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## ABRADING CONTACT WHEEL

Arthur E. Kimball, Chicago, Ill., assignor to Minnesota Mining & Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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7 Claims. (Cl. 51—135)

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This invention relates to a contact wheel of the type used in abrading operations either as a wheel over which an abrasive coated belt is run or as a wheel upon which an abrasive coated band is fitted. In the use of wheels of this kind, whether the wheel is used with an abrasive belt or as a mounting for an abrasive band, or as a set-up wheel in which an adhesive and abrasive grain are applied directly to the face of the wheel, the work to be ground or finished is applied against the abrasive surface which is backed by the wheel.

The objects of this invention are to provide a wheel which is sufficiently resilient to cushion the work without unduly weakening the abrasive surface of the wheel, belt or band; and to provide a wheel which, though resilient, is sufficiently rigid and strong to remain concentric in use and to support the belt or band sufficiently firmly to form a good abrading contact.

A further object of the invention is to provide a contact wheel of this type which, in spite of its resilience, does not have a great deal of internal friction to generate heat.

Another object of the invention in its modified forms is to provide cooling devices on a wheel of this type which will carry off heat that may be generated within the wheel or during the abrading operation within which the wheel is employed.

These and other features of the invention will be seen from the following detailed specification read in connection with the accompanying drawings forming part thereof and in which—

Fig. 1 is a preferred form of this invention in the form of a contact wheel shown in use with an abrasive belt;

Fig. 2 is a section of the wheel shown in Fig. 1 on the line 2—2 thereof;

Fig. 3 is an elevation of a fragment of a wheel incorporating a modified form of the invention;

Fig. 4 is a middle section of the wheel shown in Fig. 3;

Fig. 5 is an elevation of a fragment of a wheel incorporating a second modification of this invention; and

Fig. 6 is a middle section of the wheel shown in Fig. 5.

Referring to the drawings (Fig. 1), the wheel 11 is shown as one wheel upon which the abrasive coated belt 12 runs. The belt also runs over the pulley 13 and either the pulley 13 or the wheel 11 may be driven to drive the belt 12.

The wheel is shown fitted upon the arbor 14

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and is held there by means of the clamping side plates 15 and the nut 16.

The wheel is composed of a textile or fabric material which may be stitched pads of cotton material or may be pads of felt, hair or other fibrous materials, or other materials forming ordinary buff sections.

While the materials shown in the drawings are shown merely as cloth pads 17 stitched together with the stitching 18, these pads may be composed of materials impregnated with soft plastics, rubber, or other cements or coated on adjacent surfaces with similar materials, which will hold the pads together but nevertheless leave them yielding, flexible, and resilient.

In the preferred embodiment shown in Figs. 1 and 2 the wheel is made up of a plurality of pads 17 which are circular in form and supported by intervening pads 19 and 21, the former cut into small circular pads and the latter into annular pads which are in outer diameter equal to the size of the outer diameter of the pads 17.

The inner pads 19 must be sufficiently small so that when assembled, as indicated in Fig. 2, they leave the annular voids or chambers 20 which are of the thickness of the pads 19 and 21.

The size of the annular chambers 20 may be varied without affecting the principle of this invention but it is necessary that they lie in substantial part beyond the circumference of the clamping side plates so as not to interfere with the clamping pressure of the side plates or to subject the wheel to deformation or collapse when the clamping plates are applied. The radial width of the annular pads 21 must be sufficiently great to give firm but yielding support to the abrasive coated band or belt which is borne by the wheel when the work is applied.

The various pads can be secured to each other by means of stitching or suitable soft cements which will permit them to yield and deform together, or can be held together by the clamping side plates or the wheel arbor.

In the modification shown in Figs. 3 and 4, the construction is substantially like that of the form shown in Figs. 1 and 2 with the addition of the spaced holes 30 cut into the outer and middle pads 17 and entering upon the voids 20 so as to permit a flow of air through the chambers 20 both to increase the resiliency of the wheel and to improve the dissipation of heat generated by the wheel and by the grinding action of the band or belt being driven thereby.

While the holes or openings 30 are shown circular in form, they may necessarily be varied

in size, shape, and number without affecting the principle of the invention. They can be punched through the cloth pads after assembly of the cloth laminations into pads or even after assembly of the complete wheels.

In the second modified form shown in Figs. 5 and 6, the structure shown is like that shown in Figs. 3 and 4 with the addition that the annular pads 121 are cut with substantially radially extending holes or channels 122 entering into the voids or chambers 28 to increase the air flow through the wheel. Similar passages 123 may be provided between the holes 30 and the periphery of the wheel through the pads 117. These passages may be varied in number, location, direction, and size.

