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ABRASIVE PACK WITH SELF-CONTAINED ANCHORING FLANGE  
AND REARWARDLY ADJACENT SUPPLEMENTAL LEAVES  
Filed May 24, 1968

3,512,311

FIG. 2

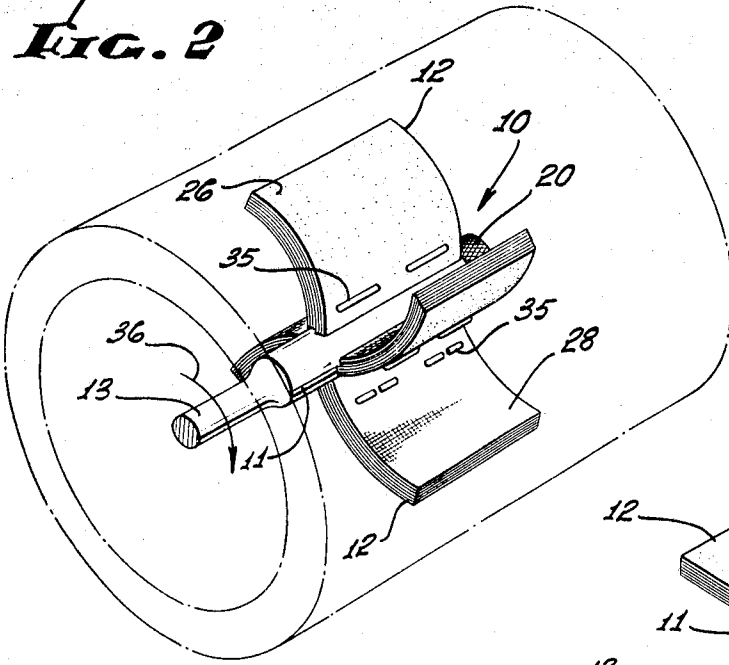


FIG. 1

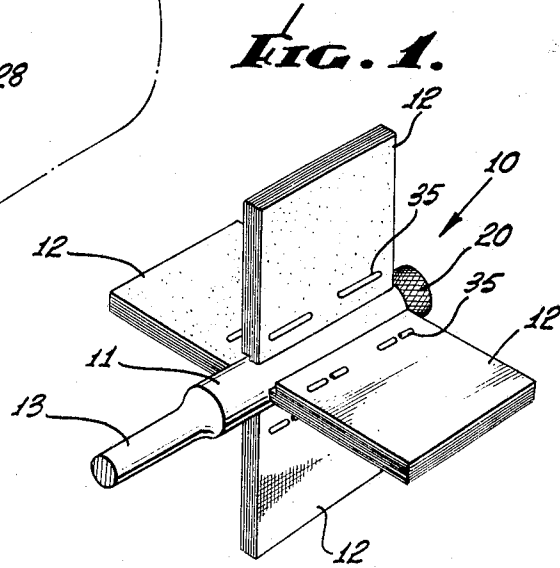


FIG. 4

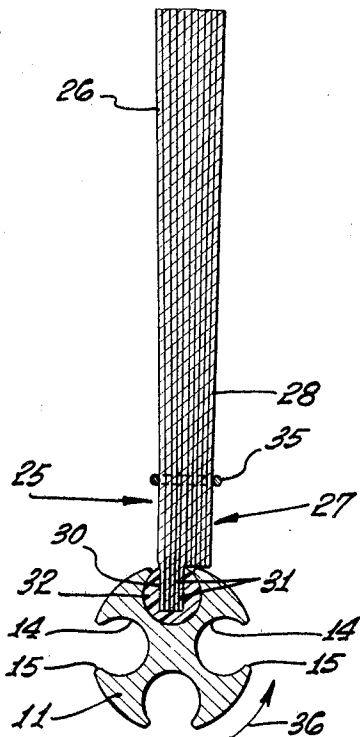
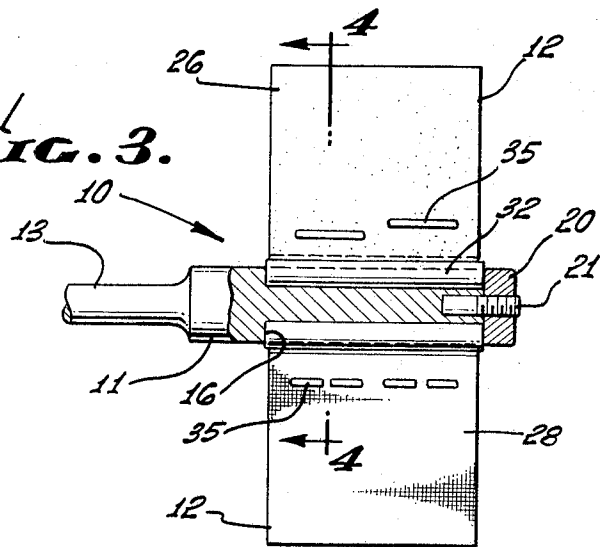


