United States Patent [19]

Maeda

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[45] **Nov. 25, 1975**

[54] **CENTRIFUGAL BLASTING APPARATUS**

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July 19, 1974	Japan	49-82284

[52] **U.S. Cl.** ..... **51/9 R**

[51] **Int. Cl.²** **B24C 5/06**

[58] **Field of Search** ..... 51/9 R, 9 M, 14, 15; 241/275

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Primary Examiner—Donald G. Kelly

Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A centrifugal blasting apparatus including an improved blast wheel and an improved deflector is disclosed. The blast wheel comprises a pair of saucer-like disks and a plurality of vanes extending between the disks, attached thereto and spaced equiangularly from each other. Each of the vanes is comprised of a central face of substantially isosceles triangle configuration and a pair of substantially triangular sloping faces. The sloping faces extend from the equal sides of the central face farther off the axis of rotation of the blast wheel than the central face and slant laterally and backwards with respect to the direction of rotation of the blast wheel. The deflector has a feed slot formed through the peripheral wall thereof. The feed slot is of a nock-like configuration oriented to point to the direction of rotation of the blast wheel. Such a blasting apparatus can present a regular and widened blast pattern having a uniform distribution of abrasive particles, thereby giving a desirable even processing to the workpiece.

6 Claims, 21 Drawing Figures

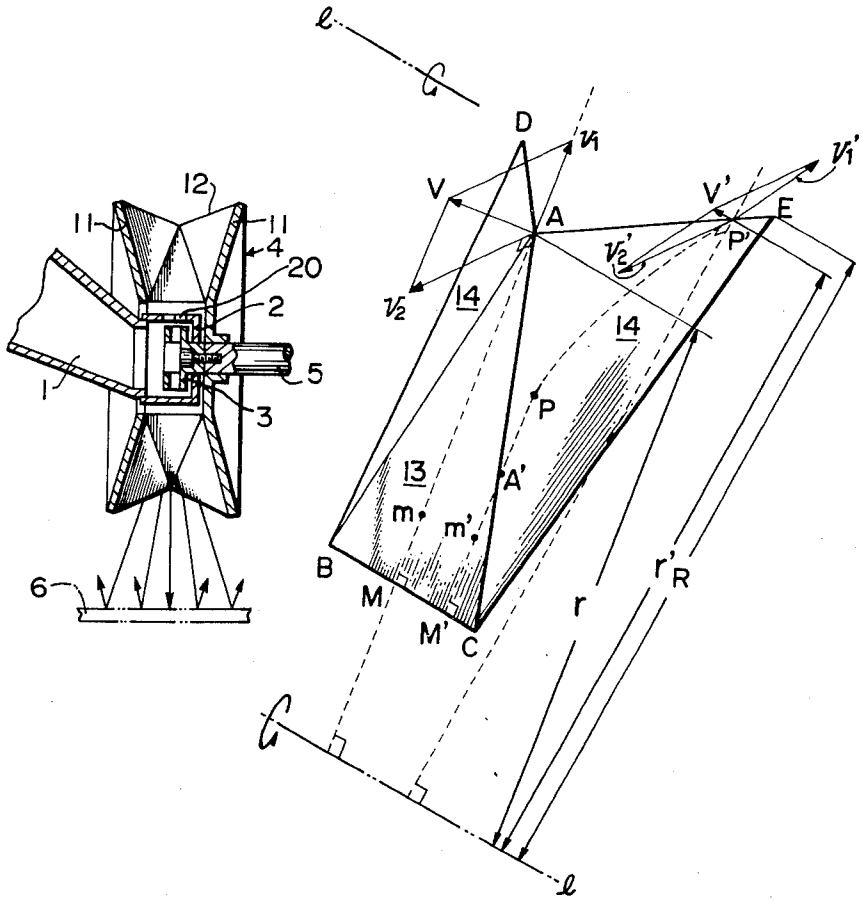


FIG.1

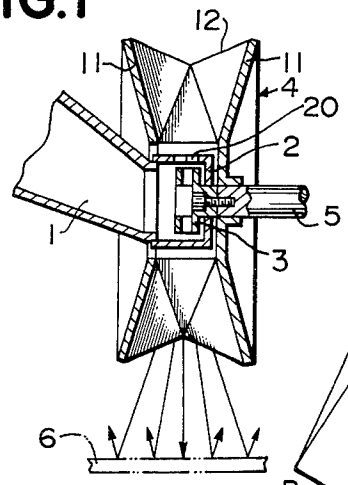


FIG.2

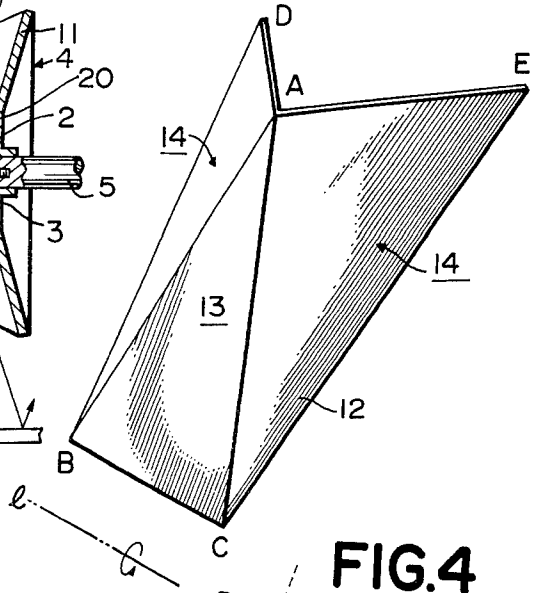


FIG.3

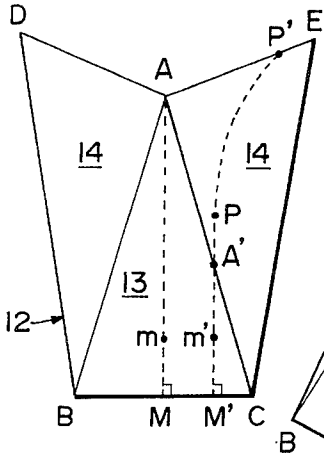


FIG.4

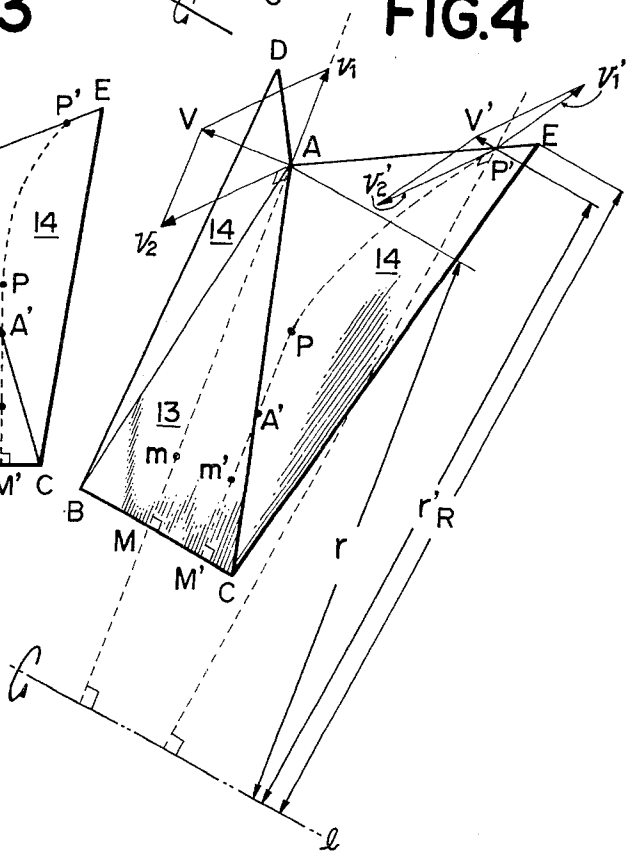


FIG.5

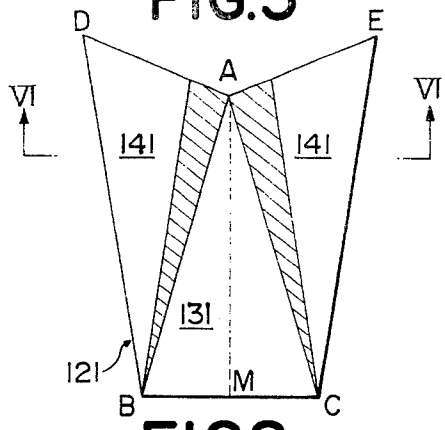


FIG.6

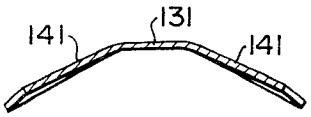


FIG.7

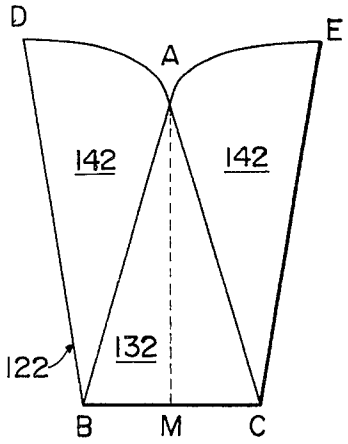


FIG.8

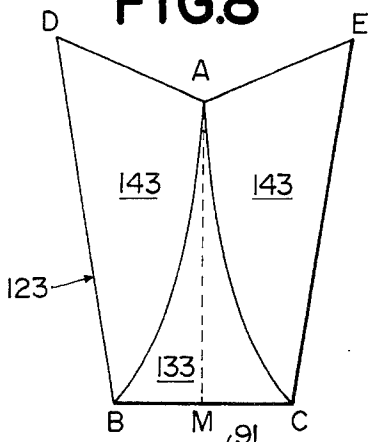


FIG.9
PRIOR ART

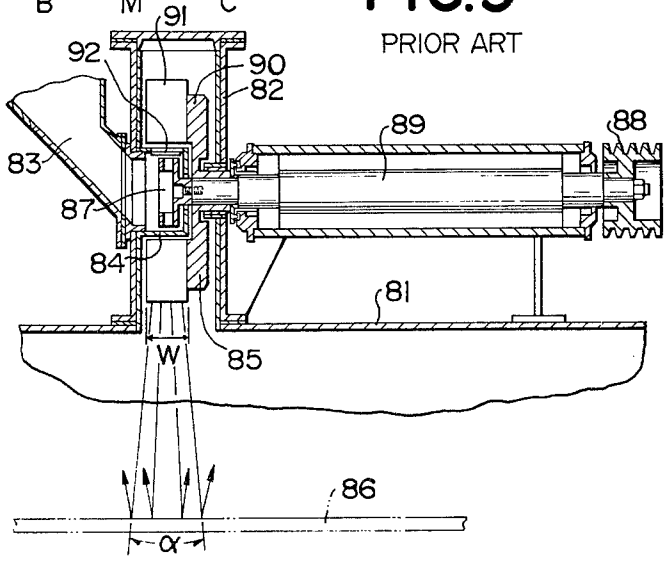


FIG.10
PRIOR ART

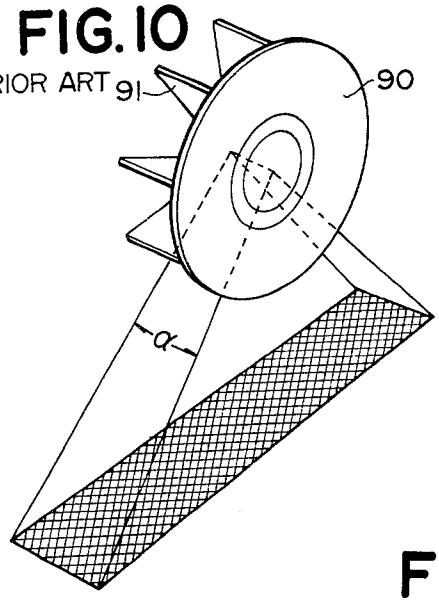


FIG.11
PRIOR ART

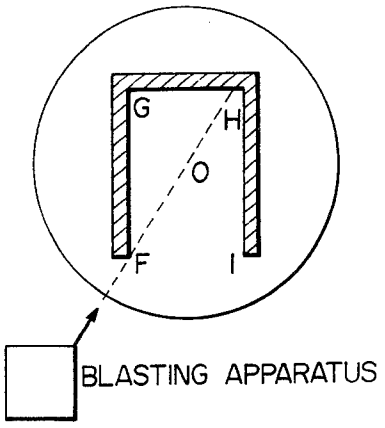


FIG.12
PRIOR ART

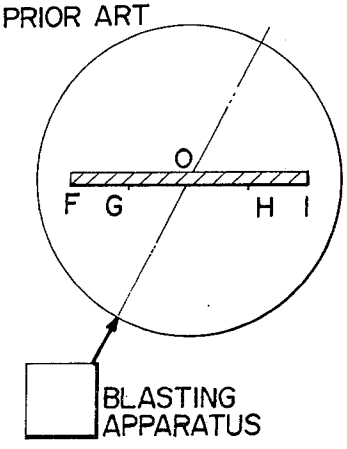


FIG.13

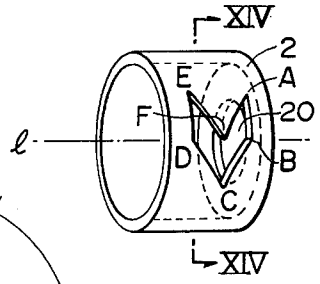


FIG.14

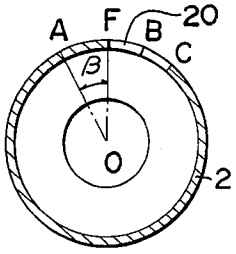


FIG.15

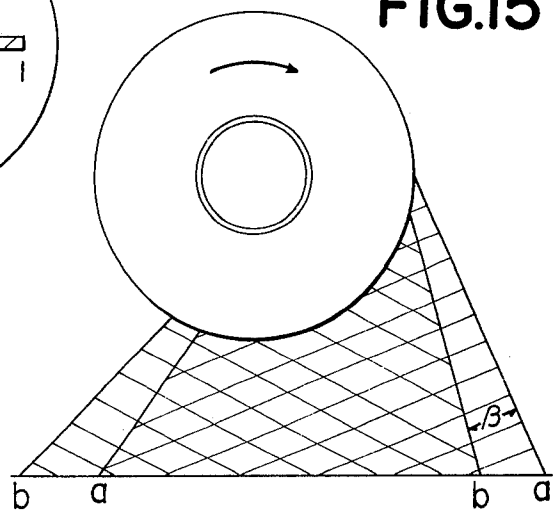


