

[54] **HINGE TYPE FILL UNIT WITH INTEGRAL PIN CONSTRUCTION FOR CYLINDRICAL HUB UNITS**

[75] Inventor: **James A. Belanger**, Livonia, Mich.

[73] Assignee: **Belanger Inc.**, Northville, Mich.

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[21] Appl. No.: **330,630**

[52] U.S. Cl. **51/334**

[51] Int. Cl. **B24b 9/02**

[58] Field of Search **51/334-337;**
15/230, 11-17

[56] **References Cited**

UNITED STATES PATENTS

2,423,992	7/1947	Nordgren et al.	51/334
2,608,816	9/1952	Lembke	51/336 X
3,533,198	10/1970	Burns	51/337
3,548,551	12/1970	Block	51/337
3,621,622	11/1971	Belanger	51/337
3,747,285	7/1973	Block	51/334

Primary Examiner—Othell M. Simpson
Attorney, Agent, or Firm—Whittemore, Hulbert & Belknap

[57]

ABSTRACT

Circumferentially spaced finishing packs or fills each include an extruded length of stock which in one embodiment is a forked clip mount clamping a stack of abrasive sheets as part of the pack. In another embodiment, it is a mount in a simpler form of extrusion cross-section having a portion embedded in the stack. In either form, it has an integral, radially inwardly extending mounting element of key-like cross-section presenting an enlarged cylindrical bead or pin portion, which in some installations and as herein illustrated has a radially slidable mating and pivotal interfit in axially registered keyhole recesses of a hub of the wheel. These pack mounts are preferably extrusion molded and have axially spaced neck portions formed therein and integrally connecting the stack-engaging portion with the pin or bead portion. For installations of the sort described, the axial width of the neck portions of the extrusion is a trifle less than that of the axial spacing of certain radial disc-like rib formations of the hub between which said formations lie in use. Hence each finishing pack may in such case swing freely in use about the axis of the mounting bead of the extrusion. In other cases the pivotal action may not be present.

