

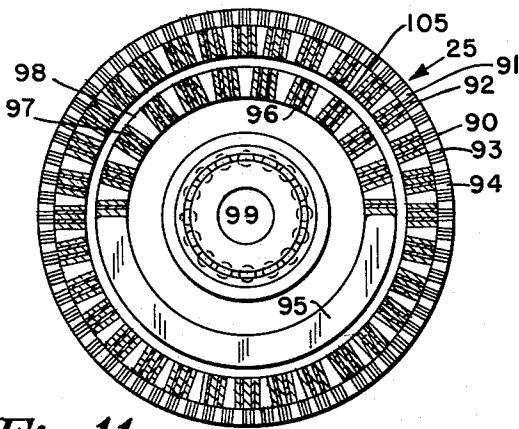
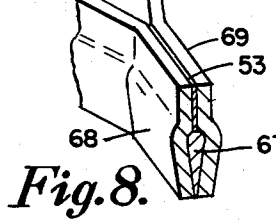
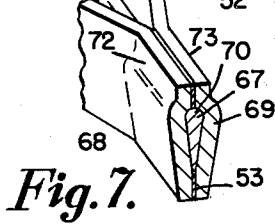
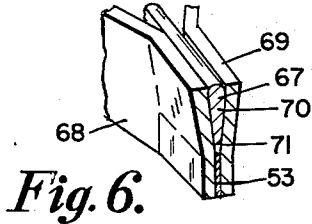
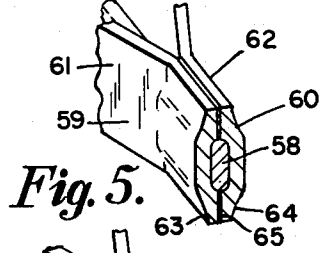
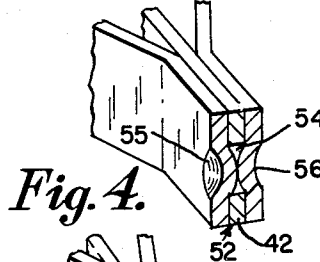
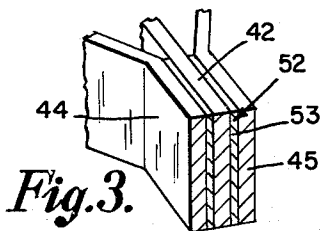
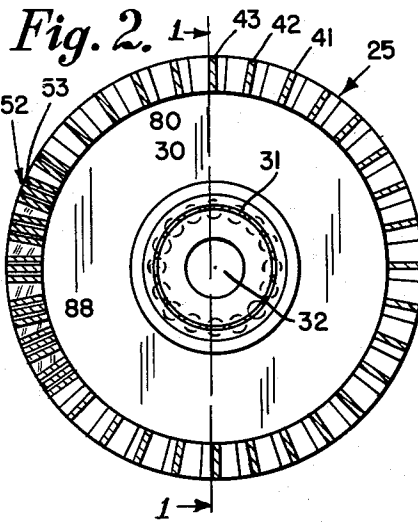
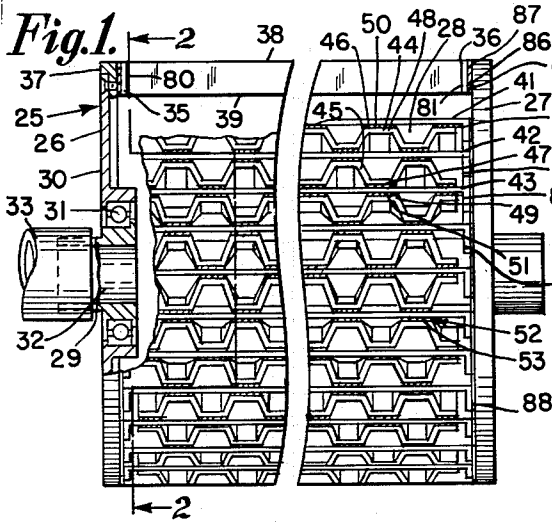
July 12, 1966

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3,259,961

CYLINDRICAL HONEYCOMB ROLL

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3,259,961

CYLINDRICAL HONEYCOMB ROLL

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This invention relates to an improved cylindrical honeycomb roll for use as a doffer roll, card roll, suction roll or the like.

In my Patents 3,100,928, granted August 20, 1963, and 3,139,375, granted June 30, 1964, a cylindrical honeycomb roll is disclosed in which the thin strip openwork forms full hexagonal apertures and certain strips are adhesively secured in radial slots in the end members. Such radial slotting while providing excellent support to the openwork, adds to the cost of manufacture.

