on the back-up pad which produce such wear. While sound in theory, such suggestions have proved impractical in practice due to the tendency of the disc to rotate on the back-up pad to some degree when pressure is applied as in the abrasion of a workpiece. Due to this tendency, rotation of a disc to bring the unworn portions thereof over the wear-producing portions of the back-up pad frequently is of no avail since the disc will slip upon usage back to its initial position. Even if the slippage does not take place to the extent necessary to return the disc to its original position in relation to the back-up pad, the haphazard location of the disc so as to place an unworn portion over the wear-producing portions of the back-up pad is inefficient and maximum wear is not obtained from the disc.

Accordingly, it is an object of the present invention to provide an improved method of abrasive disc grinding which overcomes the defects set forth above.

Another object of the invention is to provide an improved and controlled means for indexing a disc when used with a back-up pad of the type which produces spaced areas of wear on such disc.

A further object of the invention is the provision of improved apparatus for coated abrasive disc grinding.

Additional objects, if not specifically set forth herein, will be readily apparent to one skilled in the art from the following detailed description of the invention:

In the drawings:

FIGURE 1 illustrates in exploded perspective view one type of apparatus of the present invention.

FIGURE 2 illustrates a modification of the apparatus of FIGURE 1.

FIGURE 3 illustrates in exploded perspective view another apparatus embodying the present invention in its structure.

FIGURE 4 illustrates in partially cut-away form still another apparatus adapted to perform the method of the present invention in cooperation with the coated abrasive disc of FIGURE 3.

Generally, the present invention comprises a method and apparatus for abrading wherein a circular coated abrasive disc is mounted upon a back-up pad having spaced wear-producing areas thereon, used in abrading a workpiece until the portions of such disc above said wear-producing areas are worn down to the point where the abrading action is severely diminished, indexed upon said pad a definite and finite distance, anchored in such new position, and the abrading continued. This cycle is repeated a number of times dependent upon the area of the disc worn down during each cycle until substantially the entire useful area of the disc has been used up. Contrasted with prior art methods, the present invention provides a definite point to which the disc is indexed and provides for positive positioning of such disc in such new position following each indexing step.

Referring now to the drawings, there are illustrated three abrading devices adapted to carry out the method of the present invention. FIGURE 1 illustrates at **10** a back-up pad which is fairly stiff yet capable of flexing to the extent required in normal abrasive disc work, such being well-known to the art. On the disc-supporting surface **11** of pad **10** are provided a plurality of spaced, raised areas **12** which may be cast, moulded or adhered to the surface **11**. The pad **10** may be formed of rubber, plastic, metal or the like as desired. Positioned at the center of pad **10** is a disc-retaining means **13** which may be any of the means well-known in the art. As shown in FIGURE 1 this means is a threaded hole adapted to receive a fastening bolt **14** and disc flange **15** which cooperate to hold the coated abrasive disc **16** against the pad **10**. Protruding from the surface **11** of pad **10** is a positioning pin **17**. This pin **17** cooperates with a plurality of positioning holes **18** in coated abrasive disc **16** to form the index fixing means based on the present invention. The positioning holes **18** are disposed adjacent to but separate from the center hole **19** of disc **16**. The distance A—A between the positioning holes **18** will vary depending upon the width of the wear-producing areas **12** of the back-up pad **10**, and should be such as to permit maximum wear of the abrading surface of disc **16**. In use, the disc **16** is positioned on pad **10** and locked into place with bolt **14** and flange **15**. One of the positioning holes **18**, preferably at one end of the series, is filled by positioning pin **17**. When applied to a workpiece, disc **16** will wear in those areas immediately above raised areas **12** of pad **10**. When the cutting action of the disc decreases due to such wear, the pad (mounted in any conventional rotary grinder—not shown) is stopped, the flange loosened and the disc rotated to permit pin **17** to enter the next positioning hole **18**. The cycle is then repeated, the number of holes being such as to permit substantially full passage of the surface of the disc above said wear-producing areas **12** of pad **10**. The pin **17**, holes **18** and the center fastening device combine to positively position and lock the disc against movement relative to the pad for each indexed position.

FIGURE 2 illustrates a modification of the device in FIGURE 1 in that a plurality of positioning pins **27** are used with the same number of positioning holes **28** in the disc **26**. The positioning holes **28** should be equal in number or be a multiple of the number of positioning pins. Obviously more or less pins may be used as desired. Also, in FIGURE 2, the pad **20** has eight raised areas **22** on surface **21** as contrasted with the four areas in FIGURE 1. Again, a greater or lesser number of these areas may be used as desired. For practical purposes eight are the maximum preferred while two are the mini-

mum desired. Again the center holding means consists of threaded hole **23** in pad **20**, bolt **24**, locking flange **25** and the center hole **29** in the disc **26**. In use, the illustrated disc **26** performs as described in connection with FIGURE 1. Here, however, there are but three index positions for such disc upon pad **20**.