FIG.16

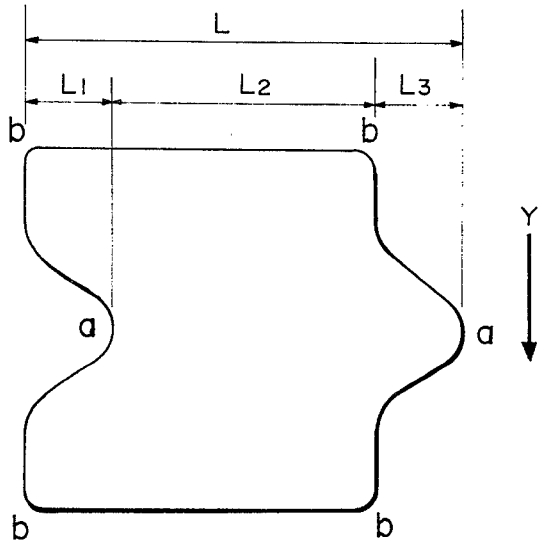


FIG.20

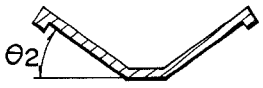


FIG.18

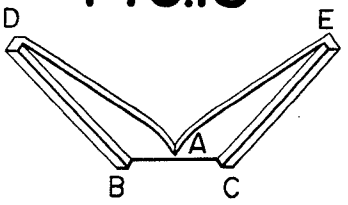


FIG.19

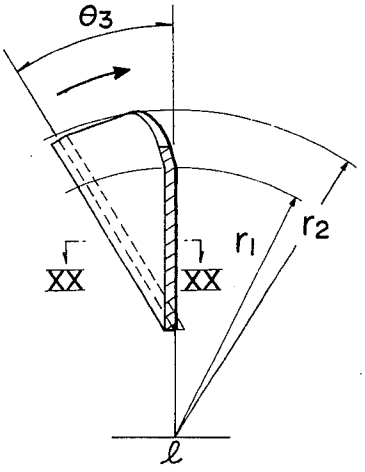


FIG.17

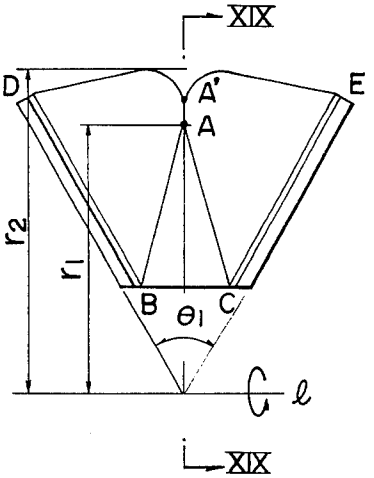
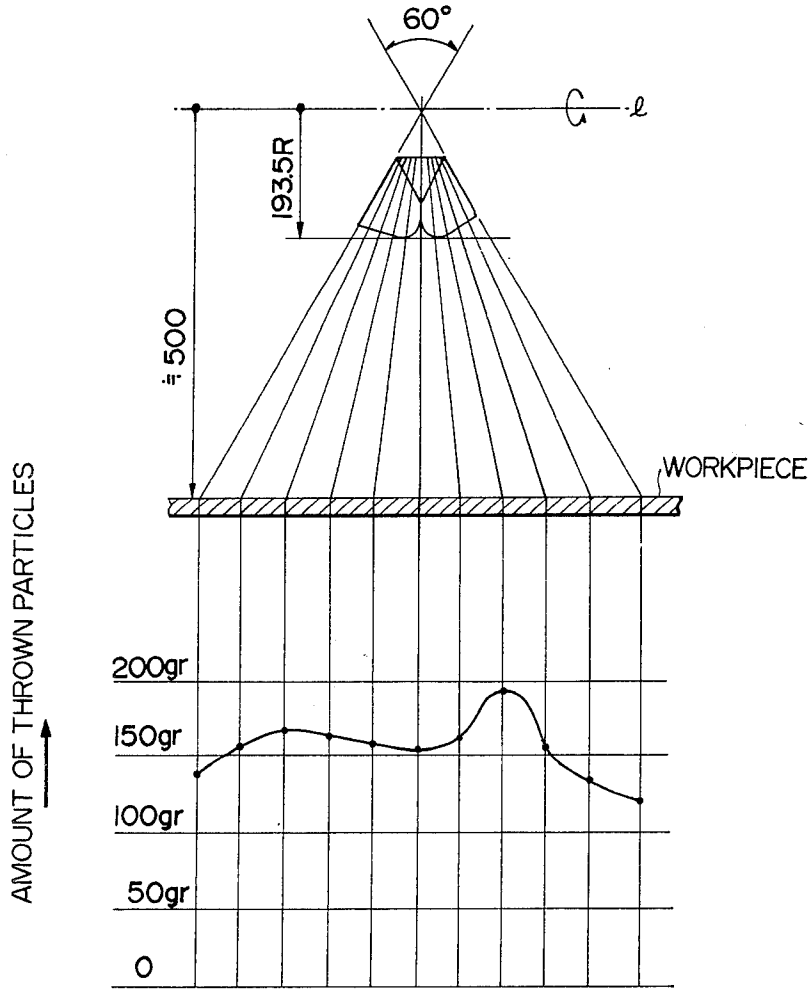


FIG. 21


60°
193.5R
≒500
WORKPIECE
AMOUNT OF THROWN PARTICLES
200gr
150gr
100gr
50gr
0

CENTRIFUGAL BLASTING APPARATUS

BACKGROUND OF THE INVENTION

a. Field of the Invention

The present invention is concerned with a centrifugal blasting apparatus for blasting abrasive particles such as metallic shot against a workpiece to be cleaned or abraded. More particularly, it relates to an improved centrifugal blasting apparatus including a rotatable blast wheel and a stationary deflector which are designed to produce a widened blast pattern having a uniform distribution of abrasive particles.

b. Description of the Prior Art

A conventional centrifugal blasting apparatus comprises, as shown in FIG. **9**, a base frame **81**, a casting **82** fixed to this base frame **81**, a chute **83** for supplying abrasive particles, a cylindrical deflector or impeller case **84** attached to said chute **83**, and a rotatable blast wheel **85** provided cocentrically with said cylindrical deflector **84**. The blast wheel **85** is rotated via a drive pulley **88** and a drive shaft **89** and includes a vane supporting disk **90** fixed to the shaft **89** and a plurality of vanes **91** which are substantially rectangular in shape. These vanes **91** are attached on one flat surface of the disk **90** radially thereof and spaced equiangularly from each other. In the central opening of the disk **90** is positioned an impeller **87** which is fixed to the shaft **89** and housed in the cylindrical deflector **84**. A feed slot **92** which is either square or rectangular in configuration when viewed from directly thereabove is formed locally through the peripheral wall of the cylindrical deflector **84** so as to face the vane **91**. Abrasive particles supplied via the chute **83** into the interior of the cylindrical deflector **84** are hurled by the impeller **87** through the feed slot **92** toward one surface of the respective vanes **91**. The particles of abrasive are then propelled on the surfaces of the vanes **91** and blasted against the workpiece **86**.

The direction of the blast stream produced by the conventional centrifugal blasting apparatus of the type described is virtually perpendicular to the axis of rotation of the blast wheel so that the blast pattern of abrasive particles cannot become much wider than the width w of the vanes **91**. Practically, the angle α of the blast pattern as shown in FIG. **10** is as small as ten degrees.

Because of its narrow blast pattern, the centrifugal blasting apparatus of the type described tends to undesirably cause an uneven processing of workpieces. For example, in case of processing a workpiece having a channel section as shown in FIG. **11** while turning it about its center O on a turn table, the blasting apparatus can abrade the entire outer surfaces and the inner surface GH of the workpiece but cannot give a sufficient processing to the inner surfaces FG and HI. When a turning flat plate as shown in FIG. **12** is processed by the use of the above-mentioned conventional blasting apparatus, there also arises an uneven processing because those portions G and H closer to the center O and those portions F and I more distant from the center have substantial differences therebetween in angle at which the abrasive particles impinge said respective portions, in distance through which the particles travel before impinging the portions, and thus in processing force.

To eliminate the aforesaid inconvenience, I, the inventor, have proposed, in Japanese Patent Application

No. Sho 49-13675 published on Apr. 2, 1974, vanes of a blast wheel each comprising a central face of an isoceles triangle configuration and a pair of triangular sloping faces each extending from the isoceles edge of said central face laterally and backwards with respect to the direction of rotation of the blast wheel. The vane has the general configuration of an isosceles trapezoid when viewed from directly thereabove. By the use of the proposed blast wheel having the vanes constructed as above, the blast pattern has been spread in width, i.e., in the direction parallel to the axis of rotation of the blast wheel. However, it has been found that even the proposed blast wheel cannot avoid the uneven processing because of the fact that those abrasive particles thrown from the central portion of the vane noticeably differ in speed from those thrown from the lateral side portions of the vane.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a centrifugal blasting apparatus including a blast wheel for widening the blast pattern of abrasive particles.

Another object of the present invention is to provide a centrifugal blasting apparatus including a blasting wheel of the type described which throws and spreads abrasive particles with a uniform distribution as well as imparts a substantially equal magnitude of velocity to the particles.

Still another object of the present invention is to provide a centrifugal blasting apparatus including a blast wheel of the type described which minimizes the amount of unavailing abrasive particles.

Still another object of the present invention is to provide a centrifugal blasting apparatus including a blast wheel of the type described vanes of which are free from excessive wear.

A further object of the present invention is to provide a centrifugal blasting apparatus including a deflector which cooperates with the blast wheel of the type described to prevent local irregularity in the blast pattern.

A still further object of the present invention is to provide a centrifugal blasting apparatus which effectively reduces the length of time required for processing workpieces as compared with the prior art without causing any uneven result of processing.

According to the present invention, there is provided a centrifugal blasting apparatus including a chute, a stationary hollow cylindrical deflector connected at one opening end thereof to said chute for receiving therewithin abrasive particles fed via said chute and provided with a feed slot formed through the peripheral wall thereof, a rotatable impeller positioned within said deflector with the axis of rotation thereof coinciding with the axis of the deflector for hurling the abrasive particles through said feed slot, a drive shaft carrying said impeller, and a rotatable blast wheel fixed to said drive shaft so as to be positioned cocentrically with said deflector and rotated together with said impeller, said blast wheel comprising: a pair of disks, one of said disks being fixed to said drive shaft; and a plurality of vanes extending between said disks, attached thereto and spaced equiangularly from each other, said vanes each comprising a central face of a substantially isosceles triangle configuration and a pair of substantially triangular sloping faces extending from the respective equal sides of said central face, at least a part of each of said sloping faces slanting laterally and backwards with respect to the direction of rotation of said blast wheel, the

distance between a pair of apexes of said sloping faces which are opposite to the equal sides of said central face being longer than the length of the bottom edge of said central face, the distance from one of said pair of apexes of said sloping faces to the bottom edge of said central face being longer than the height of said central face between the top apex thereof and the bottom edge, and said vanes being attached to said pair of disks at the sides of the sloping faces opposite to the top apex of said central face in such a way that the bottom edge of said central face is parallel with the axis of rotation of said blast wheel and also that the top apex of said central face is positioned opposite to the axis of rotation with respect to the bottom edge of said central face.

According to the present invention, there is also provided a centrifugal blasting apparatus including a feed slot which is of a nock-like configuration so oriented as to point to the direction of rotation of the blast wheel.

The above and still further objects as well as advantages of the present invention will be more clearly understood from the following description when taken conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view diagrammatically showing an essential part of the centrifugal blasting apparatus according to the present invention.

FIG. **2** is a perspective view showing a type of vane for a blast wheel of the centrifugal blasting apparatus.

FIG. **3** is a plan view of the vane shown in FIG. **2.**

FIG. **4** is an explanatory illustration showing the movement of the abrasive particles on the vane of the blast wheel.

FIG. **5** shows a plan view of a modified vane.

FIG. **6** is a sectional view taken along the line VI—VI in FIG. **5.**

FIGS. **7** and **8** each show a plan view of a further modified vane.

FIG. **9** is a vertical sectional view of a known centrifugal blasting apparatus.

FIG. **10** is an explanatory illustration showing a conventional blast wheel used in the known centrifugal blasting apparatus as shown in FIG. **9** and the blast pattern produced thereby.

FIGS. **11** and **12** show the function of the known blasting apparatus as shown in FIG. **9.**

FIG. **13** is a perspective view of a deflector in the centrifugal blasting apparatus according to the present invention.

FIG. **14** is a sectional view taken along the line XIV—XIV in FIG. **13.**

FIGS. **15** and **16** are explanatory illustrations showing the blast pattern of abrasive particles.

FIG. **17** is a plan view of a vane used for a performance test.

FIG. **18** is a top plan view of the same.

FIG. **19** is a sectional view taken along the line XIX—XIX in FIG. **17.**

FIG. **20** is a sectional view taken along the line XX—XX in FIG. **19.**

FIG. **21** is a chart showing the result of the performance test.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows an essential part of a centrifugal blasting apparatus embodying the present invention. The centrifugal blasting apparatus comprises a chute **1** for supplying abrasive particles such as metallic shot for a cylindrical deflector or impeller case **2** attached thereto. The inlet of the chute **1** is connected to a supply of the abrasive particles (not shown) and the outlet thereof to one opening of the cylindrical deflector **2.** An impeller **3** and a blast wheel **4** are mounted integrally and cocentrically with each other on a drive shaft **5** so as to rotate together. The impeller **3** is housed in the cylindrical deflector **2.** The drive shaft **5** for both the impeller **3** and the blast wheel **4** extends from the interior of the cylindrical deflector **2** through the other opening of the deflector and is connected to a power source (not shown). The deflector **2,** the impeller **3,** and the blast wheel **4** are arranged so that the central line of the cylinder of the deflector **2** coincides with the common axis of rotation of the impeller **3** and the blast wheel **4.** In other words, these members are positioned with their circumferences cocentrical.

The abrasive particles are fed from their supply into the deflector **2** via the chute **1.** Then, the particles are hurled by the impeller **3** housed within the deflector **2** through a feed slot **20** formed on the circumferential wall of the deflector **2** to the blast wheel **4** and blasted thereby against the workpiece **6.**

According to the present invention, the blast wheel **4** comprises a pair of saucer-like disks **11** and a plurality of vanes **12.** The pair of disks **11** are located opposite to and spaced from each other. The plural vanes extend between said pair of disks **11** and they are fixed to the disks **11** and equiangularly spaced from each other. One of the disks **11** is rigidly fixed to the drive shaft **5.** The distance between the saucer-like disks **11** becomes longer as it goes toward the circumference of the disks. That is to say, the distance between the imaginary centers of the disks is shortest while that between the circumferences of the disks is longest.

The respective vanes **12** are of the identical configuration, one of which is shown in FIGS. **2** and **3** in perspective and plan views, respectively. The vane **12** is comprised of a central face **13** of an isosceles triangle configuration (ΔABC) and a pair of identical triangular sloping faces **14** (ΔABD and ΔACE) connected with the central face **13** at the isosceles edges AB and AC, respectively. These faces **13** and **14** have flat surfaces. The central face **13** lies in a plane containing the axis of rotation of the blast wheel **4** and the sloping faces **14** each form such an angle with the central face **13** that the sloping faces are slanting backwards with respect to the direction of rotation of the blast wheel. (In the following description, the term "backwards" will be used in terms of the direction of rotation of the blast wheel.) The vane **12** is fixed to the disks **11** at the lateral edges BD and CE opposite to the apex A of the respective sloping faces **14** in such a way that the bottom edge BC of the vane **12** is parallel to the axis of rotation *l* of the wheel and that the apex A is opposite to the axis of rotation *l* with respect to the bottom edge BC.

As will be clear from FIGS. **1** to **4,** the vane **12** is circumferentially wider along the axial direction than centrally. More specifically, the distance between the apexes D and E, respectively opposite to the isosceles edges AB and AC, of the sloping faces **14** is longer than the length of the bottom edge BC. The sloping faces **14** extend radially farther than the central face does so that the distance R between the axis of rotation *l* and the apex D or E is longer than the distance *r* between the axis *l* and the apex A (See FIG. **4**).

Referring particularly to FIGS. 3 and 4, description will hereinafter be made on the movement of abrasive particles on the vane 12 during the rotation of the wheel.

Through the feed slot 20 of the deflector 2, abrasive particles are fed uniformly to the vane 12 over the entire length of the bottom edge BC of the central face 13. Consideration is first directed to the case of an abrasive particle m supplied at the median point M of the bottom edge BC. The particle m is accelerated on the central face 13 and it goes along the median line AM. Then, the particle m leaves the central face 13 at the apex A and is blasted toward a workpiece at a resultant velocity V of a velocity component V_1 and of another velocity component V_2. The velocity component V_2 lies in the plane containing the central face 13, i.e., in the direction coinciding with that of the line AM and said another velocity component V_2 is the velocity of rotation lying in the direction of a tangent line to the circle of rotation of the blast wheel.

Next, consideration is directed to the case of an abrasive particle m' supplied at a point M' of the bottom edge BC deviated from the median point M. The particle m' advances on the central face 13 along a line A'M' parallel with the median line AM. Since the vane 12 is folded at the boundary line AC backwards with respect to the direction of rotation, the particle m' temporarily leaves the surface of the vane 12 at the point A' due to its inertia. However, the speed of rotation of the vane 12 becomes greater as it goes radially outwardly so that the particle m' lands on the sloping face 14 at a point P which lies on the extension of the line A'M'. Not only a centrifugal force in the radial direction but also a force oriented laterally and backwards with respect to the direction of rotation acts on the particle m' because the sloping face 14 is slanting backwards with respect to the direction of rotation of the blast wheel. As a result, while the particle m' moves forward in the radial direction, it goes farther off the median line AM of the vane 12, thus depicting a curving loci on the sloping face 14.

When the particle m' reaches at a point P' located on the free edge line AE of the sloping face 14, it is thrown at a resultant velocity V' of a velocity component V'_1 lying in the plane containing the sloping face 14 and of a velocity component V'_2 which is the velocity of rotation in the direction of a tangent line to the circle of rotation of the blast wheel.

Similarly, those abrasive particles supplied uniformly over the entire length of the bottom edge BC of the vane 12 are, except for that particle supplied at the median point M, oriented on the sloping faces 14 in directions deviated from the directions imparted originally to the particles and they are distributed uniformly over the length of the free edges AD and AE of the sloping faces and then thrown therefrom.

As will be understood from FIG. 4, those abrasive particles about to be blasted from the points on the free edges AD and AE have velocity components in such directions as go farther off the median line AM of the central face 13, so that those particles are radiated from the free edges AD and AE.

For an even and effective processing, it is desired that the speeds V and V' at which the particles m and m' are thrown toward the workpiece are equal with each other. The present invention realizes this for the following reasons. That is to say, in the above-mentioned vane, the directions of the velocity components v1' and v_2' form an obtuse angle therebetween while the directions of the velocity components v_1 and v_2 form a right angle therebetween. On the other hand, in practice, the magnitude of the velocity component V_1 and that of the velocity component v_1' are considered equal with each other in view of various factors such as the friction between the particles and the surface of the vane, the length through which the particles pass on the vane, and the wind velocity on the vane. In addition, the magnitude of the velocity component v_2' is greater than that of the velocity v_2 due to the fact that the distance r' between any point located on the free edge AD or AE of sloping faces 14 and the axis of rotation l is longer than the distance r between the apex A and the axis l. Therefore, according to the present invention, the magnitude of the velocity V and that of the velocity V' can be made substantially equal to each other.

As has been explained, in the blast wheel according to the present invention, those abrasive particles thrown from the sloping faces of the respective vanes are given a velocity component having a direction oblique to the axis of rotation l of the wheel. As a result, the area covered by the blasted particles is remarkably wider in breadth than the blast wheel. At the same time, since the radius of each of the extremities of the sloping faces is longer than that of the apex of the central face, the magnitude of the velocity at which the particles are blasted can be made substantially equal at any point of the free edge line of the vane. In addition, the abrasive particles fed uniformly over the entire length of the bottom edge of the vane are presented uniformly over the free edges of the sloping faces and thrown therefrom. As a result, there is obtained a blast pattern having a uniform distribution of abrasive particles. Therefore, an uneven processing of a workpiece is effectively prevented.

Modified vanes for the blast wheel will now be explained referring to FIGS. 5 and 6. A vane 121 as shown in these figures is similar to the vane 12 as shown in FIGS. 2 to 4 with the exception that each of sloping faces 141 is convexly curved in the vicinity of the connection with the central face 131. More specifically, the sloping faces 141 have convexly round surfaces extending along their connection with the central face 131. These convexly curved surfaces each are of a substantially triangular configuration when viewed from directly thereabove, the surfaces being shadowed in FIG. 5. The breadth of each convex surface becomes gradually greater as it goes from the apex B or C of the sloping face 141 to the free edge AD or AE along the boundary line AB or AC between the faces 131 and 141.

Due to the convex surfaces in the vicinity of the boundaries between the central face 131 and the respective sloping faces 141, the abrasive particles do not leave the surface of the vane 121 even when they pass from the central face 131 to the sloping face 141, but they are constantly controlled by the surface of the vane 121 until they reach the free edge AD or AE. Accordingly, those particles supplied at points slightly deviated from the median point M do not leave the central face directly outward off the vane and thus it can be safely said that all of the particles supplied are thrown from the free edges of the sloping faces 141. As a result, the blasting by the use of the vanes 121 is free from any loss of the particles and an abnormal wear of the surface of the vanes which might be caused but for the convex portions by the landing of the particles onto

the sloping faces. In addition, the advantages mentioned in connection with the blast wheel having the vanes **12** are true of the blast wheel provided with these vanes **121.**

FIG. **7** shows a further modification of the vane. A vane **122** is almost identical in configuration with the vane **12** shown in FIGS. **2** to **4,** with the exception that the free edges AD and AE of respective sloping faces **142** are formed to project outwardly arcuately.

The sloping faces **142** thus formed present landing areas for those abrasive particles which have been supplied at points slightly deviated from the median point M, advanced on the central face **132** and then left this face. In other words, it is prevented that those particles supplied near the median point M are thrown directly from the central face without being controlled by the sloping faces **142.** Therefore, the sloping faces **142** having the projecting edge portions exert control over almost all of the abrasive particles supplied and throw them against the workpiece so that the amount of unavailing particles is minimized. In addition, the advantages described in connection with the vanes **12** are true of these vanes **122** having the sloping faces **142** provided with the projecting edge portions.

