April 8, 1969 B. FUERST 3,436,867

BLASTING MACHINE BLADE FORMATION FOR PRODUCING A DIVERGENT STREAM OF ABRASIVE

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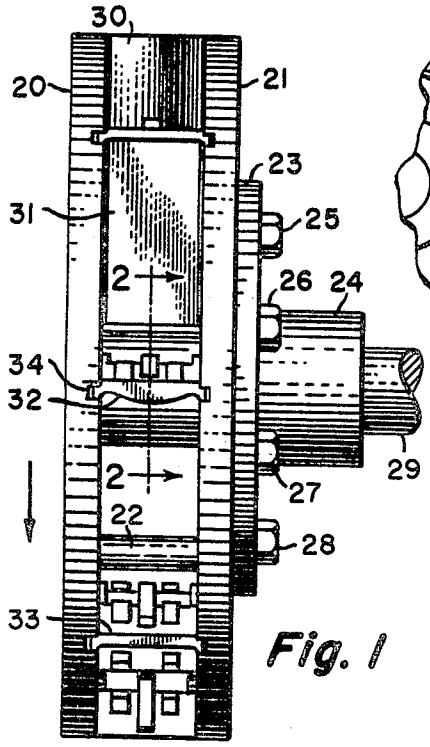


Fig. 1

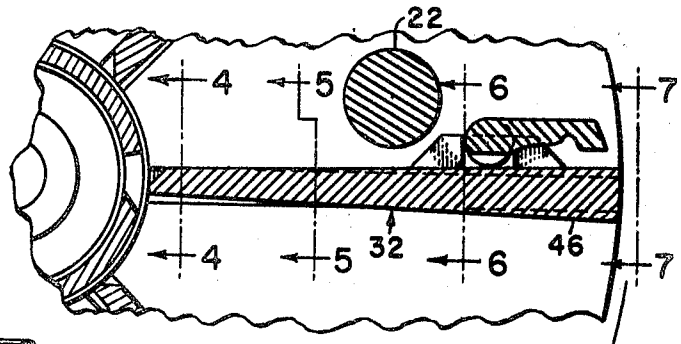


Fig. 2

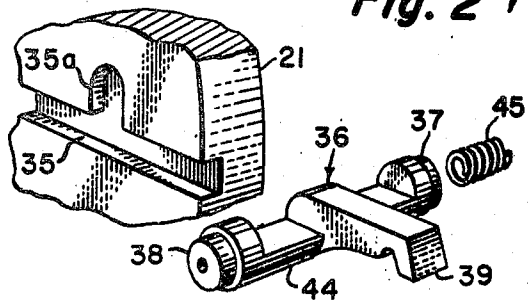
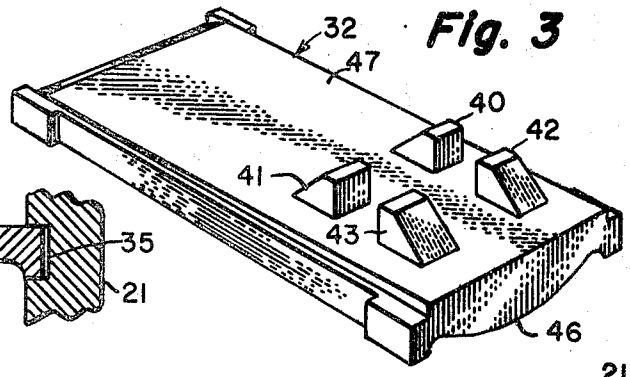


