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A. BLOCK

3,141,269

ABRADING ARTICLE

Filed Nov. 1, 1961

Fig. 1

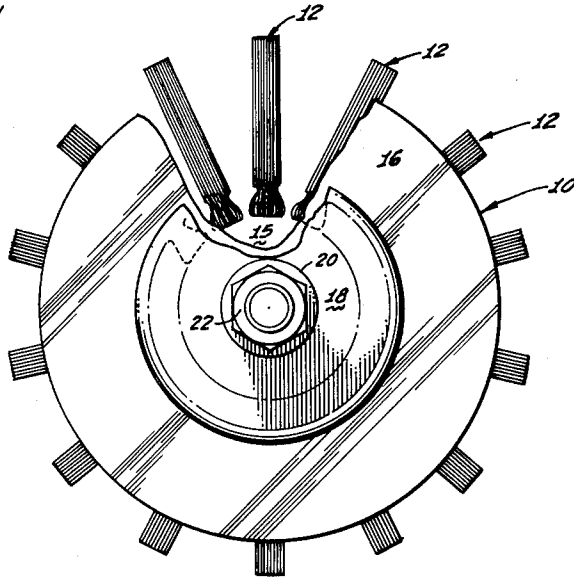


Fig. 2

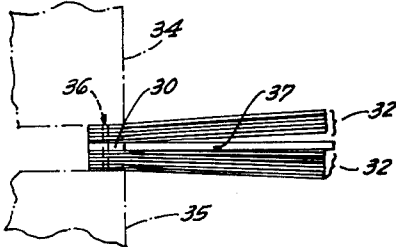


Fig. 6

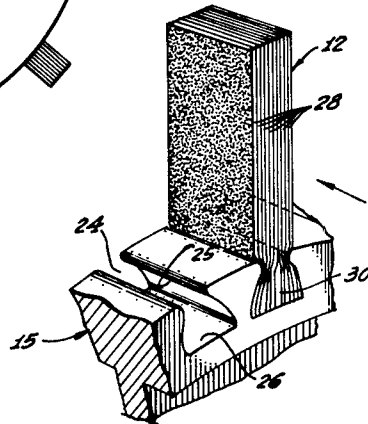


Fig. 3

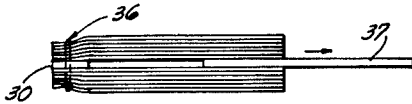


Fig. 7

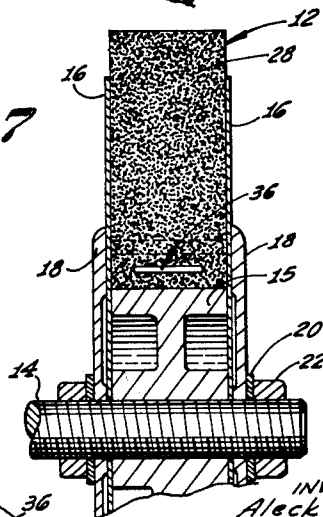


Fig. 4

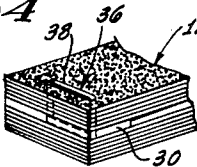
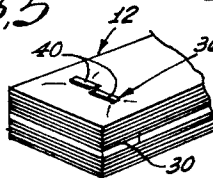


Fig. 5



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3,141,269

ABRASING ARTICLE

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13 Claims. (Cl. 51—193.5)

This invention relates to a flap-type abrasive wheel comprising a rotary hub structure with an annulus of flexible abrasive leaves mounted on the hub structure and extending radially therefrom. The invention is specifically directed to the problem of removably mounting the abrasive leaves on the hub structure so that the abrasive leaves may be replaced when worn out or damaged.

It has been suggested heretofore that the periphery of a rotary hub structure may be formed with axially aligned undercut slots of generally circular cross sectional configuration with narrow neck openings and that abrasive units in the form of packs of flexible abrasive leaves may be mounted in the slots by employing adhesive and locking pins. To form such an abrasive unit, the inner ends of a pack of flexible abrasive leaves are dipped into a suitable glue composition and then the glue-dipped end of the pack is inserted into a mold cavity of the same size and configuration as one of the undercut slots in the hub structure. While the glue is still wet the locking pin is inserted between the leaves to expand the base end of the pack to the general cross-sectional configuration of the mold cavity. At the same time the glue spreads into the mold cavity to conform into the configuration of the cavity. The glue is then permitted to harden to result in the pack being formed with a transverse bead on its base end that will fit into a peripheral slot of a hub structure in an interlocking manner. Such a method is disclosed in Cosmos Patent 2,871,632.

For a disposable abrasive unit, this fabrication procedure is unduly expensive because it takes time to dip the pack into the glue, to manipulate the glued end of the pack into the mold cavity and to drive the locking pin into the confined end of the pack. In addition the pack must be left in the mold for a period of time to permit the glue to harden. The method is also difficult since it requires the pack to be formed for retention in the cavity after the sheets have been placed in the cavity.

It has also been proposed to staple together the leaves of a pack at the base end of the pack and then to mold a transverse bead of vulcanized rubber compound on the base end of the pack. Here again the fabrication procedure requires a mold and requires a prolonged period of time for curing the molded bead.

The present invention is directed to the problem of providing a simple inexpensive procedure for fabricating such a disposable abrasive unit, the problem being to eliminate the need for a mold and to eliminate the delay for drying, curing or hardening any kind of a composition. This problem is solved by inserting at least one transverse flat spacer means in the base end of a pack of abrasive leaves and then extending fastening means through the end of the pack and the flat spacer means to unify the assembly.

In the preferred practice of the invention the flexible abrasive leaves are assembled into a plurality of individual packs of leaves having a total thickness to fit into the narrow neck portion of an undercut peripheral slot of the hub structure. These individual packs are assembled to form a composite pack with the flat spacer means interposed between the successive individual packs at the base end of the composite pack. A force is then applied across the end of the composite pack to compress the base end of the pack and simultaneously to

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drive a staple through the base end of the pack and the spacer means that is incorporated therein. The termination of the applied force leaves the staple under tension in engagement with the opposite faces of the pack to maintain the base end of the pack under continued compression.

The features and advantages of the invention may be understood by reference to the following detailed description and the accompanying drawing.

In the drawing, which is to be regarded as merely illustrative:

FIGURE 1 is a side elevation of a flap-type abrasive wheel embodying a selected practice of the invention, a portion being broken away to reveal concealed structure;

FIGURE 2 is an elevational view illustrating the steps of stapling the base end of the pack of leaves of a disposable abrasive unit;

FIGURE 3 is a side elevational view of the abrasive unit immediately after the stapling operation;

FIGURE 4 is a fragmentary perspective view of a base end of an abrasive unit with the backside of the staple uppermost;

FIGURE 5 is a similar perspective view with the clinched legs of the staple uppermost;

FIGURE 6 is a fragmentary perspective view showing a portion of the slotted hub body with a disposable abrasive unit mounted radially thereon; and

FIGURE 7 is a fragmentary axial section of the assembled abrasive wheel.

In the drawing which shows an assembled flap-type abrasive wheel embodying a selected practice of the invention, the illustrated assembly comprises a hub structure, generally designated 10, and a plurality of disposable abrasive units 12 extending radially from the hub structure and forming an annulus around the hub structure.

In the construction shown, the hub structure is mounted on a threaded drive shaft 14 and includes a hub body 15, a pair of thin metal disks 16, a pair of hub caps 18 pressing the disk against the side of the hub body, a pair of washers 20 in abutment against the hub caps and a pair of nuts 22 clamping the washers against the hub caps. The hub structure may be simplified by omitting the two thin disks 16 and, in the simplest practice of the invention, the hub plates 18 are also omitted.

The hub body 15 is formed with uniformly circumferentially spaced transverse peripheral slots 24, each of which is undercut to provide overhanging side walls forming a narrowed neck 25 on the radially outward open side of the slot. Thus each slot 24 characteristically has a relatively narrow width dimension at its neck 25 on its radially outward open side and is of a relatively wide dimension in the region radially inward from the neck. Preferably the bottom walls 26 of the slots are substantially flat so that each slot is of a generally dove-tailed cross-sectional configuration.

Each slot 24 is occupied by one of the abrasive units 12 comprising a plurality of flexible abrasive leaves 28 positioned face to face to form a pack. The abrasive leaves 28 may, for example, be rectangular pieces of emery cloth or the like. The total thickness of the abrasive leaves 28 of the pack is of a dimension to fit snugly in the neck 25 of a slot 24. The base end of the pack confined by the slot is, however, enlarged to a configuration that interlocks with the slot to anchor the pack in an effective manner for resistance to centrifugal force.