FIG. 3



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**ABRASIVE PACK WITH SELF-CONTAINED ANCHORING FLANGE AND REARWARDLY ADJACENT SUPPLEMENTAL LEAVES**

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Int. Cl. B24b 9/02

U.S. Cl. 51—334

6 Claims

**ABSTRACT OF THE DISCLOSURE**

For use in an abrasive wheel an abrasive pack of flexible abrasive coated leaves embodying one section with anchor means to removably hold the pack in a mandrel, the anchor means including a stiff or substantially rigid flange formed of certain of the leaves and supplemented by a retention element in combination with a second section having a plurality of leaves secured to the first section rotationally rearward of the first section and with their inner ends terminating adjacent the periphery of the mandrel for bracing contact therewith during rotation of the wheel.

**BACKGROUND OF THE INVENTION**

Reference is made to Gillett U.S. Pat. No. 3,212,219 granted by mesne assignment to Merit Products, Inc., assignee of the present application. In that patent there is disclosed a method of fabricating a unitary pack of abrasive leaves with an enlargement at one end of the pack for anchoring the pack in an undercut slot of a rotary hub structure. This involves applying adhesive to one end of the pack, placing that end of the pack in a mold of substantially the same configuration as the slot of the hub, and forming an end enlargement for the pack by introduction of moldable material into the mold.

The structure thus produced is subject to the problem that the entire pack is employed in forming the anchor region, thus requiring either a relatively wide slot in the hub or a relatively limited number of leaves.

In order to obtain the benefit of multiple abrasive leaves, systems have been employed wherein a rigid plate has been inserted at the inner end of the pack and the pack stapled to the plate. Associated with the plate has been some form of element to prevent radial dislodgement of the plate from the hub. These forms require additional materials with resulting added weight, and additional fabricating steps.

**SUMMARY OF THE INVENTION**

The present invention utilizes in part the general teaching of U.S. Pat. No. 3,212,219 in the formation of a pack wherein a practical (limited) number of leaves are employed in the section with the anchor means. The latter is provided by adhesively laminating at least some of the leaves at their inner ends to form a stiff or substantially rigid flange of suitable thickness to be inserted in the slot of the hub or mandrel.

An enlargement for retention purposes is secured to the inner end of the flange. This may be provided in various ways, but the most convenient is to mold a rod-like portion along the inner end of the laminated leaves, as disclosed in the aforesaid Pat. No. 3,212,219.

Then a plurality of auxiliary leaves shorter than those from which the flange is formed are attached, as by stapling, to the first section. The outer ends of the auxiliary leaves are in a plane generally coincident with the outer ends of the first section. The inner ends of the auxiliary leaves terminate in a plane outwardly from the anchor enlargement, a distance such that when the pack is mounted in the mandrel, the inner (butt) ends of these

leaves are adjacent the peripheral surface of the mandrel.

It is important that the pack be installed in the mandrel with the auxiliary leaves rearwardly of the direction of rotation. This results in the desired increase in abrasive action; and the butt ends of the auxiliary leaves press against the surface of the mandrel and contribute an important bracing action against any tendency of the leaves to collapse when working.

**BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a perspective view of an abrasive wheel embodying packs of the present invention.

FIG. 2 is a perspective view of the abrasive wheel telescoped in working position within a cylinder workpiece shown in phantom lines.

FIG. 3 is a front elevation, partly in section, of the abrasive wheel of FIG. 1.

FIG. 4 is an enlarged sectional view taken on the line 4—4 of FIG. 3.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

A wheel 10 comprises a hub 11 and a plurality of abrasive packs 12 mounted thereon.