10 Claims, 8 Drawing Figures

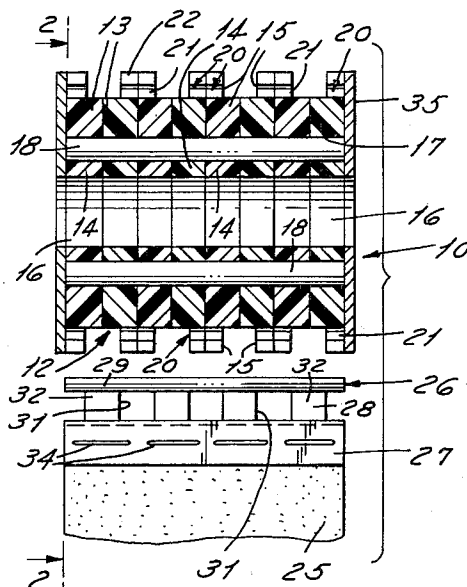


FIG. 1

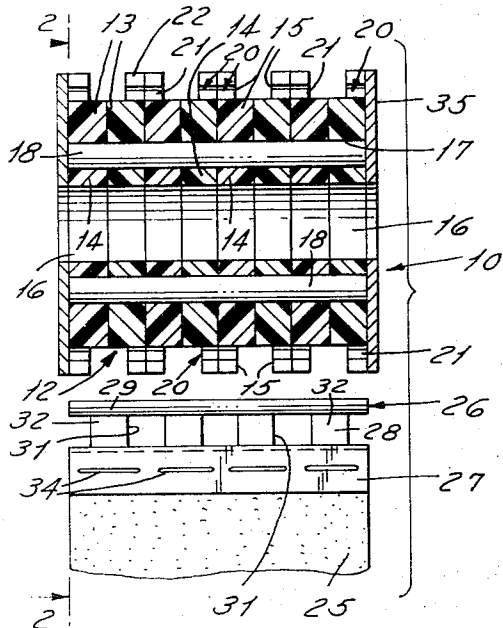


FIG. 2

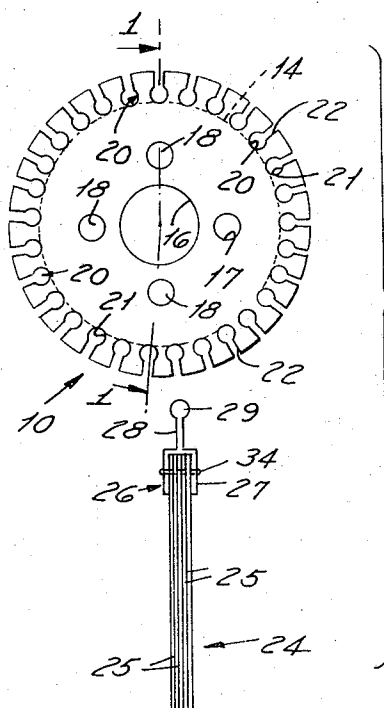


FIG. 3

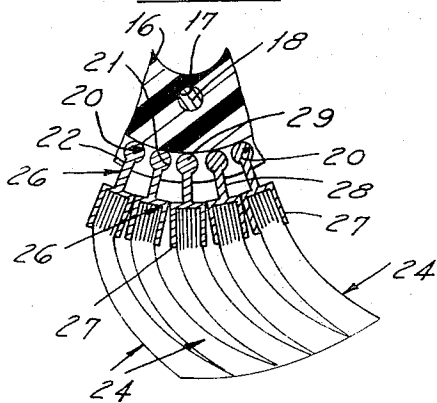


FIG. 4

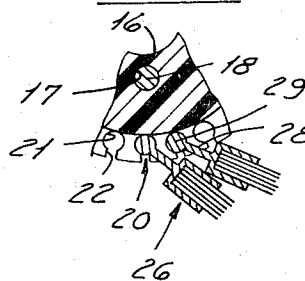


FIG. 5

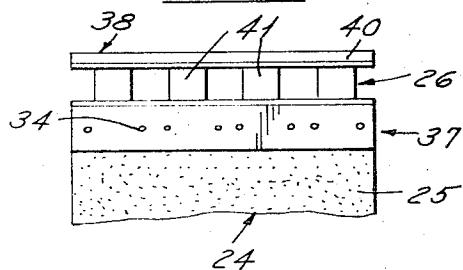
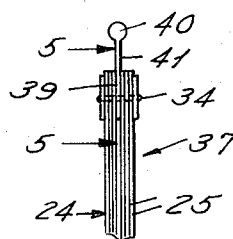
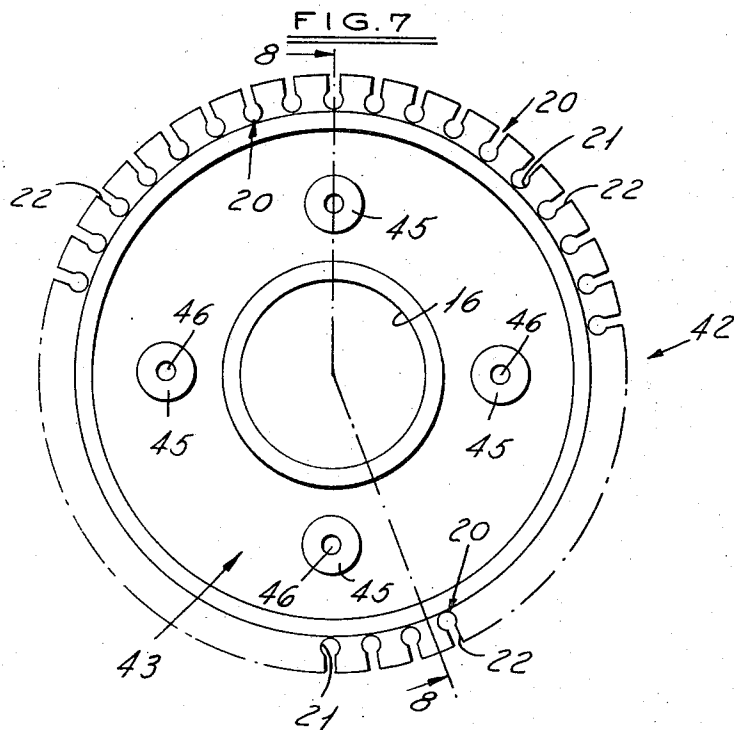
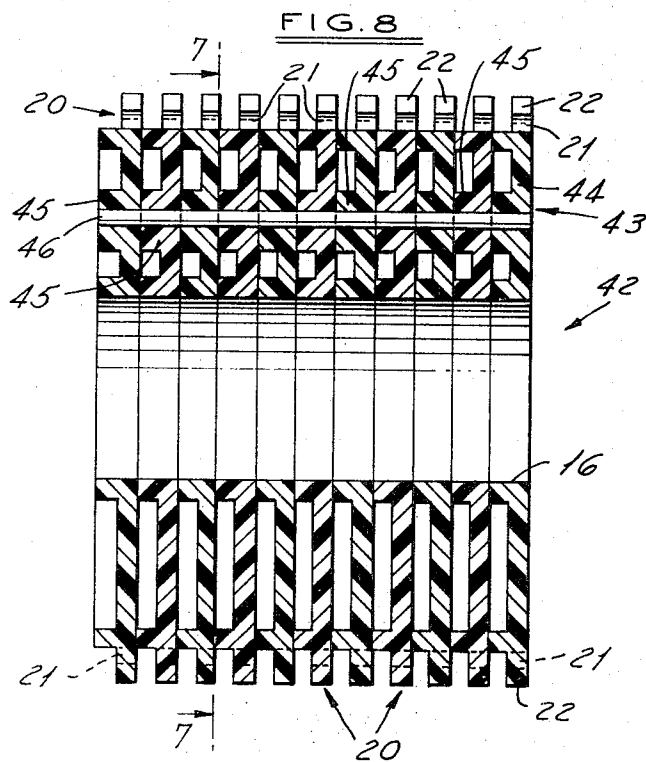


FIG. 6





HINGE TYPE FILL UNIT WITH INTEGRAL PIN CONSTRUCTION FOR CYLINDRICAL HUB UNITS

CROSS REFERENCE TO RELATED APPLICATIONS

My co-pending application, Ser. No. 155,733, filed June 23, 1971 now abandoned, discloses various embodiments of extruded metal or plastic abrasive-mounting clips of a considerably different nature for the same general purpose as those of the present improvement. Another co-pending application of mine, Ser. No. 330,629, filed Feb. 8, 1973, discloses and claims a fixed-type fill or pack unit having an integral clip or related type mounting means generally similar to what is disclosed herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The replaceable hinged finishing pack and hub unit or assembly of the invention finds application in various types of buffing wheels, polishing wheels, non-solid type grinding wheels, and other related applications for the rough or finish abrasive working, brushing, burnishing or polishing of metal or other rigid parts.

2. Description of the Prior Art

Abrasive pack-type units of a nature and use generally similar to those disclosed herein are the subject matter of prior patents to Block, U.S. Pat. No. 2,804,730 of Sept. 3, 1957, Peterson, U.S. Pat. No. 2,984,053 of May 16, 1961; Block, U.S. Pat. No. 3,058,269 of Oct. 16, 1962, and Burns, U.S. Pat. No. 3,533,198 of Oct. 13, 1970, but lack disclosure of special structural features and functional attributes such as are hereinafter described in detail.

My U.S. Pat. Nos. 3,455,068 of July 15, 1969, and 3,535,833 of Oct. 27, 1970, relate to rotary finishing tools having a replaceable finishing pack feature on which the present invention is an improvement.

