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VARIABLE ABRASIVE BELT BACKUP WHEEL

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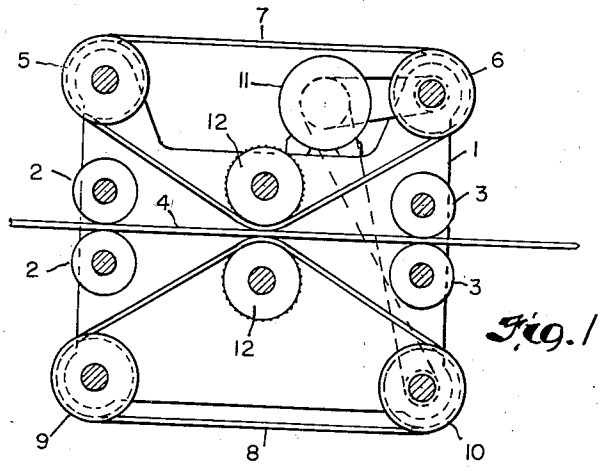


Fig. 1

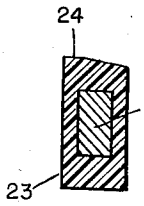


Fig. 6

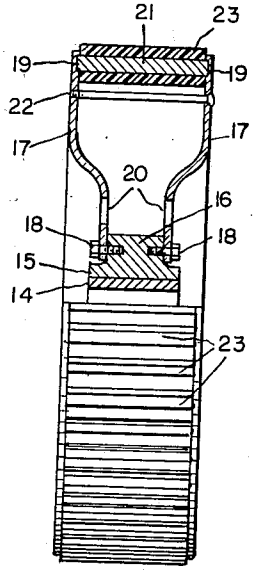


Fig. 3

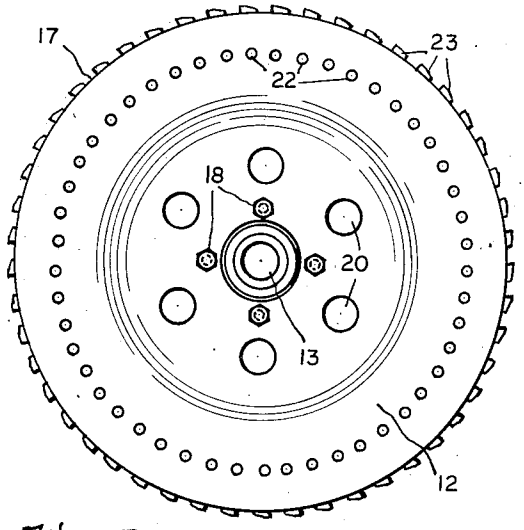


Fig. 2

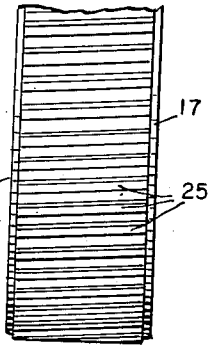


Fig. 4

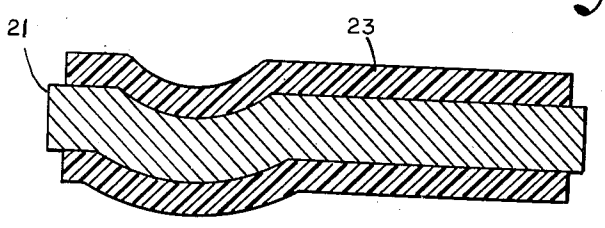


Fig. 5

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VARIABLE ABRASIVE BELT BACKUP WHEEL

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6 Claims. (Cl. 51—141)

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This invention relates to grinding and polishing apparatus, and more particularly to an improved form of back-up wheel for holding an abrasive belt or the like in contact with the material being ground or polished.

In the grinding or polishing of material such as metal sheets, strips, knives, tools, lids and other such articles that have either a flat surface or gently curving surface, it is customary practice to employ a presser or back-up wheel to hold or back up an abrasive belt against the surface of such material. It is important that a back-up wheel develop sufficient pressure against the belt to insure maximum belt life and maximum cutting action by the individual grains of abrasive. In addition, it must be sufficiently flexible to conform with the contour of the material being ground or polished.

It has been found that a wheel having a solid face which is flexible enough to shape itself to the contour of the material being ground cannot produce sufficient pressure to effect the maximum rate of cut. The desired pressures can only be developed by wheels having an intermittent face. Such a wheel allows the piece being ground or polished intermittently to depress below the surface of the wheel, the projecting surface then contacting the work-piece, thereby effecting an intermittent striking, or saw-tooth, action and producing great pressure.

Furthermore, maximum belt life can only be attained by the application of sufficient pressure to cause individual grains of abrasive to penetrate the material being ground to a depth where the grains pull out of the bond holding them to the belt when they become dull or worn. As a result of such increased pressure as is caused by a wheel having an intermittent face, the belt continuously presents a new cutting surface as grains of abrasive are shed, thus insuring maximum cutting action.

It is a primary object of this invention to provide a back-up wheel having all the above-enumerated desirable characteristics.

Other objects and advantages will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

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In said annexed drawing:

Fig. 1 is a longitudinal sectional view of a grinding or polishing machine;

Fig. 2 is a side elevation of a back-up wheel within the principle of my invention;

Fig. 3 is a front view of the back-up wheel shown in Fig. 2, partly in section;

Fig. 4 is a front view of a portion of a back-up wheel having a modified form of construction;

Fig. 5 is a longitudinal sectional view of a special contour back-up bar; and

Fig. 6 is a transverse sectional view of a back-up bar.

Referring now to the drawing and more especially to Fig. 1 thereof, the grinding or polishing machine there indicated is supported by side frames 1, only one of which being there shown. Pairs of guiding or feed rollers 2 and 3 are journaled in the side frames 1, either or both of which may be driven from a suitable source of power to advance a metal sheet or strip 4 through the machine. Pulleys 5 and 6 are journaled in the side frames 1 of the upper portion of the machine, an abrasive belt 7 passing around such pulleys. Abrasive belt 8 passes around pulleys 9 and 10 journaled in the side frames 1 in the lower portion of the machine. A motor 11 is provided to drive the pulleys to effect movement of the belts 7 and 8. Back-up wheels 12 are journaled in the side frames 1 of the machine and serve to hold respective belts 7 and 8 in grinding engagement with the work 4.

Referring next to Fig. 2, the back-up wheel 12 comprises a shaft 13, a bushing 14, and a hub 15, the latter having a flange 16 centrally about its periphery. A pair of identical circular discs or side plates 17 are secured to the flange 16 by means of bolts 18, the side plates being formed with a series of circumferentially spaced slots 19 adjacent their peripheries. A series of openings or vents 20 are formed in each side plate 17 disposed in circular arrangement about the axis thereof. A plurality of axially disposed back-up bars are provided about the periphery of the wheel, such bars comprising inserts 21, preferably of a hard metallic substance, secured between the side plates 17 by extending into respective slots 19 of the latter. Bolts 22 are provided to secure the side plates in fixed transversely spaced relation, thus to retain the back-up bars firmly in their respective slots.

The inserts 21 are provided with a resilient covering 23, preferably of rubber or a plastic material, which covering extends beyond the periphery of the side plates, the cutting area 24 of

the covering 23 being adapted to bear upon the belt at the point of contact of the latter with the surface being ground or polished. A special contour bar as, for example, the one shown in Fig. 5 of the drawing, may be provided for work-pieces having a surface of a particular contour.

Thus, the entire assembly is made so that by removal of the bolts 18 securing the side plates 17 to the flange 16 of the hub, all of the parts may be quickly disassembled permitting the use of different side plates and back-up bars to vary the diameter and width of the wheel. Likewise, change may be made in the peripheral surface of the back-up wheel by changing the spacing between the back-up bars (as, for example, by removing alternate bars from the wheel). It will be noted that increasing the spacing between the back-up bars produces a more definite striking, or saw-tooth, action as the latter intermittently press the belt against the surface being ground or polished, thus increasing the pressure whereby greater cutting action is obtained. Of course, if more flexible back-up bars are substituted, it is necessary to provide even greater spacing to obtain the same amount of pressure.

The back-up bars may be replaced by others having different cutting areas and having covers of varying degrees of resilience. Referring to Fig. 6 of the drawing, it is seen that the metallic bar or insert 21 is rectangular in cross-section and thus may be rotated 180° to present a greater cutting area and thus increase the rate of cut. It is, of course, obvious that inserts having other cross-sections may be employed whereby such inserts may be rotated and secured in any number of selected rotative positions so that the cutting area which bears upon the abrasive belt may be varied as desired, limited only by the number of rotative positions available.

