ABRASIVE BLASTING WHEEL ASSEMBLY
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Filed July 13, 1964, Ser. No. 382,416
20 Claims. (Cl. 51—9)

This application is a continuation-in-part of our co-pending application Serial No. 307,665 filed September 9, 1963, now abandoned.

The present invention relates to an improved abrasive blasting wheel assembly for use in cleaning, descaling and otherwise treating metal articles and other types of articles formed of either hard or soft material. In particular, the invention relates to an abrasive blast wheel assembly which has long life because of protecting surfaces on critical wear points of the assembly which normally suffer and fail because of severe wear, for instance from abrasive which ricochets from the article bank to the wheel assembly.

Over the past years, many experiments have been conducted with the aim of developing abrasive throwing vanes which have long life. Among these experiments was the use of a tungsten carbide face vane wherein the face was mechanically clamped to a backing or holder but this was not found to be practical because the holder design was too expensive and its service life was too short.

Another experiment involves cementing a carbide face vane to the backing or anchor plate but this was not practical because the carbide grade used had too short a life as did the holder design.

One particular disadvantage with the development of cementing the carbide face vane to the backing or holder is that the adhesion can be broken when treating or blasting articles under high temperature conditions. For instance, this can occur when treating red hot castings using a vane formed of tungsten carbide face adhered to the backing by an epoxy adhesive.

It is, therefore, an object of the present invention to provide a new and novel abrasive blasting wheel assembly wherein the vanes for propelling the abrasive exhibit extremely long life as compared with prior vanes.

A further object of the invention is to provide a tungsten carbide face vane and means for attachment of the vane to the rotatable wheel which eliminates the disadvantages mentioned above with former carbide face vanes.

Other objects and advantages of the invention will become more apparent from a study of the following description and drawing wherein:

FIGURE 1 is a plan view of a portion of the rotatable blast wheel showing one vane in position;
FIGURE 2 is a section taken along line 2—2 of FIG. 1;
FIGURE 3 is an end view of the vane of the assembly of FIGURE 2;
FIGURE 4 is a section taken along line 4—4 of FIG. 1;
FIGURE 5 is an exploded perspective view showing the backing plate and the tungsten carbide face vane prior to assembly;
FIGURE 6 is a perspective partially in section of the assembly of FIGURE 2 showing a different type vane which can be used in the present invention;
FIGURE 7 is an end view of a different type vane which can be used in the present invention;
FIGURE 7A is a plan view of a portion of the rotatable blast wheel shown in FIG. 7 showing one vane in position;
FIGURE 8 is a section taken along line 8—8 of FIG. 7;
FIGURE 9 is an end view of the vane of FIG. 7 in the reverse position; and
FIGURE 10 is an end view of a different type vane which can be used in the present invention.

Referring more particularly to the drawings, there is shown in FIGURE 1 a rotatable abrasive blasting wheel 1 which supports in vane channels 2 a tungsten carbide vane face portion 3 secured, as will be explained later, to a steel backing plate 5 which is, in turn, anchored to the channel 2 in the wheel by bolts 9, 9 in block 25 which is integral with plate 5 or secured thereto in any conventional manner. Positioning the 14 is used to accurately and easily position the backing 5 in position in the vane channel 2. It also serves as an additional lateral supporting means to maintain the backing plate 5 in position during operation.

As shown better in FIGURES 2—5, the vane face 3 tapers as it extends outwardly from the center 15 of the wheel 1. This is done so that the abrasive spray may be emitted in a concentrated pattern from the more narrow outer end 17 of the vane.

As seen also better in FIGURE 5, the vane face 3 has upwardly extending sides 19, 19 which serve to form an open channel through which the abrasive passes. As better shown in FIGURE 2, the sides gradually thicken as they extend outwardly and approach the middle portion of the vane and then gradually diminish as they approach the outermost end 17 of the vane face 3. With this arrangement, additional reinforcement is provided for the vane as the abrasive is moved therealong at rapid rates of speed, particularly since the vane facing 3 tapers as mentioned above which requires additional support along its sides 19 to handle the more concentrated abrasive.

To secure the vane facing 3 to the backing plate 5, an adhesive is used to cement the two units together. The adhesive may be any suitable heat resistant adhesive but is preferably an epoxy type adhesive which is known to provide strong bonds between metals.

The vane facing 3 also is connected with the backing plate 5 by a pin 21 shown better in FIGURE 5 which seats in an opening 23 in the backing or supporting plate 5. Pin 21 not only serves as a positioning element but also as a brake, reinforcement or deterrent against centrifugal force developed during operation of the wheel. With the pin connection, the plate 5 and vane 3 cannot slide axially of one another because of any developed centrifugal force.

The so-combined facing 3 and backing plate 5 are then placed within the wheel channel 2 after which the bolts 9, 9 and the positioning pin are inserted through corresponding openings 23 in the horizontally extending face portion 25 (see FIGURE 5) of the backing plate 5.

The vane facing 3 as mentioned above is formed of tungsten carbide which is proved to be a highly satisfactory wear material being very resistant to ricocheting of abrasive, that is the abrasive rebounding from the article being treated back to the wheel assembly.

The runner head or rotatable wheel 1 as well as the vane backing members 5 are formed of machine, carbonized, and case hardened steel. With these hardened units the throwing face of the vanes is maintained precisely parallel with the spindle center line for the wheel which position gives the best abrasive distribution. Also
the use of carbonized, case hardened steel provides adequate strain with a generous safety factor to withstand stresses to the high density of tungsten carbide as compared with the density of iron vane.

Since the bolts 9 are accessible from the top, this permits vane removal without removing the rotatable wheel from its rotatable mounting. Also the bolts are located for maximum protection from abrasive to prevent loss through wear.