SUMMARY OF THE INVENTION

Each fill or pack unit according to the invention comprises a clip or equivalent component clamping or otherwise supporting a stack of abrasive sheets of a finishing pack, said components being inexpensively extruded in quantity in metal or plastic, requiring only the further forming operation of severing of a length of the extrusion stock into individual lengths, and when needed, punching or otherwise aperturing the stock thereof radially outwardly of its integral pivoting bead or pin portion, for a purpose which will appear. The clip is easily and quickly mounted to the hub, being then end-confined, typically although not always, by plate components removably attached to the hub structure, thus enabling clipped abrasive pack units to be removed when worn and quickly replaced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view in axial section through components of the improved wheel or drum construction on a line corresponding to broken line 1—1 of FIG. 2, a typical abrasive pack pursuant to the invention being shown before assembly in an axial position relative to the hub corresponding to the position it will have as finally assembled to the hub;

FIG. 2 is a similarly exploded end elevation view, as from the line 2—2 of FIG. 1, of the hub and pack components;

FIG. 3 is a fragmentary view in section, in a radial plane at 90° to the axis of the wheel, during the axially slidable mounting of abrasive packs to the hub;

FIG. 4 is a fragmentary sectional view similar to FIG. 3, but indicating the swingability of the abrasive packs about individual axes of their respective integral clip hinges in the completed assembly of the parts;

FIG. 5 is a fragmentary view of a modified and simpler type abrasive pack featuring an integral stack holding and hinging component or sub-assembly as generally contemplated by the invention, being in section on a line corresponding to line 5—5 of FIG. 6;

FIG. 6 is a fragmentary end elevation of the subassembly or unit of FIG. 5;

FIG. 7 is a sectional view on line 7—7 of FIG. 8 of a hub structure of a larger size and different orientation of its component discs than the unit of FIGS. 1—4; and

FIG. 8 is a sectional view of said structure on a line corresponding to broken line 8—8 of FIG. 7, end confining plate means being omitted for simplicity.

DESCRIPTION OF PREFERRED EMBODIMENTS

FIGS. 1—4, inclusive, show one embodiment of the wheel or drum structure of the invention, generally designated by the reference numeral 10. It comprises a hub body assembly 12, relatively massive and drum-like in nature for its dimensions, which is constituted by an assembly of like, radially outwardly flanged disc member 13, each presenting an inner circular, generally rectangular-sectioned body portion 14, from which an integral flange or rib 15, also continuously circular in outline, projects radially outwardly.

It is contemplated that these hub discs be molded from a suitable phenolic, a glass-filled nylon, or other rigid thermoplastic or thermosetting plastic material, or they may be die-cast, molded of powdered metal, etc., or conventionally machined of metal; and in the formation of each there is provided a central bore at 16, where the assembly 12 of such discs is key or otherwise mounted to an appropriate driver shaft (not shown). Radially outwardly of this bore formation, the disc bodies 14 are similarly provided with like smaller diameter bores 17 paralleling the disc axis, which bores, with the disc members in axial assembly, are axially aligned accurately with one another to receive driver pins 18, shown four in number, through which connection the assembly rotates as a unit.

Finally, each of the disc components 13 is provided in its radially outwardly extending flange with a circumferential series of equally spaced, keyhole-shaped axial through-openings 20, each including a cylindrical inner pivotal bore portion 21 opening outwardly to a circumferentially restricted neck or throat slot portion 22. For maximum hub strength the inner bore portions 21 lie inwardly flush with the outer periphery of the disc body portions 14. The keyhole formations 20 slidably receive integral mating portions (later described) of mounting components of each of a series of abrasive packs or fills, such as are generally designated 24.