The improved honeycomb roll of this invention eliminates radial slots, by including a straight longitudinal strip alternately with each undulate, or sinuate, bent strip, the straight strip having right angularly bent integral tongues, brazed to the inner face of the end members. The apertures are thus half, rather than full, hexagon in configuration but the straight longitudinal strips add considerable resistance to compression, or distortion and the strip material can be of reduced thickness to partially compensate for any loss in area of the flow apertures. By reason of the increased strength and lower cost of the improved roll, it lends itself to use as a doffer, card or suction roll and especially for supporting a thin perforate cylindrical skin of finer honeycomb, card clothing or the like.

The principal object of the invention is to provide a low cost, rugged, honeycomb roll, having sufficient strength to resist compression or distortion when used in various mill applications, for example, as a suction roll, doffer roll or support roll.

Another object of the invention is to provide a roll having a cylindrical honeycomb openwork with alternate straight and undulated thin metal strips, the nodes being connected to the straight strips by a zinc alloy layer and the straight strips having tongues affixed to the end members by a silver braze.

A further object of the invention is to provide such a roll with serrated outer edges on the strip for point support of work, with cooperating holes and dimples at the nodes of the strips for a mechanical mutual support and to provide strips of tapered cross section to increase the area of the flow passages, or apertures.

Still another object of the invention is to provide such a roll with an inner stationary hollow cylindrical shell, solid and imperforate in the lower portion and formed of honeycomb strips in the upper portion, the honeycomb roll being resistant to centrifugal force to maintain a slight clearance between the inner cylinder and outer roll.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawing and from the drawing in which:

FIGURE 1 is a front view, in section on line 1—1 of FIGURE 2, of an improved roll constructed in accordance with the invention;

FIGURE 2 is an end view in section on line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary end view showing the nodes connected to the straight strips by a layer of zinc;

FIGURE 4 is a view similar to FIGURE 3 showing the nodes mechanically connected by holes and dimples;

FIGURE 5 is a similar view showing a straight strip of less height than the height of the bent strips;

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FIGURES 6, 7 and 8 are similar views showing a straight strip of tapered cross section at various desirable positions relative to the bent strips;

FIGURE 9 is a view of a honeycomb strip, before bending, and having a serrated upper edge suitable for use as card clothing or point support of sheet material;

FIGURE 10 is a fragmentary isometric view of a fine, thin honeycomb layer constructed in accordance with the invention using strips of the type shown in FIGURE 9, and

FIGURE 11 is an end view, in section showing a roll constructed in accordance with the invention supporting a layer of finer honeycomb on the outside and having a combined solid and honeycomb cylinder in the inside.

As shown in FIGURES 1 and 2, the improved rotary cylindrical roll 25, of the invention, includes a pair of oppositely disposed, parallel, longitudinally spaced, circular end members 26 and 27, with the hollow, cylindrical, honeycomb openwork 28 extending therebetween. Each end member is preferably supported on a stationary hollow bearing journal 29, by means of a bearing plate 30 and bearing 31, the hollow journal forming a fluid conduit 32 connecting the interior of the roll to a source of positive or negative air pressure 33. Each end member also includes an annular, peripheral, inner face such as 35 or 36, the faces 35 and 36 preferably being flat, smooth and normal to the longitudinal axis of the roll. The end members are unslotted, and are, conveniently, in the form of circular, flanged rings 37 detachably secured to the bearing plates 30.

The hollow cylindrical honeycomb openwork 28 has a cylindrical outer face 38 and cylindrical inner face 39 and is formed of thin metal strips, such as stainless steel, upstanding on edge and bent to form radially extending flow passages into the interior of the roll. Openwork 28 consists of a plurality of alternate straight, thin strips such as 41, 42 and 43 and undulated, sinuate or half hexagonally bent thin strips 44 and 45, the strips extending axially from the inner face 35 of one end member to the opposite inner face 36 of the other end member. The terms "undulate" and "sinuate" are used herein to include half hexagonal bent strips, or any other equivalent configuration which will produce a useful pattern of flow passages, a useful embossing pattern, or the like.

However, the preferred configuration, is that shown, in which the nodes 46 and 47 of adjacent bent strips are oppositely disposed and half hexagonal to jointly define a full hexagon, split by a straight strip such as 42. Thus the outer faces 48 and 49 are elongated and flat to flatwise engage the corresponding area 50 and 51 of the adjacent straight strips. The flat outer faces 48 and 49 of all of the nodes of all of the bent strips such as 44 and 45 are firmly and securely united to the straight strips by connecting means 52, which is preferably a layer 53 of relatively hard infusible metal, for example a zinc dip. The honeycomb structure is dipped in a bath of pure molten zinc for excellent results.