The steel runner head and the vane backings 5 can be used for long life because the tungsten carbide wear face protects critical points from severe wear. The carbide face since it covers the entire holder and since it is flush with the bottom of the vane mounting flange, sweeps abrasive rich chipping and thus prevents wear of the wheel at the periphery joining of the vane holder and wheel. This point has always been a problem area in previous wheel designs.

The steel backing plate 5 in turn protects the tungsten carbide which is very brittle so that the longest wearing or, correspondingly, the most brittle grade of tungsten carbide can be used. Further the tungsten carbide wear facing results in minimum total van weight for the lowest possible wheel stress.

The epoxy adhesive attachment of the facing to the backing plate 50, the bolted and pinned attachment of the vane to the head or wheel 1 allows salvage of any combination of components when wear does require re-building the unit.

The contour face of the vane faces described above allows a wide abrasive pickup end with a narrow abrasive discharge end. The wide pickup contributes to abrasive control and pickup efficiency and the narrow discharge end concentrates the abrasive for small target blasting. However, it should be pointed out that the vane need not be so restricted. Actually, full width, straight side vane facing as shown in FIG. 6 can be satisfactorily used with the present invention.

Since the carbide face 3 also fits seats in the outer head groove or channel 2, it serves to eliminate wear on the channel walls of the wheel 1.

FIGS. 7-10 show a variation of vane 3 in which the vanes are rotatable. As shown in FIG. 7 vane face portion 103 is secured to steel backing plate 105 in the aforedescribed manner by means of cement and pin 121. Vane facing 103 is symmetrically shaped with a pair of identical flanges or sides 119. The vane facing 103 and backing plate 105 are rectangularly shaped and for example are flush with the edge of blasting wheel 101 as shown in FIG. 8. Block or leg 125 of plate 105 is secured to wheel 101 in channel 102 by bolts 109, 109 and pinning pin 111 which extends into a set of receiving holes 110 in vane channel 102.

As shown in FIGS. 7 and 9 channel 102 has a second set of holes 112 so that the position of vane face portion 103 can be reversed from the position shown in FIG. 7 to the position shown in FIG. 9 in which bolts 109, 109 and pin 111 are then secured in set of holes 112.

FIG. 10 shows another form of the reversible vanes 103. In this form of the invention vane channel 102 has a single set of holes 114 along its longitudinal axis. Bolts 109, 109 and pin 111 are located in block 225 and are received in holes 114. In this manner the vane face portion 103 may be reversed to the position shown in FIG. 9 without the necessity of a second set of receiving holes.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A rotatable abrasive blasting wheel assembly comprising a rotatable wheel, radially extending vane supporting channels in one face of said wheel and having floors, vane face backing plates supported in said channels, tungsten carbide vane facing secured to said backing plates and also supported in said channels, additional means connecting each face vane with its backing plate for reinforcing the plate and face against centrifugal force, and means for securing each backing plate to the floor of a vane supporting channel in said wheel.

2. The assembly of claim 1 wherein the vane facing is secured to the vane backing plate by an adhesive material.

3. The assembly of claim 1 wherein the connecting means is a pin extending from said vane face which seats within a correspondingly shaped opening in the vane backing plate.

4. The assembly of claim 1 wherein the vane is of uniform width throughout its length.

5. The assembly of claim 4 wherein said means for securing said backing plate includes fastening means for mounting each vane with its vane face on one side of the longitudinal center line of its supporting channel and for mounting each vane in the reverse position with its vane face on the other side of the longitudinal center line of its supporting channel.

6. The assembly of claim 5 wherein said fastening means includes attaching members on said plate extending into its supporting channel on one side of its longitudinal center line, and said supporting channel having receiving apertures on each side of said longitudinal center line for mounting its vane in each of its two positions.

7. The assembly of claim 5 wherein said fastening means includes attaching members on said plate extending into its supporting channel along its longitudinal center line, and said supporting channel having receiving apertures along its longitudinal center line for mounting its vane in each of its two positions.

8. The assembly of claim 1 wherein the vane tapers as it extends outwardly along the periphery of the wheel, and said tapering vane having side walls which are thicker along the middle portion thereof.

9. The assembly of claim 1 wherein the backing plate and the wheel are formed of machine, carbonized, case hardened steel.

10. The assembly of claim 1 wherein the backing plates have a horizontally extending base portion, a vertically extending portion which is secured to the vane face, and means are provided for attaching the base portion to the vane supporting channels in said wheel.

11. The assembly of claim 1 wherein the vane faces extend beyond the backing plates at the outer edges thereof.

12. A combination abrasive throwing vane for use on rotatable abrasive blasting wheels comprising a tungsten carbide vane face, a backing plate for said vane, means for securing the vane face to the backing plate, and additional means connecting said vane face with said backing plate to reinforce the vane face and plate against centrifugal force.

13. The combination vane according to claim 12 wherein in the securing means comprises an epoxy adhesive material.

14. The combination vane according to claim 12 wherein said connecting means is a pin extending from the vane face which seats in a correspondingly shaped opening in the vane backing plate.

15. The combination vane of claim 12 wherein the tape faces as it extends outwardly from its innermost end.

16. The combination vane of claim 15 wherein the tapering vane has outwardly extending side walls which are thicker along the middle portions thereof.

17. The combination vane of claim 12 wherein the backing plate is formed of machine, carbonized, case hardened steel.
18. The combination vane of claim 12 wherein the vane facing is of uniform width.

19. The combination vane of claim 12 wherein the backing plate has a horizontally extending base portion for attaching the vane combination to the blasting wheel, and a vertically extending portion which is secured to the vane face.

20. The combination of claim 12 wherein the vane face extends beyond the backing plate at the outer end thereof.

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