The units 24 will preferably be constituted alike of a stack of flexible abrasive sheets 25 of the sort described in my above-identified patents, by further preference being of sisal or cloth woven or in cord form, such as

a uniwoven nylon "Behr-tex" tampico. Abrasive sheets of a known slashed type are also contemplated. Each such stack of sheets 25 is held in the pack assembly 24 by an improved clip 26 pursuant to one embodiment of pack of the invention.

In said one embodiment (FIGS. 1-4 inclusive) the clip 26 is integrally molded one-piece of an extrusion of aluminum or other selected rigid-setting metal or plastic to afford at a radial outer portion thereof a pair of parallel fork arms 27 integrally connected to an intermediate radially outwardly extending and axially interrupted throat or neck formation 28. The latter is of a width, in the circumferential sense, to fit slidably in the neck or throat portions 22 of the set of registered disc keyhole slots 20, as appears in FIG. 3; and the neck formation 28 terminates integrally and radially inwardly in a full length cylindrical pivot bead or pin portion 29 shaped for a sliding assembly in the cylindrical pivotal portion 21 of the registered keyhole openings 20.

Further, as illustrated in FIG. 1, the neck formations 28, each of almost the same overall axial length as clip 26 as a whole, are each interrupted along the axial length thereof, as by stamping or milling at 31, to provide individual tongue-like neck or throat parts 32. These are of an axial dimension to fit within a corresponding space 33 existing between successive rim or flange portions 15 of the set of hub discs 13, there being adequate side clearance in the final assembly to permit a free swing of the abrasive packs 24 about individual parallel axes at pin elements as the wheel 10 operates in abrading, polishing, or otherwise finishing a workpiece, as indicated in FIG. 4 of the drawings. However, in certain installations the individual pivoting of packs on a hub may not be in order, desired or necessary, as illustrated and described in my copending application, Ser. No. 330,629, mentioned above. Staples 34 assist in clamping the sheets of pack 24 between the arms 27 of clip 26, as also shown in my application Ser. No. 155,733.

A pair of like end plates 35, at least one of which is removably attached to the hub disc assembly, as by restraining nut or like means threaded on the driver shaft to be drivably mounted in hub bore 13 (as suggested in patent to Root U.S. Pat. No. 339,585 of Apr. 6, 1886). Such removable plate means restrains the clips 26 and disc registering pins 18 from endwise movement; and it is seen that upon removal of one of the plates 35 any pack 24 may be axially slidably removed for replacement.

FIGS. 5 and 6 of the drawings illustrate a somewhat modified embodiment of an abrasive pack unit which is specially designated 37, in particular a mounting clip-type part 38 thereof, capable of assembly with the composite disc hub structure 12 of FIGS. 1-4 inclusive. In this case, the forked arm clip 26 of those figures has its equivalent in the simpler plate-like extrusion 38. It has a single flat and radially inwardly extending neck formation 39 embedded at its radially outer portion in the center of the stack 25 of abrasive sheets, with a radially inner terminal cylindrical pivoting pin or bead portion 40 slidably engageable in a keyhole opening in the manner described above. Neck formation 39 is subdivided into axially spaced individual and integral neck or throat parts 41 spaced from one another as and for the purpose described above in reference to the portions 32 of clip 26. By preference, the sheet stack 25

is adhesively bonded and heat and pressure sealed along its radially inner edge, with the series of staples 34 applied through the inner portion of mounting member 39 to complete the pack assembly 37.

FIGS. 7 and 8 illustrate another wheel or driving embodiment of the invention, generally designated by the reference numeral 42, in which the hub body structure 43 comprises a plurality of like disc parts 44 optionally produced in the manner previously described in regard to discs 13. However, in this case discs 44 have the same orientation relative to one another, i.e., front-to-back, along the axial length of the hub assembly 43, rather than the back-to-back relationship of the embodiments of FIGS. 1-4. Features of the pack-receiving keyhole structure are the same as previously described, hence are designated by similar reference numerals. Discs 44 are each provided with a circumferentially spaced series of circular side bosses 45 through which four registering and keying pins 46 extend axially.