The back-up wheel of my invention is thus seen to be quickly adaptable to varying peripheral surface requirements and to work-pieces of a variety of conformations.

Fig. 4 shows a back-up wheel having a modified form of construction. Instead of being axially disposed about the wheel, the back-up bars 25 are there illustrated as being helically disposed thereabout. It is well known to those familiar in the art that at certain critical speeds of belt travel, chattering of the belt often occurs. The modified form of construction of back-up wheel shown in Fig. 4 of the drawing serves a purpose in addition to those described with reference to the previous embodiment in that such wheel serves also to prevent chattering of the belt, since the latter will be held against the work at all points along the length of contact without any intermediate portions of belt being unsupported.

The same result may be obtained with the embodiment previously described by securing the back-up bars in non-opposed slots of the side plates to effect helical placement of the bars, or, for finer adjustment, by forming the side plates so as to be relatively rotatably adjustable, whereby the back-up bars may be disposed axially or helically as desired. Of course, by reducing the spacing between the back-up bars, the intermediate portions of unsupported belt may be correspondingly reduced, thereby lessening the tendency of the belt to chatter.

It should be noted, however, that the intermittent striking action or saw-tooth effect caused by circumferential spacing of the back-up bars is most effective where such bars are disposed axially about the wheel. Thus, the degree of helical placement of the bars to reduce possible chattering of the belt must necessarily correspondingly reduce the cutting action of the belt. Relatively close spacing of the bars also sacrifices belt cutting action, since the striking action of the individual bars is less effective to produce the high pressures necessary for a high rate of cut.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A back-up wheel for an abrasive belt and the like comprising a pair of axially spaced, substantially radially rigid circular side plates, a plurality of substantially rigid back-up bars extending between said side plates adjacent their peripheries and removably supported on said plates in circumferentially spaced relation, and a resilient covering surrounding each said back-up bar and projecting radially outwardly of the peripheries of said side plates.

2. A back-up wheel for an abrasive belt and the like comprising a hub, a pair of axially spaced, substantially radially rigid circular side plates secured on said hub, said side plates being formed with a series of circumferentially spaced slots adjacent their peripheries, a plurality of substantially rigid back-up bars extending between said side plates and removably engaging such slots, and a resilient covering surrounding each said back-up bar and projecting radially outwardly of the peripheries of said side plates.

3. A back-up wheel for an abrasive belt and the like comprising a pair of axially spaced, substantially radially rigid circular side plates, a plurality of substantially rigid back-up bars extending between said side plates adjacent their peripheries, means removably supporting said back-up bars on said plates in circumferentially spaced relation, whereby said bars may be rotated to present a different face or selectively removed to vary the spacing therebetween, said bars extending parallel with the axis of said wheel, and a resilient covering surrounding each said back-up bar and projecting radially outwardly of the peripheries of said side plates.

4. A back-up wheel for an abrasive belt and the like comprising a hub, a pair of axially spaced, substantially radially rigid circular side plates removably secured on said hub, said side plates being formed with a series of circumferentially spaced slots adjacent their peripheries, a plurality of substantially rigid back-up bars extending parallel with the axis of said wheel removably secured between said side plates and engaging such slots, and a resilient covering surrounding each said back-up bar and projecting radially outwardly of the peripheries of said side plates.

5. A back-up wheel for an abrasive belt and the like comprising a hub, a pair of axially spaced, substantially radially rigid circular side plates removably secured on said hub, said side plates being formed with a series of circumferentially spaced slots adjacent their peripheries, a plurality of substantially rigid helically disposed, mutually parallel back-up bars removably secured between said side plates and engaging such slots, and a resilient covering surrounding each said back-up bar and projecting radially outwardly from the peripheries of said side plates.

6. A back-up wheel for an abrasive belt and

the like comprising a pair of axially spaced, substantially radially rigid circular side plates, a plurality of substantially rigid back-up bars disposed between said side plates adjacent their peripheries in circumferentially spaced relation and extending parallel with the axis of said wheel, said bars and plates having, interfitting portions thereon adapted removably to secure said bars between said side plates, said interfitting portions permitting selective adjustment of the spacing between said back-up bars or rotation of said bars to present a different face, and a resilient covering surrounding each said back-up bar and projecting radially outwardly of the peripheries of said side plates.

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