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R. S. GUTSELL

2,221,173

SANDING OR POLISHING WHEEL

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Fig. 1.

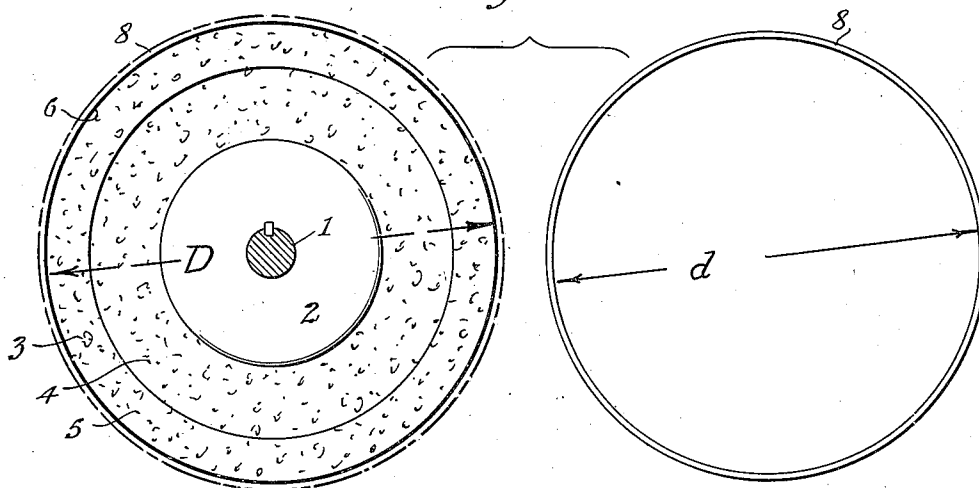


Fig. 2.

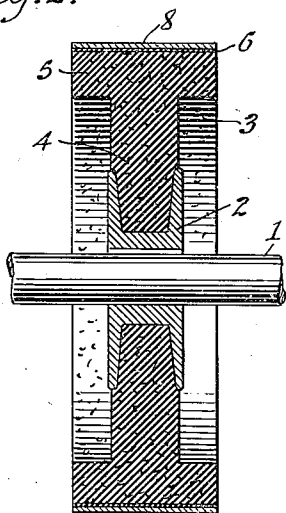


Fig. 3.

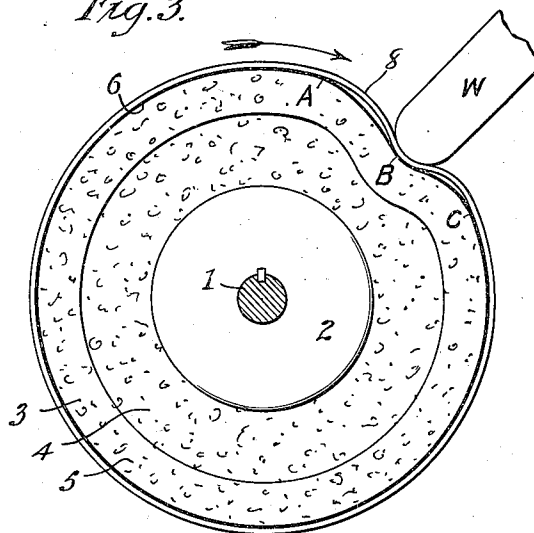
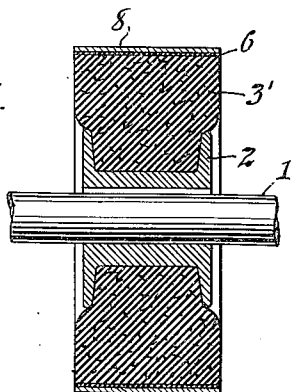


Fig. 4.



INVENTOR.
Robert S. Gutsell
BY *Robert V. Morse*
ATTORNEY.

UNITED STATES PATENT OFFICE

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SANDING OR POLISHING WHEEL

Robert S. Gutsell, Phoenix, N. Y.