However, other connecting means may be used, for example, mechanical interlocking means in the form of spaced holes 54 in the straight strips and spaced dimples 55 and 56 impressed in the bent strips, the dimples of adjacent nodes meeting within the hole of the straight strip therebetween (FIG. 4).

The straight strips are preferably equal in height to the bent strips but, as shown in FIGURE 5, each straight strip 58, corresponding to straight strips 41, 42 and 43, may be of lesser height than the adjacent bent strips 59 and 60, corresponding to strips 44 and 45. The straight strips 58 may be positioned midway of the height of the bent strips 59 and 60, the nodes 61 and 62 of the latter being crimped as at 63 and 64 for mutual interlocking, and a layer 65 corresponding to layer 53 may also be used to unite the nodes laterally to the straight strips.

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In FIGURE 6 the straight strip 67 corresponding to strips 41, 42 and 43 is of less height than the bent strips 68 and 69 corresponding to strips 44 and 45, and is of tapered cross section with the wider edge 70 on the outside and the thinner edge 71 on the inside of the openwork. The strips 67 are at the outside face of the openwork in FIGURE 6, intermediate of the faces of the openwork in FIGURE 7 and at the inside face of the openwork in FIGURE 8. The bent strips 68 and 69 may be flat and uncrimped as in FIGURE 6, or the nodes 72 and 73 may be dimpled, embossed or crimped, toward each other to form a seat for the straight bar. A suitable layer such as 53, may also be used to unite the nodes 72 and 73 to each other and to the straight strips 69.

As shown in FIGURES 9 and 10 a plurality of flat strips 74, may be formed with sharp pointed teeth, or serrations, 75, then bent into sinuate configuration, as shown at 76 and alternated with straight strips 77 having tongues 78 to create a honeycomb openwork 79, similar to openwork 28. The multiplicity of teeth 75 provide point support to a sheet-like work carried on a roll such as 25, or the openwork 79 may be used as card clothing on a carding roll, doffer roll or the like. For additional point support, the straight strips 77 may also have serrated upper edges.

All of the straight strips 41, 42 and 43 of the openwork 28, and all of the other embodiments of the straight strips shown at 58, 67 and 75 are provided with integral right angularly bent tongues such as 80, 81, 82, 83, 84 and 85 at the opposite terminal ends thereof. The outer face 86 of each tongue is in flatwise engagement with the inner, peripheral face 35 or 36 of the adjacent end member 26 or 27 and a layer 87 of relatively hard infusible alloy firmly and securely affixes the tongue to the face.

The layer 87 is preferably a low temperature silver braze alloy 88, this having been found to support the ends of the openwork between the inner faces under extreme stresses and strains caused by compression and centrifugal forces on the openwork during rotation or by temperature caused expansions and contractions of the openwork. A very satisfactory low temperature silver braze alloy, for the above purpose, is "Easy-Flo 45" commercially available from Handy & Harman of Bridgeport, Connecticut, this product being 45% silver and flowing freely at about 1145° F.

The straight strips are preferably alternated with the bent strips to retain the circular section of the roll. If a straight strip were placed between each pair of bent strips the section of the roll becomes polygonal with flats across the paired bent strips, this being objectionable in most installations. When a full hexagonal pattern of flow passages is desired, for example in a breast roll, the construction of FIGURES 5, 7 and 8 may be used, the straight strip being below the level of the outer face of the openwork and the nodes being embossed and offset at the outer diameter into node to node contact. In a doffer roll, the area of the inside of each cell remains about equal to the area of the outside of each cell, while still providing space at the outside of the openwork for a straight strip alternated with each bent strip, for example as shown in FIGURE 6.

In FIGURE 11, the roll 25 of the invention is provided with a second cylindrical, honeycomb openwork 90, substantially identical in structure with the openwork 28 and affixed to the inner faces of the roll end members by the tongues 91 of the straight strips 92. However, the straight strips 92 and undulate strips 93 are of smaller dimensions than the strips of openwork 28 so that the flow passages 94 are relatively fine and the openwork is relatively thin as compared to the relatively thick and coarse openwork 28. The fine, thin openwork 90 may thus be used for delicate embossments while supported by the more rugged openwork 28.