End confining plates like the plates 35 of the first embodiment may be employed; and in all other respects the operations in use and advantages of the assembly 42 are the same as in the embodiments of FIGS. 1-4 and 5, 6.

What is claimed is:

1. A finishing unit comprising fill material to be mounted in a position radially outwardly of the axis of a rotary driver structure, and a unitary member for supporting and so mounting said fill material on such structure, said member being in a solid cross-section throughout in a plane at 90° to said axis as thus mounted and presenting a radially outer portion secured to said material, a radially inner, axially extending and transversely enlarged bead-like mounting portion integral with said outer portion and adapted for a mating engagement with said driver structure, and an intermediate neck portion integrally connecting said bead-like and radially outer portions, said neck portion having at least one opening between integral axially spaced neck elements thereof to afford clearance for a free swing of said unitary member on said driver structure about said bead-like portion as an axis.

2. A finishing unit comprising fill material to be mounted in a position radially outwardly of the axis of a rotary driver structure, and a unitary member for supporting and so mounting said fill material on such structure, said member being in a solid cross-section throughout in a plane at 90° to said axis as thus mounted and presenting a radially outer portion secured to said material, an intermediate neck portion, and a radially inner, axially extending and transversely enlarged bead-like mounting portion integral with said outer portion and neck portion, said neck portion and bead-like mounting portion being shaped for an axially sliding mating engagement with a correspondingly sectioned opening of said driver structure, said neck portion having at least one opening between integral axially spaced neck elements thereof to afford clearance for a free swing of said unitary member on said driver structure member about said bead-like portion as an axis.

3. The finishing unit of claim 1, in which said three portions are components of an extruded axially elongated length of stock.

4. The finishing unit of claim 2, in which said three portions are integral components of an extruded axially elongated length of stock, said member being substan-

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tially coextensive axially overall with said fill material.

5. The finishing unit of claim 1, in which said radially outer portion of said mounting member has forked arms between which the fill material is clamped.

6. The finishing unit of claim 2, in which said radially outer portion of said mounting member has forked arms between which the fill material is clamped.

7. The finishing unit of claim 1, in which said radially outer portion of said mounting member has an integral coplanar plate element by which the fill material is carried:

8. The finishing unit of claim 2, in which said radially outer portion of said mounting member has an integral coplanar plate element by which the fill material is carried:

9. The combination in a finishing wheel of a circumferential series of finishing units each in accordance with claim 1, and a driver structure as therein referred to, said structure being provided with a series of like

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circumferentially spaced sets of aligned openings paralleling the axis of the driver structure, in each of which sets the bead-like mounting portion of a finishing unit is mounted with a substantially mating fit.

5 10. The combination in a finishing wheel of a circumferential series of finishing units each in accordance with claim 2, and a driver structure as therein referred to, said structure being provided with a series of like circumferentially spaced sets of aligned openings paralleling the axis of the driver structure, in each of which sets the bead-like mounting portion of a finishing unit is slidably mounted with a substantially mating fit, said driver structure having at least one radially outwardly extending rib formation having said openings and being straddled by axially spaced neck elements of said neck portion of the mounting member, said units being pivotal relative to said driver structure about individual axes of said bead-like portions.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,842,547 Dated October 22, 1974

Inventor(x) James A. Belanger

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The following paragraph, which is a part of the Abstract, was omitted from the printed patent:

"The hub is shown as constituted in a drum-like form by an axially extending series of circular disc components of identical cross-sectional outline in a plane including the hub axis. In one embodiment said hub discs are oriented oppositely in said series so that similar, radially outwardly extending integral rib or flange portions of successive discs are disposed in flush back-to-back axial engagement with one another. In another embodiment the disc orientation is uniform throughout the series, i.e., the discs are in front-to-back axial abutting contact."

(Paragraph 1, page 2 of the application).

Signed and sealed this 6th day of May 1975.

(SEAL)

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks