FASTENING DEVICE FOR PSA ABRASIVE DISC

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ABSTRACT
A backup pad having a protruding centering button to quickly fasten pressure sensitive adhesive abrasive discs and other surface treating discs on a backup pad for a conventional power rotary tool.

9 Claims, 4 Drawing Figures
FASTENING DEVICE FOR PSA ABRASIVE DISC

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a backup pad and pressure sensitive adhesive (PSA) coated surfacing disc, and in one aspect, to a disc fastening member on a backup pad for a conventional rotary power tool.

2. Description of the Prior Art

Coated abrasive discs, which have existed for decades in a wide spectrum of constructions, can be used to remove stock, cut grooves, polish a surface, etc. These discs are typically and preferably constructed so that the disc can be mounted and demounted with a minimum of effort. That this had been an object of many inventions is evidenced by the number of patents directed to quick change tools. To the best of our knowledge and belief, however, all tools heretofore known have suffered from one or more of such disadvantages as high cost of fabrication, excessively complicated mechanism, danger of damaging either the disc or the drive assembly during installation or removal, necessity for separable fasteners of which one tends to lose a part, special mounting tools, inability to resist the torque encountered in normal use, tendency to mar the workpiece, etc.

One means of quickly mounting a disc is by the use of a pressure sensitive adhesive (PSA) coating on the backside of the disc; there is an advantage of a quick change but this advantage is offset by the hazard of a disc flying off during normal speed operations. This is particularly true if the PSA disc is not centered on the backup pad. The known prior art has not provided any fastener or centering member to aid in securing the PSA disc to the backup pad.

SUMMARY OF THE INVENTION

The present invention provides an improved fastening device for quickly attaching a pressure sensitive adhesive (PSA) coated abrasive disc to a backup pad for a rotary power tool. The present invention eliminates the need for tools and other separate pieces to aid in placement or attachment of the discs to the pad.

The present invention includes a conventional backup pad comprising a circular backup plate and a central fitting. The backup pad is provided with a centering button which is secured to and protrudes from the disc supporting surface of the backup plate.

The centering button aids in centering the disc on the backup plate and also aids in preventing hazardous lateral displacement of the PSA disc relative to the backup plate when rotating at high rpms. The novel backup pad device provides quick attachment and "fail-safe" retention of pressure sensitive adhesive coated abrasive discs and other PSA coated surfacing discs that are used on power tools that may operate at speeds of 4,000 to 5,000 rpms.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reading the following detailed description which refers to the accompanying drawing, in which like reference numbers refer to like parts in the several views, and in which:

FIG. 1 is an exploded side elevational view of the backup pad and a PSA abrasive disc, constructed according to the invention.

FIG. 2 is a plane view of the assembly of FIG. 1 with portions cut away to show hidden portions.

FIG. 3 is a vertical section taken generally on the line 3--3 of FIG. 2, and

FIG. 4 is a vertical cross-sectional partial view of a modification of the backup pad of FIGS. 1 to 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing there is illustrated in FIG. 1 a generally circular backup pad generally designated 10 and an abrasive disc 13 embodying the invention. The backup pad 10 includes a nylon disc-centering button 11 having a regular geometric shape and comprising a short neck 11a protruding outward from a disc supporting surface 14a of the pad and terminating with a shoulder 11b formed about the outer protruding end of the button 11. The button 11 provides for the firm engagement and the centering of the abrasive disc 13 on the backup pad.

Backup pad 10 further includes a backup plate 14 having a disc supporting surface 14a and a rear side 14b. The backup plate 14 has a central fitting in part provided by a threaded metal shaft-connecting hub 15 and in part by a threaded base 11e of the button 11 as seen in FIG. 3.

The shaft-connecting hub 15 is an insert permanently affixed in an opening 14c in the backup plate 14. The button base 11e is permanently affixed in the opening 14c coaxially with the hub 15.

The button 11 protrudes from the supporting surface 14a in a manner such that an opening 13f in the abrasive disc 13 is easily snapped over the shoulder 11b to fit around the neck 11a. In the illustrated embodiments, the button 11 and the opening 13f are circular but they could be triangular, square, star-shaped, or have other selected geometric shapes. Preferably the button 11, and especially its neck 11a, are continuous to provide sufficient strength to resist any tendency of the disc to migrate laterally. The opening 13f in the disc 13 is preferably slightly smaller than the shoulder 11b and is slightly larger than the adjacent portion of the neck 11a. The length of the neck 11a, as measured from the supporting surface 14a, is approximately equal to the total thickness of the abrasive disc 13 at its opening 13f.

The abrasive disc 13 includes a granular coating 13a, a support base material 13b, a pressure sensitive adhesive coating 13c, and the opening 13f. The PSA coating 13c adheres the abrasive disc to the entire disc supporting surface 14a of the backup pad 10.

As FIG. 3 illustrates, the shoulder 11b of the button 11 has a beveled outer edge 11c designed to temporarily expand the opening 13f in disc 13 upon placement of the disc on the backup pad. An under surface 11d of the shoulder 11b engages the abrasive coating 13a of the abrasive disc 13 adjacent to the opening 13f. For that purpose, the backing 13b of the disc 13 is made of a flexible material such as paper or cloth so as to facilitate the expansion of the opening 13f.

In FIG. 4, the backup pad 110 has a central fitting which is provided by an internally threaded metal shaft-connecting hub 115 which is permanently affixed to a backup plate 114. The hub 115 is inserted into a central opening 114c in the backup plate 114 and swaged around a metal washer 119.
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The centering button 111 is a separate metal piece which is also internally threaded for attachment to a driving shaft 120 of a rotary power tool (not shown). The centering button 111 includes a neck 111a and a shoulder 111b which is formed with a beveled outer edge 111c. An under surface 111d of the shoulder 111b engages the abrasive coating 113e of the abrasive disc 113 adjacent to its opening 113f.

The backup plate 114 includes a depression 114d around the central fitting. This permits the centering button 111 to be replaced by a shorter button which would be recessed with respect to the plane of the working surface of the abrasive disc 113, thus providing a wider working band and less likelihood that the button will contact a work piece.

If desired, the backup pad may include two or more centering buttons as described, preferably symmetrically arranged about the central fitting.

Backup plates may be formed of a variety of materials, such as multi-ply phenolic cloth laminate or poly-carbonate. If a rigid material is used, the disc supporting surface may be a layer of an elastomeric material. By using a rigid material, the circular backup plate, the central fitting and the centering button may be formed as a single piece of material.

1. In combination, a rotary backup pad and a pressure sensitive adhesive abrasive disc having a centering opening of a regular geometric shape, said backup pad designed for supporting and readily removably retaining said disc, said backup pad comprising a circular backup plate having a disc supporting surface; a central fitting adapted to connect to a rotary driving shaft of a power driven tool; a centering button which protrudes from the disc supporting surface, which button is formed at its protruding end with a shoulder which is slightly larger than the opening of the disc and with a neck which is equal to or slightly smaller than the opening of the disc and has a length equal to or greater than the thickness of the disc at its opening to center the abrasive disc on the support surface and to restrict lateral displacement of the abrasive disc relative to the backup pad during the operation thereof.

2. A combination of claim 1 wherein said central fitting is integral with said centering button and has an inner threaded bore portion that screws onto the driving shaft of the rotary power tool.

3. A combination of claim 1 wherein the circular backup plate, the central fitting and the centering button are formed as a single piece of material.

4. A combination of claim 1 wherein the disc supporting surface of the backup plate is covered with a resilient surfacing adapted to aid in receiving and holding the pressure sensitive adhesive coated abrasive disc thereon.

5. A combination of claim 1 wherein the shoulder of said centering button has an under surface spaced from and opposed to said supporting surface to engage the abrasive surface of a said abrasive disc adjacent to the opening in the abrasive disc.

6. A combination of claim 1 wherein a centering button is located at the center of the backup pad and is internally threaded to provide at least a part of the central fitting.

7. A combination of claim 1 wherein the centering button is an integral part of the backup plate.

8. The combination of claim 1 wherein the central fitting is provided by an internally threaded metal hub permanently affixed to the backup plate, and the centering button is a separate metal piece which is internally threaded for attachment to the driving shaft of the power tool, and the backup plate is depressed around the central fitting.

9. The combination of claim 7 wherein the centering button, when the backup pad and abrasive disc are attached to the power tool, does not substantially project beyond the plane of the outer working portion of the abrasive surface.