In Fig. 5 the wheel is indicated as traveling in a counter-clockwise direction with the radial passages 122 and 123 cut at an inclination to the radius of the wheel to give the most desirable flow of air through the channels. Obviously, these radial passages may be cut at different angles with alteration only in degree of the effects produced.

Where the wheel is employed with liquid coolants or lubricants the passages shown in the forms illustrated in Figs. 3–6 inclusive may be employed to circulate coolant through the wheel although the general practice is to operate wheels of this type in the open air.

*Method of operation*

With the wheel assembled as shown in Fig. 2 the wheel can be sufficiently deformed merely by pressure of the hands to slip the belt 12 over the pulley 13 and the face of the wheel 11, or conventional take-up devices can be used for that purpose. If the wheel is used with a band which merely fits over the periphery of the wheel, the wheel can be similarly deformed while the band is applied. Although the band may fit rather loosely, as soon as the wheel is rotated at the high speeds employed in grinding, the centrifugal action tends to expand the wheel to its normal size and to snugly grip the band on its inner surface.

As the wheel is rotated, whether used with a belt or band, when the work is pressed against the abrasive coating the wheel, because of the voids or chambers 28, will yield slightly so that the belt or band bears evenly against surfaces whether flat or irregular or curved in their contours. Because of the fabric construction the yielding of the wheel is accomplished without any substantial movement of its parts against each other and the internal friction and accompanying generation of heat within the wheel are kept to the minimum.

In the forms shown in Figs. 3 and 4 the deformation of the wheel, which alters the size and shape of the voids 28, is accompanied by a pumping action by which the air within the chambers is constantly moved and a circulation of air effected through the wheel.

This pumping action, as well as the rotation of the wheel in the form shown in Figs. 5 and 6 effects a movement of the air not only through the opening 30 but also through the radial passages 122 and 123. If the passages 122 and 123 are cut as shown in Fig. 5 the movement of the wheel in a counter-clockwise direction will result in a low pressure area in back of these passages and the air will be thus drawn through the openings 30, chambers 28 and passages 122 and 123.



While I have shown this wheel in each case composed of five pads, the principle of the invention is not dependent upon either the number or size of pads used.

If the wheel is used as a set-up wheel, it would be assembled and then treated with the bonding agent and abrasive grits in the conventional manner.

Having thus shown and described several embodiments of the invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is intended to claim all novelty inherent in the invention as broadly as permissible, in view of the prior art.

What I claim is:

1. A contact abrading wheel comprising a plurality of circular resilient pads, a plurality of smaller pads separating them, and a plurality of annular pads having an inside diameter greater than the diameter of the smaller pads and each surrounding one of the smaller pads to provide annular chambers in the wheel, the circular resilient pads having openings cut therethrough and entering upon the annular chambers in the wheel.

2. A contact abrading wheel for abrasive bands and belts comprising a plurality of circular resilient pads, a plurality of smaller pads separating them, a plurality of annular pads having an inside diameter greater than the diameter of the smaller pads and each surrounding one of the smaller pads to provide annular chambers in the wheel, the circular resilient pads having openings cut therethrough and entering upon the annular chambers in the wheel and the annular pads having radially arranged passages extending therethrough from the chambers to the periphery of the wheel.

3. A contact abrading wheel for abrasive bands and belts comprising a plurality of circular resilient pads, a plurality of smaller pads separating them, a plurality of annular pads having an inside diameter greater than the diameter of the smaller pads and each surrounding one of the smaller pads to provide annular chambers in the wheel, the circular resilient pads having openings cut therethrough and entering upon the annular chambers in the wheel and the annular pads having radially arranged passages extending therethrough from the chambers to the periphery of the wheel and the circular resilient pads having radially arranged passages extending from the openings cut therethrough to the periphery of the wheel.

4. A contact wheel for use in abrading operations comprising a plurality of coaxial circular sections of resilient material in sheet form of substantial thickness and means for retaining said circular sections in cooperative relation with each other to form a body having a cylindrical surface, said circular sections being arranged to provide spaced and longitudinally aligned continuous annular chambers within the body of said wheel, certain of said circular sections being provided with transverse apertures communicating with said continuous annular chambers.

5. A contact wheel as set forth in claim 4 wherein certain of said circular sections are provided with substantially radially arranged passages extending from the cylindrical surface of said wheel to the open space therein.

6. A contact wheel for use in abrading operations comprising a plurality of coaxial circular

sections of resilient material in sheet form of substantial thickness and means for retaining said circular sections in cooperative relation with each other to form a body having a cylindrical surface, said circular sections being arranged to provide one or more continuous annular chambers within the body of said wheel, certain of said circular sections being provided with transverse apertures communicating with said continuous annular chambers.

7. A contact wheel as set forth in claim 6 wherein one or more of said circular sections are provided with substantially radially arranged passages extending from the cylindrical surface of said wheel to an open space therein.

ARTHUR E. KIMBALL.



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