Fig. 3



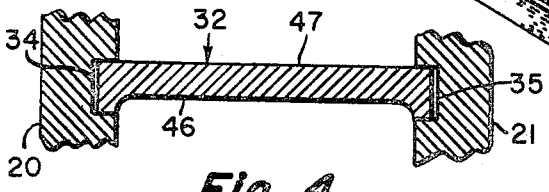


Fig. 4

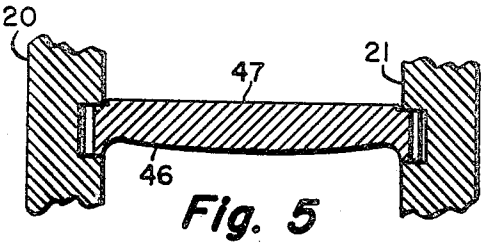


Fig. 5

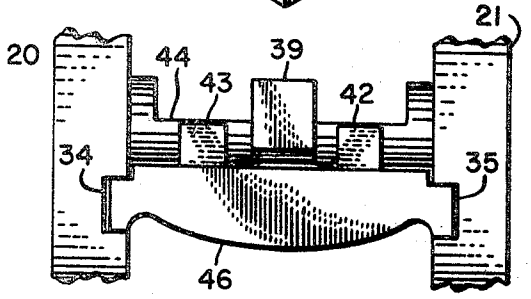


Fig. 7

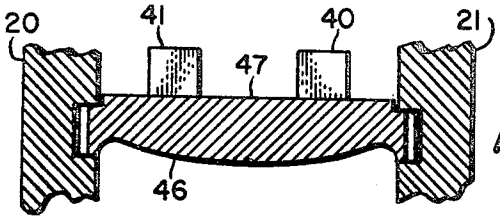


Fig. 6

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BLASTING MACHINE BLADE FORMATION FOR PRODUCING A DIVERGENT STREAM OF ABRASIVE

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U.S. Cl. 51—9 5 Claims

ABSTRACT OF THE DISCLOSURE

A blade for a centrifugal blasting machine, the surface of the blade having a convex configuration on the propelling face to produce a diverging stream of abrading particles.

This invention relates to the construction of rotary blasting machines. These machines are equipped with a rotar suggestive of a paddle wheel, with the components analagous to the paddles being a group of removable blades of a material resistant to abrasion. The rotor is driven at substantial speed, and abrasive particles are fed into the central area, where they are engaged by the blades to produce a high velocity tangential stream. The direction of the stream is controlled by selecting the point where the abrasive particles are engaged by the blades. Scale is removed from castings, and a variety of surfaces are cleaned and prepared for painting by blasting machine operations. Surface preparation to inhibit fatigue cracks is also common practice. The abrasive particles may be in the form of steel shot, or some nonmetallic abrasive, depending upon the purpose for which the blasting operation is adapted.

Some applications of the blasting technique require a highly focused stream, and some a divergent stream to cover a larger area. The present invention provides a blade conformation to generate a divergent stream with greater effectiveness than can be obtained with prior developments. Tilting of the blades in alternating directions to achieve a diverging stream is shown in United States Patent No. 3,242,615. This arrangement tends to produce spaced points of concentration, however, rather than a uniform coverage of a large area, and also induces increased abrasion of the wheel components. The present invention makes it possible to generate a very substantial dispersion without sacrifice of uniformity of density, and with minimum increase in wheel abrasion.

The several features of the invention will be analyzed in detail through a discussion of the particular embodiment illustrated in the accompanying drawing. In the drawing:

FIGURE 1 is a side view of a conventional blasting machine rotor equipped with blades embodying the present invention.

FIGURE 2 is a sectional elevation on the plane 2—2 of FIGURE 1, on an enlarged scale.

FIGURE 3 is an exploded view showing the components of the locking device that secures the blades against the effects of centrifugal force.

FIGURES 4, 5, and 6 are sections on the planes 4, 5, and 6, respectively, of FIGURE 2.

FIGURE 7 is an end view of the blade taken on the plane 7—7 of FIGURE 2.

The rotor assembly shown in FIGURE 1 is formed by a pair of spaced disc-shaped plates 20 and 21 secured in spaced relationship by a group of spacer posts 22, as shown in FIGURE 2. This assembly is secured to the flange 23 of the hub 24 by a group of bolts as shown

at 25–28. The hub 24 receives the driving shaft 29, which is mounted in suitable bearings (not shown) in a blasting machine.

