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SERRATED CONTACT WHEEL

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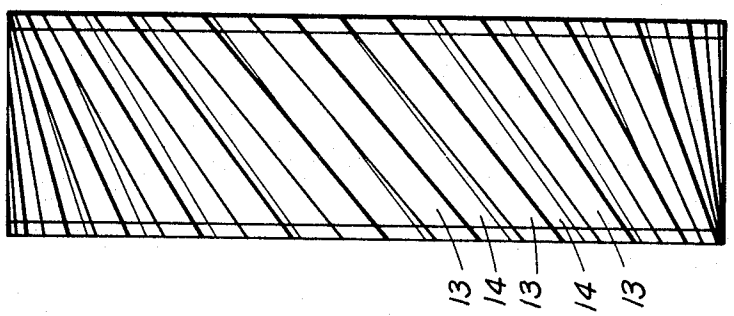


FIG. 3

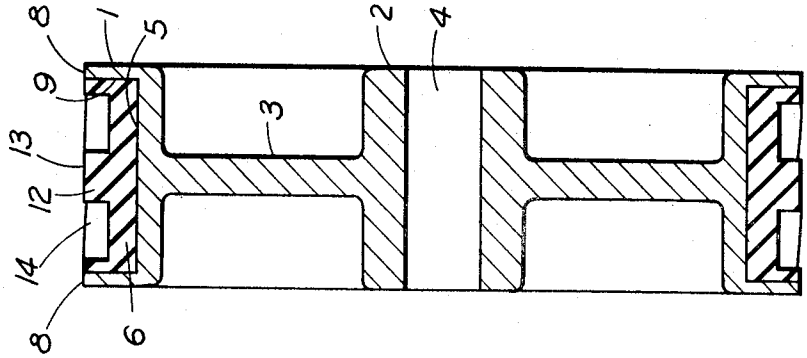


FIG. 2

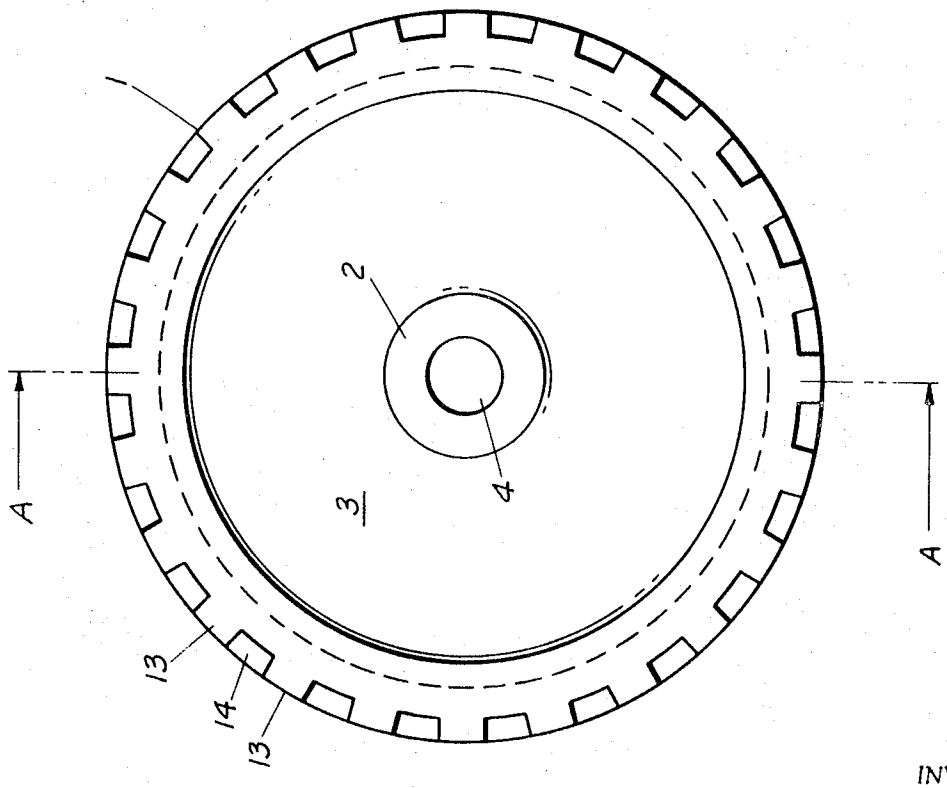


FIG. 1

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SERRATED CONTACT WHEEL

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ABSTRACT OF THE DISCLOSURE

This invention relates to a contact wheel for backing coated abrasive belts. The wheel has a composite working periphery comprised of a hard rubber central section supported by marginal metal sections. The working periphery is serrated having transverse lands and separating grooves extending entirely across the central and marginal sections.

