March 7, 1950 S. HAYS 2,499,643

POLISHING WHEEL

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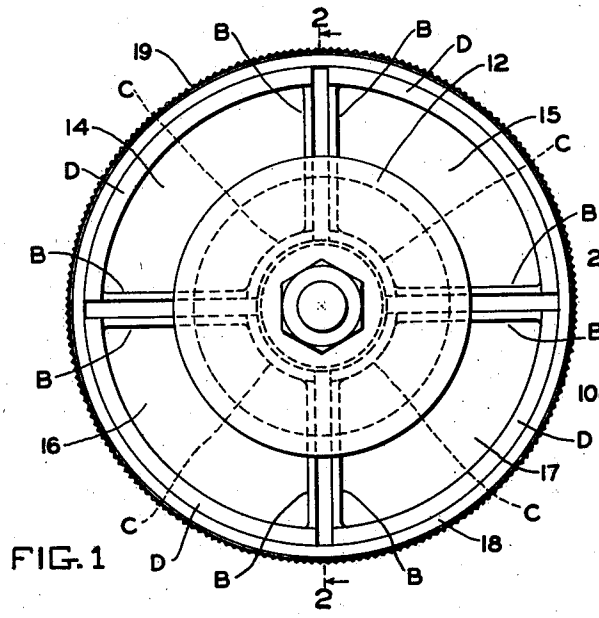

FIG. 1

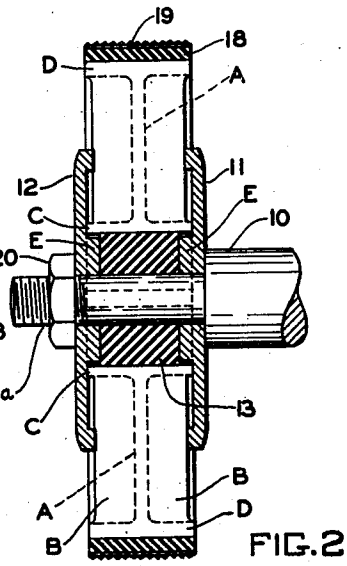

FIG. 2

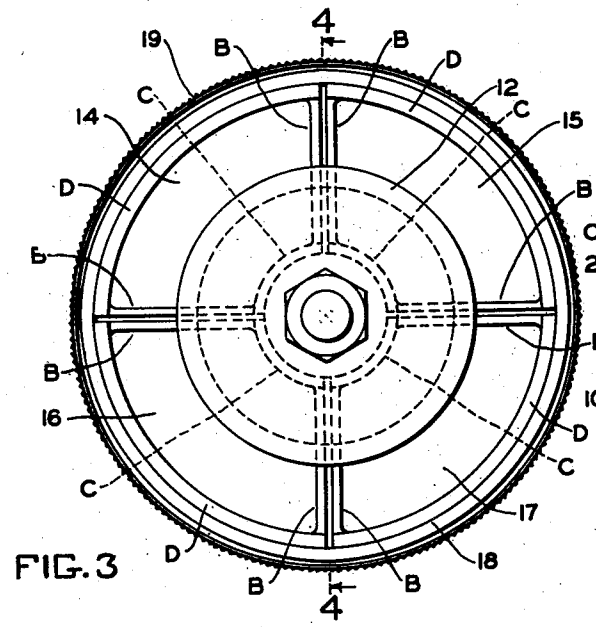

FIG. 3

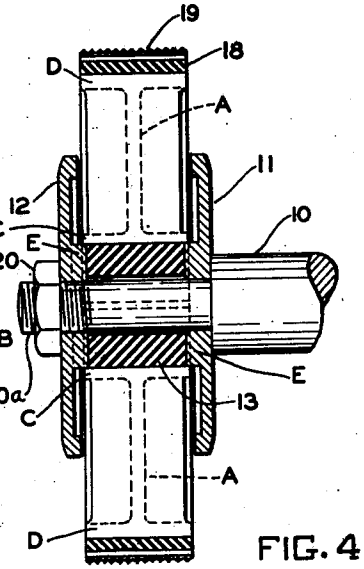

FIG. 4

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POLISHING WHEEL

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9 Claims. (Cl. 51—190)

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This invention relates to a polishing wheel, or the like, and particularly concerns such wheels in which an abrasive sleeve is secured to the periphery of the wheel for performing polishing and/or buffing operations.