A group of removable blades as shown at 30–33 in FIGURE 1 is installed in the rotor, with each blade being received along its opposite edges in slots as shown at 34 and 35 in the plates 20 and 21, respectively. The blades are preferably retained against the effect of centrifugal force by the locking device shown in detail in FIGURE 3, which is described and claimed in United States Patent No. 3,352,064. A cam-lock generally indicated at 36 has end journals 37 and 38 received in recesses as shown at 35*a* communicating with the slots, and the central portion of the locking device 36 on the opposite sides of the arm 39 are received between the lugs 40–41 and the lugs 42–43, with the arm 39 normally lying between the lugs 42 and 43. Rotation of the lock 36 from the position shown in FIGURE 3 by approximately 180 degrees to where it points toward the axis of rotation of the rotor will position the cutout 44 so that it will clear the lugs 40 and 41, and thus permit withdrawal of the blade radially outward from its retaining slots in the plates 20 and 21. The compression spring 45 is preferably incorporated in the structure to act against the end of the journal portion 37 to provide a degree of resistance to rotation of the locking member, so that the effects of gravity will not inadvertently unlock a blade. The structure thus far described forms no part of the present invention.

To achieve a diverging stream of abrasive particles, the surface of the blade facing in the direction of rotation of the wheel is rendered convex. The arrow in FIGURE 1 illustrates the direction of rotation of the rotor, and it will be the surface 46 that receives the abrasive particles and accelerates them to produce the tangential stream. It is preferable that the surface 46 exhibit an increasing degree of convexity with increase in distance from the axis of rotation of the rotor. This change in curvature becomes apparent upon an examination of FIGURES 4, 5, 6, and 7. By progressively increasing the curvature in this manner, there is a minimum tendency to produce undesirable abrasion against the inside surfaces of the plates 20 and 21. If the large curvature apparent in FIGURES 6 and 7 were to be present at the radially innermost extremities of the blades, there would be a strong tendency for particles to be given a large enough axial component to induce them to engage the surfaces of the plates during their radially outward passage. If the diverging pattern is induced largely at the outer extremity of the blade, there is a reduced likelihood that the individual particles will rebound from the surfaces of the wheel plates before departing along their tangential path.

Where substantial degrees of convexity are used, as shown in the drawing, it is frequently desirable to alternate the convex blades illustrated in FIGURES 4 through 7 with blades of a flat configuration throughout. This arrangement is shown in FIGURE 1, in which case the leading surfaces of the blades 31 and 33 are flat throughout the radial length, with the convex blade 32 interposed between the flat blades. This alternating arrangement will tend to maintain a more uniform particle density across the stream, rather than divert all the particles to the sides and leave the central portion of the stream of decreased density. The configuration of back surfaces 47 of the blades, from which the lugs 40–43 protrude, may be determined entirely by the desired blade thickness at the various points. For convenience, the surface 47 is shown in the drawings as substantially flat throughout the radial length of the blade.

The particular embodiments of the present invention which have been illustrated and discussed herein are for

illustrative purpose only and are not to be considered as a limitation upon the scope of the appended claims. In these claims, it is my intent to claim the entire invention disclosed herein, except as I am limited by the prior art.

I claim:

1. In combination with a blasting machine having a wheel rotating in a particular direction, and means for feeding abrasive particles into a space in the central portion of said wheel,

at least one blade having means along at least one edge thereof for secured interengagement with said wheel, said blade having the leading surface thereof disposed substantially radially and extending axially to receive and accelerate said particles,

said surface having a continuous convex configuration in cross section extending over a major portion of the width of said blade, and occupying the central area thereof, in a plane perpendicular to a radius to the axis of said wheel, said radius being adjacent said blade.

2. A combination as defined in claim 1, wherein said wheel has said blade interposed between blades having nonconvex configuration on said surface in said plane.

3. A combination as defined in claim 2, wherein said blades having convex configuration alternate with said blades having nonconvex configuration.

4. A combination as defined in claim 1, wherein the amount of convexity of said configuration increases with the distance from the axis of rotation of said wheel.

5. A combination as defined in claim 4, wherein said surface is substantially flat at the radially inner extremity thereof.

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