For the purpose of enlarging the base end of an abrasive unit, at least one flat spacer 30 is inserted in the confined base end of the pack to make the base end of substantially thicker dimension than the width of the narrow neck 25 of the slot 24. For this purpose at least one flat spacer 30 is inserted. While such a spacer means

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may be made of any suitable material, the use of mild steel sheet metal has been found to be advantageous. The enlarged base portion of the pack is unified by suitable fastening means that extends through the leaves of the pack and the interposed spacer means. Preferably the fastening means is of a type that stitches the assembly together. In the preferred practice of the invention a metal staple is employed for this purpose.

The preferred procedure for fabricating an abrasive unit 12 is illustrated by FIGURES 2 and 3. In this particular practice, two individual packs 32 of the abrasive leaves are assembled with the total thickness of the two individual packs of a dimension for snug fit in a neck 25 of a hub slot 24. A narrow sheet metal spacer 30 is positioned between the two individual packs 32 with the two individual packs positioned to form a composite pack. The composite pack with the flat spacer 30 at the base end thereof is then positioned between the jaws of a suitable stapler, the jaws being indicated diagrammatically at 34 and 35. Such a stapler, which is of well-known construction, operates in a well-known manner to drive a hard metal staple 36 through the assembly. A thin bar magnet 37 of the same thickness as the spacer 30 may be used as convenient means to maneuver the spacer into position and to hold the spacer in position during the stapling operation. After the stapling operation the bar magnet is removed as indicated in FIGURE 3.

The abrasive unit is then ready for mounting in a transverse slot 24 of a hub structure 10. The staple 36 is driven through the pack and the interposed spacer means by impact force of high magnitude. Under such an impact force a high carbon staple readily pierces a spacer means 30 made of 16 gauge sheet metal. The applied impact force clinches the two legs of the staple over against the opposite side of the base portion of the pack. Thus, as shown in FIGURE 4, the back portion 38 of the staple 36 engages one face of the composite pack and, as indicated in FIGURE 5, the clinched portions 40 of the two legs of the staple engage the opposite face of the pack. It is to be noted that the application of the impact force compresses the base end of the pack and that the clinching of the staple occurs while the pack is under compression. Consequently the termination of the impact force leaves the two legs of the staple 36 under tension to maintain the base end of the pack under compression.

To mount an abrasive unit 12 in a slot 24 of a hub body 15, the abrasive unit is pinched or compressed for insertion through the open end of the slot to enter the neck 25 of the slot. It is apparent that since the total thickness of the leaves of the unit is substantially equal to the width of the neck 25, the base end of the unit that is enlarged by the interposed spacer 30 is too large to pass through the neck. Radially outward centrifugal force merely tightens the base end of the unit in the slot by a wedging action. In this regard a feature of the invention is that the permanent compression of the enlarged base end of the unit by the staple 36 makes the base end dense and practically incompressible within the range of centrifugal force that is generated in a normal operation of the abrasive wheel. For this reason the abrasive units 12 do not yield radially outwardly to any appreciable extent when the abrasive wheel is rotated at relatively high speed.

The stapling of the base ends of the composite packs under compression is also advantageous in making the units rugged. The units are durable to withstand shipping and rough handling without damage.

From the foregoing description the economy achieved by the invention may be readily appreciated. A disposable abrasive unit is fabricated by a single stapling operation. Thus the invention eliminates the necessity for a plurality of molds to form the base portions of the disposable units and the invention further eliminates the

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necessity for any delays to permit any type of composition to harden or cure.

My description in specific detail of the selected practice of the invention will suggest various changes within the spirit and scope of the appended claims.

I claim:

1. In a flap-type abrasive wheel wherein a rotary hub structure has a plurality of open-ended transverse peripheral slots with radially outwardly convergent side walls, a plurality of abrasive units for mounting in said slots respectively, each of said units comprising:

(a) a plurality of flexible abrasive leaves arranged in a pack with the total thickness of the pack dimensioned to fit between the outer convergent portions of said side walls of the corresponding slot;

(b) spacer means disposed in said pack transversely thereof adjacent one end of the pack and forming the pack with an enlargement at a first end of the pack for insertion into the slot, the spacer means being disposed within the slots in the rotary hub structure; and

(c) stitch means extending through leaves in the pack at the first end of the pack and the inserted spacer means at substantially the position of convergence of the side walls in the slots in the rotary hub structure to unify the leaves in the pack and the inserted spacer means, the combined thickness of the pack and the spacer means being greater than the gap between the outer convergent portions of the walls of the slot for anchorage of the pack in the slot by a wedging action.