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5 Claims. (Cl. 51—191)

This invention relates to the art of sanding, buffing, or polishing, in which rotating wheels carrying abrasive or polishing material are used. These wheels have usually been provided with a somewhat yieldable core, such as felt, leather, or rubber, and in some cases the abrasive was directly glued to the felt, while in others removable bands of the abrasive material were applied over the core. In any case it has always been considered essential to definitely secure the abrasive rim to the wheel in some positive manner, to prevent it flying off; and it was also though that when so secured the abrasive band would cut more positively. Under ordinary working conditions the bands had to be changed occasionally, and in that case the operator had to unfasten the securing means to release the band. Various means were used to secure the abrasive or polishing band to the wheel, such as mechanical wedges or expanders, blowing up the core with air pressure, or providing the band with inwardly extending side pieces or flanges which were clamped to the hub or drawn up by a lace or draw-string. In any case, a positive means of some kind for holding the abrasive band in place was always considered necessary.

I have discovered that not only can these fastening means be eliminated, but that when so omitted the abrasive band operates more effectively—so that not only is the cost and trouble of mounting reduced, but better work is obtained. The improvement in performance appears to be due to the greater flexibility of the core permitted, and to the fact that the band is allowed a certain amount of creep or distortion independent of the core, which permits the band to clean itself—as will be described. In any event the abrasive band when free works better than when tightly secured, and yet is sufficiently retained by natural forces as will be described so that it does not fly off.

The objects of the present invention are to provide a simpler and cheaper means and method for sanding and polishing; to improve the construction of sanding and polishing wheels; to improve the quality of work obtained from such wheels; and to save time in changing bands. Various other objects will become apparent as the description proceeds.

Referring now to the drawing,

Fig. 1 is a side view of a wheel or core with the abrasive band removed and at one side.

Fig. 2 is a cross-section of the wheel with the abrasive band in place.

Fig. 3 is a side view of the wheel and band in

operation, showing how the band is free to creep on the core and bend free of the core near the point of application to the work.

Fig. 4 illustrates in cross-section a modified form suitable for certain types of work.

Similar reference numerals refer to similar parts throughout the various views.

Referring now to Fig. 1 and Fig. 2, the drive shaft 1 has mounted thereon a hub 2 in which is clamped or otherwise fastened a flexible wheel body, indicated generally by the reference numeral 3, this body being of some yielding material such as previously mentioned—preferably sponge rubber or some similar material. To make the body 3 more flexible, the inner disk portion 4 is generally made narrower, while the rim 5 has a wider face giving an overhanging shoulder as shown in Fig. 2. The spongy material has not much strength, and in order to prevent disintegration the outer face 6 is made smooth, either by so casting the rubber or by cementing a peripheral band to the spongy body 3. This is not the working band for the abrasive, but merely a means of finishing the core or body 3.

Referring now to Fig. 1, the diameter D of the flexible core or body 3 is slightly larger than the diameter d of the abrasive strip or working band 8. This working band 8 consists merely of an endless strip or band having suitable abrasive or polishing material on its outer face, as is customary in the art, but the general construction differs from the prior art in that all fastening elements are omitted. The band 8 can readily be slipped on the wheel body 3 by slightly compressing the yieldable material of the body 3 by hand, as has previously been done, but it will be noted that I do not provide any flanges on the band 8 for tying it in place, nor clamp it or otherwise secure it.

The band 8 is so loosely applied that if the wheel were turned slowly and applied to the work the band would probably fall off. But when the wheel is run at a good working speed the centrifugal force acting on the yieldable core body 3 expands it so that the band is tight and works without difficulty. The expense and trouble of fastening bands is eliminated.

Not only are the fastening troubles eliminated, but also it is discovered that the free band cuts much faster than if it were cemented or otherwise attached to the core body 3. I have confirmed this by numerous tests and the action appears to be as shown in Fig. 3.

In Fig. 3 the wheel is shown rotating in the

direction of the arrows, and when a piece of work, such as the block of wood W, is pressed against it, the abrasive band 8, not being fastened, breaks loose from the rim 6 of the body 3, so that there is a gap in between. The yielding core body 3 is distorted by any considerable pressure, and so does not exactly retain its circular shape, while the band 8 takes a different and greater distortion. The distance on the band 8 between the points A and B is greater than the distance on the rim 6 between the same points, and this is also true between the points B and C; so the band 8 tends to slowly creep, (not slip), on the rim 6.

The abrasive on the band 8 consists usually of particles of suitable material, and apparently the fluttering and bending of the free portion of the band 8 clears or frees the abrasive from particles of the material worked on, which otherwise tends to clog it; or possibly the band 8 takes a better cutting angle. In any event, whatever the explanation, the free band cuts considerably faster than when it is fastened.

In some classes of work more lateral stiffness may be desired in the wheel, in which case the flexible portion 3 may be thickened as in Fig. 4, and the flange or shoulder at the rim accordingly reduced or eliminated.

It will be noted that in any of the wheels constructed under the present invention a great depth of soft or resilient material is provided, allowing a great compressibility and easy distortion. This compressibility and ability to distort the working surface of the device allows applications to recesses and irregular objects which are not easily handled by other devices. A larger area of contact can also be obtained, and the fact that the greater compressibility permits the abraded particles to be more easily released from the particles of abrasive makes greater cutting power possible. The ability of the abrasion band to adjust itself by creeping around the wheel, rather than by the formation of folds or sliding of the band on the wheel allows a smoothness of application which would otherwise be unattainable.

While it was generally considered that the softer a wheel the less it would cut, I have found that is not the case. When operating as a sanding device on wood, for example with the same size of band carrying the same kind and size of abrasive, and running at or near the optimum speeds for this device which are also at or near the usual optimum speeds of other sanding devices,—the rate at which this device cuts or wears away the object is markedly increased over the rate for wheels constructed so that the rim is less compressible.

The compressibility also varies with the speed or centrifugal force, so that there tends to be an optimum speed for any given wheel where the special advantages of this device are best obtained. This depends on a number of factors of which weight of material, extensibility, and size, which directly modify the centrifugal effect, are most important. The readily extensible construction permits the hardness of the

wheel to be considerably controlled by its speed, which may be altered for various purposes.

While I have in the foregoing described a certain specific form by way of example, it will be understood that it is merely for purposes of illustration, to make clear the principles of the invention, which is not limited to the particular forms shown, but is susceptible to various modifications and adaptations in different installations, as will be apparent to those skilled in the art, without departing from the scope of the invention as stated in the following claims.

I claim:

1. A rotary abrasive tool comprising a hub mountable on a shaft, a sponge rubber disk concentrically mounted upon and fastened to said hub, a flexible relatively non-stretchable abrasive band mounted upon said sponge rubber disk and held thereon during operation by reason of the expansion of the sponge rubber disk due to centrifugal force.

2. A rotatable abrasive tool comprising a rigid hub member mountable upon a rotatable shaft, a sponge rubber annulus concentrically mounted upon and fastened to said hub for rotation therewith, said annulus having a rim portion of the same material and of appreciable thickness overhanging at least one side of said annulus, a flexible relatively non-stretchable abrasive band mounted upon said rim and held thereupon during operation of the tool by reason of the expansion of the annulus and its rim due to centrifugal forces set up therein when rotated at operating speeds.

3. A rotatable abrasive tool comprising a rigid hub member mountable upon a rotatable shaft, a sponge rubber annulus concentrically mounted upon and fastened to said hub for rotation therewith, said annulus having a rim portion of the same material and of appreciable thickness overhanging at least one side of said annulus, a flexible relatively non-stretchable abrasive band mounted upon said rim and held thereupon during operation of the tool by reason of the expansion of the annulus and its rim due to centrifugal forces set up therein when rotated at operating speeds, the diameter of said annulus being greater than its thickness.

4. A rotary abrasive tool comprising a hub mountable on a shaft, a sponge rubber annulus concentrically mounted upon and fastened to said hub, a flexible relatively non-stretchable abrasive band mounted upon said sponge rubber annulus and held thereon during operation by reason of the expansion of the sponge rubber annulus due to centrifugal force.

5. A rotary abrasive tool comprising a hub mountable on a shaft, a sponge rubber annulus concentrically mounted upon and fastened to said hub, a thin soft dense rubber tire fastened to said annulus, a flexible relatively non-stretchable abrasive band mounted upon said tire and held thereon during operation by reason of the expansion of the sponge rubber annulus due to centrifugal force.

ROBERT S. GUTSELL.