Within the roll 25, a hemi-cylindrical hollow shell 95 of solid, imperforate material such as metal, is mounted

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in the lower portion and a hemi-cylindrical hollow shell 96 of honeycomb openwork is mounted in the upper portion to mutually form a stationary hollow cylinder 97. The outer face 98 of cylinder 97 has a slight clearance from the inner face 105 of roll 25, the clearance being maintained during rotation of the roll because of the improved construction of the roll 25. A suitable air conduit means 99, corresponding to the hollow bearing journal 29, is provided to connect the interior of the cylinder 97 with the air source 33. The roll 25 may thus be used as a rotating suction roll, with a stationary suction box therewithin in the form of cylinder 97 and the honeycomb shell 96 forms an effective seal in combination with slidable side walls or deckles not shown.

The bonding agent used for layer 53, whether zinc, solder, epoxy resin or silver braze alloy, flows between the interfaces of the strips but zinc dipping is preferred, for the layers 53, because the zinc completely covers the strips to protect the mild steel therein from rusting.

I claim:

1. A rotary cylindrical roll comprising:

a pair of spaced apart, parallel, circular end members, each having an annular peripheral, inner face;

a plurality of alternate straight, thin strips and undulated bent, thin strips, extending axially between, and spaced around, the said annular, inner faces of said members to form a cylindrical honeycomb openwork, said bent strips each having uniformly spaced, oppositely disposed, flattened nodes in engagement with the straight strips on each side thereof;

means connecting each said node to the adjacent straight strip for mutual support of said strips;

an integral tongue bent at right angles from each said straight strip at each opposite terminal end thereof, said tongues being in flatwise engagement with the inner peripheral faces of said end members, and

a layer of relatively hard, infusible alloy firmly and securely affixing each said tongue to the adjacent inner peripheral face of one of said end members.

2. A rotary cylindrical roll as specified in claim 1, wherein:

said means connecting said nodes to said straight strips is a layer of zinc.

3. A rotary cylindrical roll as specified in claim 1 wherein:

said means connecting said nodes to said straight strips comprises a plurality of spaced holes in each said straight strip;

and a plurality of laterally projecting dimples in each said bent strip, said dimples being firmly seated in said holes.

4. A rotary cylindrical roll as specified in claim 1 wherein:

said layer is a silver alloy, and

said connecting means is zinc.

5. A rotary cylindrical roll as specified in claim 1 wherein:

each said straight strip is of the less height than said undulated strips, and each said straight strip is mounted at the same radial distance from the axis of said roll.

6. A rotary cylindrical roll as specified in claim 1 wherein:

each said straight strip is of tapered cross section, the wider portion thereof facing outwardly and the narrower portion facing inwardly relative to said roll face.

7. A rotary cylindrical roll as specified in claim 1 plus: a plurality of integral, serrations on the outer edge of at least one set of said alternate strips for providing point support to work carried on said roll.

8. A rotary cylindrical roll as specified in claim 1 plus: a second cylindrical honeycomb openwork, supported on the outside of said first mentioned cylindrical honeycomb openwork, said second openwork being

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relatively thin and fine and said first face being relatively thick and coarse.

9. A rotary cylindrical roll as specified in claim 1 plus:
a hollow, hemi-cylindrical, shell of solid, imperforate,
material mounted within the lower portion of said roll;

a hollow, hemi-cylindrical shell of honeycomb, perforate
material mounted within the upper portion of said
roll;

said shells mutually forming a full hollow cylinder hav-
ing a slight clearance from the inside of said roll,
and

air conduit means leading from the interior of said
shells to the exterior thereof.

10. A hollow cylindrical roll comprising:

a pair of roll ends, each having bearing means for
rotatably supporting said roll and each having an
annular, peripheral inner face;

a hollow cylindrical honeycomb openwork extending
between said roll ends to form the cylindrical face of
said roll;

said openwork having alternate straight, and half-hex-
agonally bent, thin, metal, strips, secured to each
other at the nodes of said hexagons for mutual sup-
port, and

said straight strips, each having an integral right angu-
lar tongue at each opposite end thereof secured to
one of said annular, peripheral inner faces for sup-
porting said openwork on said roll ends.

11. A doffer roll comprising:

a hollow cylinder having a pair of circular end members,
each including a roll bearing and each having an in-
ner face normal to the axis of the roll;

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a honeycomb openwork extending between said end
members, said openwork being formed by a plurality
of thin, longitudinally extending, alternately straight
and sinuate strips, said straight strips terminating at
each opposite end in an integral right angular tongue
silver brazed to the inner face of one of said roll ends
for supporting said openwork;

and a stationary, hollow, roll journal supporting said
roll bearings, said journal forming a conduit for con-
necting the interior of said roll to a source of positive
or negative air pressure.

12. A roll as specified in claim 11

wherein the outer edges of at least said sinuate strips
are serrated to form sharp pointed teeth.

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