The invention

This invention relates to equipment useful in grinding and polishing with coated abrasive bands or belts. The belts are generally supported and rotated upon a wheel and over one or more idlers with or without a platen or carrier belt. The wheels, usually referred to as contact wheels, serve not only to rotate the abrasive band but also to back it up at its area or line of contact with the workpiece being abraded or polished.

Depending upon the particular job which the coated abrasive band is to perform upon the workpiece, the contact wheel may or may not have a smooth working periphery. A common drawback of contact wheels having a smooth periphery is that the abrasive belts running thereover usually rapidly become dull and glazed. To overcome this drawback, and to make contact wheels more aggressive, channels or serrations are often cut in the working periphery. The channels are cut in a diagonal direction with respect to the axis of the wheel so the wheel does not perform as a siren.

It is established that a serrated type of contact wheel gives better results on most grinding applications than do other types of wheels. The better results include a faster rate of cut, longer abrasive belt life, and a more uniform finish.

Typically, the working periphery of contact wheels is comprised of either metal or hard rubber or in some cases, alternately metal and rubber or alternately hard and soft rubber. Elimination of metal from the periphery of the contact wheel provides a more yielding backup for the abrasive belt. In some applications, this improves belt life but unfortunately results in a contact wheel that itself has a shorter life. Contact wheels having working peripheries comprised entirely of rubber have a tendency to fail or breakdown on their edges. The edge wear results from several things. It may be due to a walking abrasive belt which allows the workpiece to come into direct contact with the edge of the rim of the contact wheel. Also, the edges of the contact wheel are not as well supported as the interior and, therefore, the edges are more susceptible to repeated flexing which eventually results in breakdown.

Contact wheels made according to the teachings of this invention have the advantages of all rubber working peripheries but at the same time have little or no tendency to fail on the edges. This enables the use of a full width of the abrasive belt even near the extreme edges.

Briefly, according to this invention, there is provided a contact wheel having a composite working periphery comprised of a hard rubber center section and two marginal metal sections. The periphery is serrated comprising

transverse lands and separating grooves extending entirely across the central and marginal sections.

Further features and other objects and advantages of this invention will become apparent to one skilled in the are from a study of the following deailed description with reference to the drawings in which:

FIG. 1 is a schematic side elevation of the contact wheel made in accordance with and embodying features and principles of the present invention;

FIG. 2 is a sectional view through line A—A in FIG. 1; and

FIG. 3 is a front elevation of the contact wheel shown in FIG. 1.

Referring now to the drawings, contact wheels according to this invention comprise a rim **1**, a hub **2**, and means for connecting the hub and rim such as a web **3**. The hub **2** is provided with an arbor hole **4** for mounting the contact wheel on a suitable drive shaft. The rim, hub and connecting web are usually comprised of metal, for example, aluminum, and may be formed by casting or forging and machining. The periphery of the rim has a depressed central section **6** of substantially uniform diameter and two narrow marginal sections **8** having substantially uniform diameters greater than the diameter of the central section. The marginal sections have sides **9** adjacent the periphery of the central section, substantially perpendicular thereto.

The width of the marginal sections are maintained as narrow as structurally permissible considering the strength of the particular metal from which the rim is constructed. In this way, the contact wheel presents a maximum yielding backup surface for the bonded abrasive belt. On the other hand, the distance a belt tends to "walk" or wander from the edge of a contact wheel in a particular application exposing the edge to direct contact with the workpiece, must also be considered. Generally, the appropriate marginal section width is between ¼ and ½ inch.