In the ordinary course of polishing operations, it has been common practice to employ solid wheels of wood, leather or other suitable material of variant hardness. Such wheels have their peripheral surface charged with an abrasive substance to serve as the polishing agent. This abrasive agent wears away in a relatively short time and the wheel has to be reconditioned frequently and this results in a short life for the wheel as a whole.

It has heretofore been proposed that, to avoid discarding the complete wheel, a removable sleeve or band of suitable abrasive material be applied to the periphery of the polishing wheel. As this sleeve or band should be continuous, without breaks which would interfere with the polishing operation, efforts have been made to provide an expandable wheel which could be enlarged in a radial direction to fit snugly within the inner periphery of the abrasive band. Difficulties have been experienced in such developments because, it is necessary that the band have a firm support, and further that the periphery of the abrasive surface must be maintained concentric with the axis of rotation.

A major object of this invention is to provide an expansible wheel which will fit within a sleeve of polishing material and may be expanded to support the sleeve on a firm surface concentric with respect to the axis of rotation of the wheel.

More specifically, it is an object of this invention to provide an expansible wheel having a continuous, stretchable, elastic band for engaging within a band, or sleeve of abrasive material; the wheel being provided with segmental portions engaging the elastic band and adapted to expand it within the abrasive sleeve.

Still another object is to provide a polishing wheel of this character with an arrangement for positively expanding the support for the abrasive band so as to accomplish a form of peripheral friction chuck to firmly grip the abrasive sleeve or band internally and thus hold it securely on the wheel during the operation of polishing.

Further objects and advantages will appear from the folowing specification and the accompanying drawings wherein:

Fig. 1 is a side elevation showing a polishing wheel embodying the invention in its preferred form, with the various parts of the wheel arranged so as to grip the abrasive sleeve internally.

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Fig. 2 is a sectional view taken on a line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the same wheel shown in Fig. 1, but with the various parts of the wheel arranged, so the abrasive sleeve is free on the support, and thus may be readily removed and replaced with a new sleeve.

Fig. 4 is a sectional view taken on a line 4—4 of Fig. 3.

In accordance with the invention in its preferred form, an annular resilient member is arranged between a pair of discs. This annular member may fit over the tenon of a lathe spindle, with the discs having holes snugly fitting the tenon on opposite sides of the annular member. A plurality of independent segments of the wheel are arranged about the outer periphery of the annular resilient member and form a complete wheel with the annular member as a hub. The outer peripheral surface of the segments form a series of arcs having slightly less radius than the radius of the abrasive band into which the wheel is to be fitted. This peripheral surface is preferably of approximately the same width as the abrasive band. The peripheral surface of each of the segments is bonded to a continuous elastic band, preferably of synthetic or natural rubber, forming the outer periphery of the wheel and the support on which the abrasive band is secured. With an abrasive sleeve in place surrounding the elastic band, the discs may be tightened on the tenon of the lathe spindle, thereby compressing the resilient annular member, so it expands in a radial direction forcing the segments of the wheel outwardly and enlarging the circumference of the outer elastic rim until its outer periphery presses against the inner periphery of the abrasive band. The discs may have shoulders, fitting within the inner periphery of the segments, for pressing the resilient annular member inwardly. The shoulders are preferably of a width such that, when the outer periphery of the elastic rim engages the abrasive band, the remaining part of the discs will clamp the sides of the segments to form a rigid wheel structure.

Referring to the drawings for a more detailed description, I have shown the invention as embodied in a wheel structure supported on the spindle 10 of an ordinary polishing lathe.

The wheel assembly includes a pair of spaced discs 11 and 12, slidably disposed on a tenon 10a of spindle 10, and arranged concentric therewith. The discs are formed with holes which fit snugly on the tenon. An annular resilient

member 13, preferably of rubber, either natural or synthetic, is disposed between the discs 11 and 12 and has a central opening of such diameter that the annulus is normally larger than the tenon 10a, as shown in Fig. 4. A plurality of wheel segments 14, 15, 16 and 17 are disposed between discs 11 and 12, and are arranged to substantially encompass the annular resilient member 13. A stretchable, elastic, ring-like band 18, preferably of synthetic or natural rubber, surrounds the outer periphery of segments 14, 15, 16 and 17, and is immovably attached, as by bonding, to the outer peripheral surface of each of the wheel segments. Preferably, only a central part of the surface of each of the arcuate rim portions D, D, is bonded to the elastic band 18. An abrasive sleeve 19 surrounds band 18 and normally fits freely thereover.