FIGURE 3 illustrates still another modified apparatus embodying the present invention. Here a back-up pad **30** (of different configuration and lesser area than the abrasive disc **31**) in accordance with the aforesaid application of Wright and Lowther, is provided with triangular lugs or bosses **32** disposed adjacent the threaded center hole **33** of pad **30**. Abrasive disc **31** has a center hole **34** shaped to conform to and engage with the bosses **32**. As shown these are arranged in a triangular pattern so that center hole **34** is triangular in shape, the bosses **32** and center hole of disc **31** cooperate as an index fixing means along with bolt **35**, threaded center hole **33** and locking flange **36**. Again this disc can be indexed so that three distinct and finite positions are reached and maintained during the operation of the disc in abrading.

FIGURE 4 illustrates another type of back-up pad adapted to cooperate with the abrasive disc **31** illustrated in connection with FIGURE 3. In this drawing, use has been made of the cut-away technique to better illustrate the structure of the holding and positioning device. The back-up pad **40** is cut-away to show in detail the recessed, centrally-located triangularly shaped center hole **41** with the threaded shaft **42** extending upwardly therethrough. Shaft **42** extends in the opposite direction through the hub mounting member **43**. Positioning member **44** consists of a flat washer-like top plate **45** having a pair of depressed openings **46** therein to fit a standard disc locking wrench (not shown) and a downwardly-extending, internally-threaded tube **47** centered on such plate. Mounted near the lower end of tube **47** is a detent member (which may be an annular ring or the like) **48**. The detent member serves to hold triangular member **49** in place around tube **47**. Member **49**, shaped as illustrated by dotted lines **50**, in the form of a triangular solid with a hole in the center thereof is free to rotate about tube **47**. In use, a coated abrasive disc having a triangular central opening (such as illustrated at **34** in FIGURE 3) has the triangular member **49** of positioning device **44** inserted through such opening. The assembly is then placed on pad **40** so that the disc overlies the spaced raised areas **51** and triangular member **49** enters the mating recess **41** in the pad. Rotation of member **44** will engage the threaded shaft **42** inside tube **47** and will firmly and fixedly draw the coated abrasive disc down upon the upper surface of pad **40**. After use, when the disc is worn at the points overlying spaced, raised areas **51**, the assembly is loosened—lifted up and indexed so that the triangular member **49** is moved one position over without removal of the disc from such member. This places the disc roughly 33° to the angle at which it was first positioned and brings new areas thereof over spaced, raised areas **51**. The assembly is then tightened down and the abrading continued. A third and final shift of the disc and member **49** results in substantially entire usage of the surface of the disc.

Obviously many modifications and variations may be made without departing from the spirit and scope of the present invention and therefore only such limitations should be imposed as are contained in the appended claims.

I claim:

1. A back-up pad in combination with a coated abrasive disc comprising: a backing member; a plurality of spaced, raised areas on said backing member; a coated abrasive disc positioned on said spaced, raised areas; means centrally located on said backing member to hold said coated abrasive disc in close contact with said spaced, raised areas; and a second means cooperating with said first-mentioned means and with said disc to provide a plurality of finite positions which said disc may occupy in relation to said spaced, raised areas and to fixedly position and hold such disc in each of said plurality of positions.

2. An abrading device comprising a back-up pad having a plurality of spaced, raised areas on at least one face thereof; a coated abrasive disc mounted on said spaced, raised areas; means centrally located of said back-up pad and adapted to hold said coated abrasive disc in close contact with said spaced, raised areas of said back-up pad; at least one means spaced from said first-mentioned means and cooperating therewith and with said disc to position in a plurality of finite positions in fixed relationship to said spaced, raised areas said coated abrasive disc.

3. An abrading device comprising a back-up pad having a plurality of spaced, raised areas on at least one face thereof adjacent the periphery of such pad; means centrally located of said back-up pad and adapted to hold a coated abrasive disc in close contact with said spaced, raised areas of said back-up pad; a coated abrasive disc held by said means to said spaced, raised areas; and at least one raised member extending from the surface of said back-up pad and adapted to extend at least partially through the surface of said coated abrasive disc, said raised member and said means cooperating with said coated abrasive disc to provide a plurality of finite mounting positions for said disc upon said back-up pad and to fixedly secure said disc relative to said spaced raised areas in each of said finite positions.

4. A device as in claim 3 wherein said raised member comprises a plurality of up-standing pins and wherein said coated abrasive disc has a plurality of openings adapted to receive such pins.

5. A device as in claim 3 wherein said raised member comprises a plurality of lugs spaced about said central means and wherein said coated abrasive disc has a central opening of a configuration to engage with said lugs in a finite number of positions relative to said back-up pad.

6. An abrading device comprising a back-up pad having a plurality of spaced, raised areas on at least one surface thereof; a triangular recess located centrally of said pad on said one surface; a coated abrasive disc having a triangular opening at the center thereof; a positioning member having a triangular configuration adapted to enter into said triangular recess; said positioning member passing through said opening in said disc and being held in fixed relationship to said pad by engagement with said recess; and means adapted to hold said disc and said positioning member firmly against said pad.

References Cited in the file of this patent

UNITED STATES PATENTS

290,631 Cross ---------- Dec. 18, 1883