The central section of the mtal rim is filled with a hard rubber facing **12** which is secured to the entire periphery of the central section **5** and to the adjacent sides of the marginal sections **9**. The hard rubber facing may be secured to the depressed central section and the sides of the marginal sections in any of several ways. It is preferred that the surface is first prepared, for example, by roughening with shot blasting. An adhesive coating may be applied. Then the hard rubber is cast and cured in place. The outer diameter of the rubber facing is substantially the same as the diameter of the marginal sections presenting a composite working periphery. The composite rim has a transverse serrated working periphery comprising lands **13** and grooves **14** about the entire periphery of the contact wheel and extending entirely thereacross. The depth of the lands is less than the depth of the sides of the marginal sections. This enables the hard rubber face to be in contact with the depressed central section of the metal rim over its entire periphery. Individual lands and grooves of the serrated surface are disposed diagonally at an angle 0–85° but usually from 60–45° to the axle direction of the wheel. The contacting surface of the lands is substantially smooth. The ratio of land to groove area may vary considerably but will preferably be between 1:1 and 1:5. The width of the lands may be varied according to the stiffness of the hard rubber and the amount of yield desired. Practically speaking, it may be varied from about ⅛ to about ½ inch.

In the specification, reference has been made to hard rubber. By hard rubber is meant that which falls within the range of 30–100 on the Shore durometer D scale. By hard rubber it is intended not only to include natural hard rubber but also the various synthetic rubber base or elastomeric compositions together with appropriate

vulcanizers, plasticizers, fillers and/or other compounding ingredients such as the butadiene-styrene copolymers, the butadiene-acrylonitrile copolymers, polyurethane, polychloroprene, and the like. Other materials of suitable hardness can be used in place of the hard rubber such as various thermosetting and thermoplastic polymeric substances suitably compounded with or without fibrous mineral and other filler materials to provide the desired degree of hardness and compressibility to serve in the working periphery.

In one grinding application, an 8-inch diameter, 2-inch wide contact wheel of the alternating metal rubber periphery type (1:3 ratio af aluminum land to soft rubber land with small serration removed from soft rubber between alternate rubber-metal joints so that the slot precedes the metal land during rotation) has been used for a number of years with considerable success. It was then found that a serrated hard rubber (1:3 land to groove ratio, the rubber of the urethane type with a hardness of 55 on the Shore durometer D scale) contact wheel improved belt life. But due to the nature of the job, the ends of the lands tended to wear off very rapidly. Thereafter, a contact wheel according to this invention was tried. The particular wheel had an aluminum rim 2 inches wide with a 1½-inch central section and ¼-inch marginal sections. The depth of the central section was ½ inch. A hard rubber face of urethane rubber having a hardness of 55 on the Shore durometer D scale was cast into the central section. The rubber face was dressed to the height of the marginal sections. The entire working periphery was serrated providing a land to groove ratio of 1:3. The width of the lands was approximately ¼ inch and the angle of serrations was approximately 30° to the axis of rotation. This contact wheel not only increased belt life but, in addition, the wheel itself had little tendency to wear. Not only were the edges more resistant to failure but also the central part of the lands were more resistant to breakdown because they were supported at each end.

Having thus described my invention with the detail and particularity required by the patent laws, what is desired to have protected by Letters Patent are as follows.

I claim:

1. A contact wheel for backing up an abrasive belt and holding the belt against a workpiece during abrading having a composite working periphery comprising a hub, a metal rim, rim facing and means for connecting the hub and rim, said rim having a wide central section of substantially uniform diameter extending about its entire periphery and two narrow marginal sections of substantially uniform diameters greater than the diameter of the central section, the marginal sections having sides adjacent the periphery of the central section substantially perpendicular thereto, said rim facing comprising hard rubber secured to the entire periphery of the central section of the rim and to the adjacent sides of the marginal sections, the outer diameter of the rim facing being substantially the same as the diameter of the marginal sections presenting a composite working periphery, said working periphery being serrated and comprising transverse lands and separating grooves extending entirely thereacross, the depth of said grooves being less than the depth of the sides of the marginal sections.

2. A contact wheel according to claim **1** in which the areas of the lands and grooves have a ratio between 1:1 and 1:5.

3. A contact wheel according to claim **1** in which the hard rubber has a hardness between 30 and 100 on the Shore durometer D scale.

4. A contact wheel according to claim **1** in which the marginal sections have a width between about ¼ and ½ inch.

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