The hub is illustrated in the form of a mandrel having a circular cylindrical cross section, with a spindle 13 adapted for connection with any suitable rotary power source.

The mandrel is formed with a plurality of slots 14 parallel to the axis of the mandrel and having restricted openings 15, each opening being defined by parallel walls or shoulders which preferably are chamfered or rounded. Each of these slots terminates at one end in a shoulder 16 and is open at the other end.

In each of the slots is removably mounted one of the abrasive packs 12. They are retained against axial dislodgment by a nut 20 threaded on a stud 21 which extends from the mandrel.

Each pack is made up of a first section 25 of abrasive leaves 26, and a second section 27 of abrasive leaves 28. The leaves are usually fabric coated on one side with abrasive material, and are stiffly flexible with qualities resembling a weak leaf spring.

The first section may be made up of two or more leaves, and the second section will ordinarily include four or more leaves. The latter is by way of illustration and not of limitation.

The first section has the leaves laminated at their inner end region as shown at 30. This is achieved by applying any suitable adhesive 31 between the leaves and compressing them together. The leaves are thus bonded together and reduced in total thickness approximating the restricted opening in a slot of the mandrel later described. Epoxy cement is the preferable agent because when it cures a substantially rigid flange portion is formed by the lamination.

A rod-like enlargement 32 is molded along the edge of the flanged area. Conveniently, epoxy may be used to form the enlargement, and upon curing becomes substantially homogeneous with the epoxy of the flange. Additional details respecting one suitable method of fabricating the first section are set forth in Pat. No. 3,212,219 referred to above.

To the back side of the first section (as related to the direction of rotation), the second section is secured. The latter is formed of brasive leaves which are shorter than those of the first section. Their dimension is such that the outer ends lie in a plane generally coincident with that of the leaves in the first section, and they terminate inwardly in a plane generally coincident with a tangent of the mandrel and preferably in contact with or at least very close to the surface of the mandrel.

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This second section is compressibly stapled (or stitched) to the first section, as by staples 35.

In mounting the pack on the mandrel, the second section must trail the first section relative to the direction of rotation as indicated by arrow 36 in FIG. 4.

Thus, when the wheel is put to work, whether it be in a bore as shown in FIG. 2, or on the external surface of any workpiece, the pack will tend to twist and the leaves will flex as shown in FIG. 3, under the force resulting from pressure in applying the wheel to the workpiece. As the pack tends to twist (or rotate in the slot) the inner, butt ends of the second section will bear down against the surface of the mandrel. A bracing action for the whole pack thus supplements the resistance afforded by the laminated flange of the first section pressing against the edge of the constriction 15.

Although I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

What I claim is:

1. An abrasive pack adapted for installation in a rotatable mandrel having circumferentially oriented slots parallel to the axis of the mandrel and opening through the peripheral surface thereof, said pack comprising a plurality of abrasive sheets superimposed on one another in a form which includes a base portion and a work contact portion, the sheets being compressedly secured together in the region of their base portion, some of said sheets embodying an extension beyond the others at the base portion, said extensions being adhesively laminated together to form a flange which is substantially rigid relative to individual sheets, means for retaining

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the flange in a slot against centrifugal thrust, and other of said sheets being disposed rearwardly of the flange as taken from the direction of rotation and providing additional abrasive working surface, said other sheets terminating at their base portion end on a general plane by which their base edges will abut against the surface of the mandrel to brace the sheets against undue deflection when applied to a workpiece.

2. An abrasive pack as defined in claim 1 wherein the sheets are compressedly secured together in the region of their base portion by mechanical fastening elements.

3. An abrasive pack as defined in claim 1 for installation in a mandrel of the type defined wherein the slots are undercut with restricted openings, the means for retaining the flange in a slot against centrifugal thrust being a rod-like element secured adjacent the edge of the flange, the rod-like element having a diameter greater than the width of the slot opening.

4. An abrasive pack as defined in claim 3 wherein the rod-like element is formed of a moldable material which is bonded to the adhesive of the lamination.

5. An abrasive pack as defined in claim 4 wherein the laminate adhesive and the moldable material include an epoxy resin which cures as a homogeneous unit.

6. An abrasive pack as defined in claim 3 wherein the flange has a width sufficient so that it will extend outwardly from the slot and is adapted to bear against a wall of the restricted opening.

#### References Cited

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