Segmental members 14, 15, 16 and 17, each has a centralized web portion A, bounded by marginal radial ribs B, on its radial sides; by an arcuate hub portion C on its inner periphery; and by an arcuate rim portion D. Each of these wheel segments 14, 15, 16 and 17 may be cast in a single piece.

The various parts comprising the wheel assembly are held collectively intact by any suitable means such as a nut 20 threaded onto the outer end of tenon 10a and bearing against the outer face of disc 12, while the axial position of disc 11 is established by a shoulder on spindle 10.

When the parts of the wheel are in their relative positions as shown in Figs. 3 and 4, it may be said that the parts are free of restraint. That is, the resilient annulus 13 has its normal internal and external diameters, and axial length; the wheel segments 14, 15, 16 and 17 are free of contact with discs 11 and 12, and are held at a minimum distance from the axis under the contracting influence of the elastic band 18 to which they are bonded, and which has assumed its normal and smallest diameter; and the abrasive sleeve 19 is freed from any restraint so that it can readily be slipped off and on at will.

To prepare the wheel assembly for use as a polishing agent, the abrasive sleeve 19 is slipped into position surrounding the elastic band 18, and nut 20 is screwed inwardly until the wheel segments 14, 15, 16 and 17 are firmly and rigidly held between discs 11 and 12 (as in a vise). At the same time annular shoulders F, E, on the discs 11 and 12, compress the resilient annulus 13 to expand it in a radial direction, both inwardly and outwardly. The internal expansion results in a compression fit of the annulus on tenon 10a. As the annulus expands radially outwardly it moves wheel segments 14, 15, 16 and 17 radially outwardly, and expands the elastic band 18 to such an extent that it exerts a relatively heavy pressure within and upon the internal periphery of abrasive sleeve 19, thereby holding said sleeve rigidly so as to enable it to resist the polishing operation without becoming displaced. When this occurs, annular shoulders E, E, on the discs 11 and 12 have compressed the rubber annulus inwardly to such an extent that the main, outer, portions of the discs 11 ant 12 engage the arcuate hub portions C on the wheel segments 14, 15, 16 and 17.

The positions of the various parts, with the annulus compressed to retain an abrasive band 19 on the wheel, are shown clearly in Figs. 1 and 2. From an inspection of these figures, it will be apparent that the circumference of the elastic band 18 has been expanded by the radial movement of the wheel segments until it is forced against the inner periphery of the abrasive band 19. At the same time, the elastic band 18 is compressed to some extent, so the abrasive band 19 is supported on a substantially firm base. This is due to the fact that the elastic band is compressed between the abrasive 19 and the flat, arcuate rim portions D, D, of the wheel segment which forms a solid backing for the abrasive surface. Furthermore, the wheel itself, by the inward and outward expansion of the annular resilient member, has assumed a true position on the tenon 10a, so the outer periphery of the abrasive band 19 will assume a concentric position on the axis of rotation of the tenon 10a.

Thus, even though the various parts of the wheel assembly may not be initially positioned in their proper relations with respect to the axis of the tenon 10a, as soon as the rubber annulus is compressed, by tightening the discs 11 and 12 against its sides, it expands both inwardly and outwardly. The inward expansion causes it to center itself concentrically on the tenon 10a. Also, as the rubber annulus is expanded radially in both directions, it will assume a position so its outer periphery is concentric with respect to the axis of rotation of the tenon 10a. Furthermore, as it expands outwardly, the annulus forces the wheel segments 14, 15, 16 and 17 outwardly. If they have been properly machined, their outer peripheries, formed by the arcuate hub portions C, C, will also be concentric with respect to the axis of rotation of the tenon. Once the parts of the wheel assembly have assumed their correct relative positions, and, at the same time have compressed the elastic band 18 against the inner periphery of the abrasive band 19, the main portions of discs 11 and 12 engage the side edges of the arcuate hub portions C, C, on the wheel segments to clamp the wheel segments themselves in a vise-like structure between the discs. As the marginal ribs B, B, are slightly narrower than the hub portions C, C, and the rim portions D, D, peripheral ridges 11b and 12a on the inner sides of discs 11 and 12 engage the ribs B, B. Thus, not only does the periphery of the wheel assume its correct relation to the axis of rotation, but the wheel segments are firmly secured by the discs 11 and 12 in such correct relations so subsequent use of the wheel for polishing operations will not destroy the correct relation of the various parts.