2. A combination as set forth in claim 1 in which said stitch means comprises a metal staple.

3. A combination as set forth in claim 2 in which said spacer means comprises a single flat piece of metal.

4. In a flap-type abrasive wheel wherein a rotary hub structure has a plurality of circumferentially spaced transversely extending slots with the radially outward open portions of the slots of narrowed width, a plurality of disposable abrasive units for mounting in said slots respectively, each of said units comprising:

(a) a pack of flexible abrasive leaves with a base end for seating in one of said slots;

(b) spacer means interposed between the leaves of said pack at said base end and enlarging the base end to a greater width than said narrowed width of the slot and disposed within the slots in the rotary hub structure; and

(c) mechanical fastening means extending through the base end of the pack and the inserted spacer means at substantially the position of the narrowed widths of the slots in the rotary hub structure, said fastening means engaging the leaves of the pack for unifying the base end of the pack.

5. A combination as set forth in claim 4 in which said fastening means is an elongated means stressed in tension and holding the base end of the pack under compression.

6. In a flap-type abrasive wheel, the combination of:

(a) a rotary hub structure having a plurality of circumferentially based peripheral slots, each open at at least one end and each having a relatively great lateral dimension at its radially inward portion and a relatively narrow lateral dimension at its radially outward open portion;

(b) a plurality of packs of flexible abrasive sheets corresponding to said slots with a base end of each pack seated in the corresponding slot;

(c) spacer means interposed between sheets of each pack at the base end of the pack and disposed within the slots in the rotary hub structure and enlarging the base end of the pack to a thickness greater than said narrow width dimension of the slot; and

(d) at least one fastening element extending through said base end of the pack and the interposed spacer means at a position corresponding substantially to

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the narrow lateral dimension in the rotary hub structure, said fastening element engaging the opposite faces of the pack to unify the base end of the pack.

7. A method of fabricating a disposable abrasive flat unit for mounting in a peripheral transverse slot of the rotary hub structure wherein the peripheral entrance to the slot is of narrowed width and wherein the slot has a bottom wall and wherein the bottom wall of the slot and the peripheral entrance to the slot are separated by a particular distance, including the steps of:

(a) stacking flexible abrasive sheets to form a composite pack;

(b) interposing transverse spacer means of a length less than the particular distance between individual leaves at one end of the composite pack to increase the thickness of the end of the composite pack to a thickness greater than said narrowed width to the entrance of the slot; and

(c) extending fastening means through said thickened end of the composite pack and the interposed spacer means into engagement with the leaves of the composite pack at a position displaced from the end of the pack by a distance less than the length of the spacer means to unify the enlarged end of the composite pack.

8. A method as set forth in claim 7 in which the step of extending the fastening means through said enlarged end of the composite pack comprises piercing the composite pack and spacer means with stitch means.

9. A method of fabricating a disposable abrasive flat unit for mounting in a peripheral transverse slot of a rotary hub structure, wherein the peripheral entrance to the slot is of narrowed width and wherein the slot has a bottom wall and wherein the bottom wall of the slot and the peripheral entrance of the slot are separated by a particular distance, including the steps of:

(a) stacking flexible abrasive sheets to form a composite pack;

(b) interposing transverse spacer means between the successive individual packs at one end of the com-

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posite pack to increase the thickness of the end of the composite pack to a thickness greater than said narrowed width to the entrance of the slot where the spacer means has a length less than the particular distance; and

(c) applying force to said enlarged end of the composite pack to compress the enlarged end and simultaneously driving a metal staple through the enlarged end of the pack and the spacer means at a position displaced from the end of the pack by a distance less than the length of the spacer means to clinch the staple whereby terminating the applied force leaves the staple under tension in engagement with the opposite faces of the pack to maintain the enlarged end of the pack unified under compression.

10. A method as set forth in claim 7 including the additional step of disposing the composite pack in the slot in the rotary hub structure with the transverse spacer means being disposed entirely in the transverse slot in the rotary hub structure.

11. The method set forth in claim 9 including the additional step of disposing the composite pack within the transverse slot in the rotary hub structure with the spacer means being disposed entirely within the transverse rotary slot in the hub structure.

12. The method set forth in claim 10 wherein the abrasive sheets are initially stacked to form a plurality of individual packs having a total thickness to fit into the narrow width of the slot entrance and wherein the individual packs are then formed into a composite pack.

13. The method set forth in claim 11 wherein the abrasive sheets are initially formed into a plurality of individual packs having a total thickness to fit into the narrow width of the slot entrance and wherein the individual packs are then formed into the composite pack.

References Cited in the file of this patent

UNITED STATES PATENTS

2,843,980 Bernstein et al. ----- July 22, 1958