When the abrasive surface of sleeve 19 has become depleted to such an extent as to be ineffectual for further polishing, the worn out sleeve can be readily removed and replaced with a new one by merely backing off the nut 20, so the annulus will contract and permit the wheel segments and the elastic band 18 to contact sufficiently to free the sleeve 19. When the abrasive sleeve has been replaced, the nut may be tightened and the new abrasive surface immediately used.

It will be apparent that the objectives of the invention have been accomplished by the means set forth in the specification and that the invention is clearly defined in the following claims.

Having thus described the invention, what is claimed as new and useful, and desired to secure by Letters Patent, is:

1. A polishing wheel including in combination, an abrasive sleeve forming the peripheral surface of the wheel, a stretchable elastic band disposed within said sleeve, a plurality of wheel seg-

ments disposed within said band with the outer peripheral surface of each of said segments immovably attached to the inner peripheral surface of said band, and means to exert sustained pressure on each of said segments so as to cause movement thereof in a radially outward direction thus expanding said band and accomplishing an effective frictional bond between said band and said sleeve, said means being provided with a spindle receiving bore and adapted to exert sustained pressure for being compressed against a spindle within said bore.

2. The wheel of claim 1 wherein the said segmental members are collectively aligned between two axially disposed discs and rigidly secured thereby after said segments have been moved to their outermost position

3. A polishing wheel including in combination, an abrasive sleeve forming a peripheral surface of the wheel, a stretchable elastic band disposed within said sleeve, a plurality of wheel segments disposed within said band with the outer peripheral surface of each of said segments immovably attached to the inner peripheral surface of said band, a pair of discs axially disposed on opposite sides of said wheel segments, means within said segments for exerting sustained radial pressure on the inner periphery thereof, and on the wall of a spindle bore provided within said means, thereby expanding said band and accomplishing an effective frictional bond between said band and said sleeve and also between said means and a spindle within the bore thereof, and manually controlled mechanical means for moving said discs toward each other and clamping said discs in engagement with said segments.

4. The wheel of claim 3 wherein the pressure exerting means includes an annular resilient member, substantially enclosed circumferentially by said segments, and confined longitudinally between said axially disposed discs.

5. In a polishing wheel which employs a removable abrasive band, the combination of an elastic ring-like member for internally supporting and holding the band against displacement during the polishing operation, an elastic member provided with a spindle receiving bore, and manually operable means acting to apply radial pressure to the internal peripheral surface of said elastic member so as to cause enlargement of its diameter sufficiently to accomplish an effective frictional bond between said band and said elastic member and to apply radial pressure to the spindle receiving elastic member for frictionally clamping it to a spindle which is inserted within said bore.

6. The combination set forth in claim 5 wherein the said means includes two axially aligned parallel spaced discs, and a device acting to move one of said discs axially toward the other whereby said spindle receiving elastic member is compressed axially and consequently enlarged diametrically thus creating said radial pressure.

7. A polishing wheel for mounting on the

spindle of a polishing lathe, comprising a pair of spaced discs slidably disposed on the spindle, an annular resilient member disposed between said discs and encompassing the spindle, a plurality of segmental members arranged so as to substantially surround said annular member, a ring-like elastic band encompassing said segmental members and immovably attached to the peripheral surface of each of said segmental members, an abrasive sleeve supported internally upon said elastic band and held immobile thereon by pressure-induced friction, and means acting to move said discs axially toward each other so as to cause said annular resilient member to be compressed axially and consequently enlarged diametrically against the spindle, thereby urging said segmental members to move in a radially outward direction and enlarge the diameter of said elastic band whereby pressure is applied internally to said abrasive sleeve and the resilient member is caused to frictionally engage the spindle.

8. In a polishing wheel which employs a removable abrasive band, a resilient annulus provided with a spindle-receiving bore, a plurality of wheel segments surrounding said annulus, a stretchable elastic band attached to the outer periphery of each of said segments, and means for applying an axial compressive force on said annulus for radially expanding the wheel segments to clamp the elastic band against the abrasive band and to frictionally grip a spindle within the bore of the annulus.

9. In a polishing wheel which employs a removable abrasive band, a resilient annulus provided with a spindle-receiving bore, a plurality of wheel segments surrounding said annulus, a stretchable elastic band attached to the outer periphery of each of said segments, a pair of discs for engaging the ends of said annulus, and means for moving said discs toward each other for causing the elastic band to frictionally grip the abrasive band and the annulus to frictionally grip a spindle which is inserted within its bore.

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Administratrix of the Estate of Stanley Hays, Deceased.

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