FIG. **8** shows a still further modification of the vane. A vane **123** as shown in this figure is substantially same as the vane **12** shown in FIGS. **2** to **4** with the exception that the boundary lines AB and AC between the central face **133** and the sloping faces **143** are curvilinearly projected inwardly of the central face **133.** More specifically, the boundary lines are so curved as to reduced very much the breadth of the central face **133** in the vicinity of the apex A.

Owing to the construction as above, the distance between that part of the boundary line AB or AC near the apex A and the free edge AD or AE is lengthened. As a result, when those abrasive particles fed at points slightly deviated from the median point M reach the boundary line AB or AC, there is left a considerable length before they reach the free edge AD or AE. Accordingly, they are not thrown out of the vane **123** directly from the central face **133** but land on the sloping faces **143.** Thus, the sloping faces **143** can control almost all of the abrasive particles and throw them against the workpiece without causing any useless particles. In addition, the advantages of the vanes **12** as shown in FIGS. **2** to **4** are true of these vanes **123.**

It should be understood that the above-mentioned modified vanes **121, 122** and **123** are provided in the blast wheel in the same way as for the vanes **12.**

It should be understood also that the central face of the vane may lie in a plane which fails to contain the axis of rotation of the blast wheel.

A performance test was conducted by the use of a blast wheel having a plurality of vanes similar to those shown in FIG. **7.** The vane used for the test is shown in FIGS. **17** to **20.** The dimensions of the vane are as follows: the bottom edge BC is 60 mm long; the height of the central face ABC is 105 mm; the angle θ_1 formed by the lateral side edges BD and CE is 60° when viewed from thereabove; the angle θ_2 formed by the central and sloping faces is **33** degrees and **34** minutes when measured in FIG. **20;** the angle θ_3 formed by the central face and the lateral side edge of the sloping face is **32** degrees when measured in FIG. **19;** the radius r_1 from the axis l to the apex A is 175 mm; and the radius r_2 from the axis l to the outward extremity of the projecting edge line of the sloping face is 193.5 mm.

The resulting blast pattern is shown in FIG. **21.** The pattern was 60° wide. The vertical axis in the chart in FIG. **21** indicates the amount of thrown particles received at various points on the surface of the workpiece, while the horizontal axis indicates receiving points. The thick curving line shows that the distribution of the blasted abrasive particles over the entire pattern is made substantially uniform by the use of the blast wheel according to the present invention.

Referring to FIGS. **13** and **16,** a deflector cooperative with the blast wheel described above will hereinafter be explained.

By the use of the vanes as shown in FIGS. **2** to **8** and in FIGS. **17** to **20** obtained are the advantage that the width of the blast pattern becomes greater as compared with the prior art. However, in case those vanes are used with the known deflector having a feed slot which is either square or rectangular in configuration when viewed directly from thereabove, the area covered by the thrown abrasive particles is as shown in FIG. **16.** One side of the area projects locally and the opposite side is correspondingly recessed locally. The reason therefor is that those particles thrown from the lateral side portions of the vane have travelled through longer distance as compared with those thrown from the central portion of the vane and that the former is thrown later than the latter. More specifically, those particles thrown from the central portion are presented in the a-a section of the blast pattern as shown in FIGS. **15** and **16** and those particles thrown from the lateral side portions are in the b-b section. In other words, the throwing of the particles from the lateral side portions of the vane is effected at the time the blast wheel further rotates after the throwing from the central portion.

The above-mentioned blast pattern is not desirable because sometimes it may cause the uneven result of processing. For example, let us assume to process a workpiece having a width corresponding to the length L the blast pattern shown in FIG. **16** while displacing it in the direction perpendicular to the length of the blast pattern, i.e. in the direction of the arrow Y. Then, the region of the workpiece covered with the area L_3 receives the smallest amount of abrasive particles and the region covered with the area L_2 receives the largest amount of particles. This results in difference in processing of the regions covered with the areas L_1, L_2 and L_3.

FIGS. **13** and **14** show a deflector according to the present invention which produces a regular bast pattern when used with the vanes as shown in FIGS. **2** to **8.**

The deflector **2** has a hollow cylindrical body and a feed slot **20** formed through the peripheral wall of the body. The feed slot **20** is of a nock-like configuration which is oriented to point to the direction of rotation of the blast wheel. More specifically, an edge AB of the feed slot **20** is constituted by a part of the intersecting line of a plane perpendicular to the axis l of the deflector **2** and the cylindrical body of the deflector. Another edge BC of the feed slot **20** is constituted by a part of the intersecting line of the cylindrical body of the deflector **2** and a plane crossing at an angle both the axis l of the deflector and the direction of rotation of the impeller and blast wheel. A further edge AF is spaced from the edge BC and it is identical and parallel with same. A half of the feed slot is constituted by the aforesaid edges AB, BC and AF and the other half is symmetrical with the former half with respect to a plane containing the points F and C and lying perpendicular

to the axis *l*. Thus, the other half of the feed slot **20** is constituted by the edges ED, DC and EF corresponding to the edges AB, BC and AF constituting the former half, respectively. The lines EFA and DCB each are in the form of a line so folded to point to the direction of rotation of the impeller and blast wheel.

Let us assume that the a-a section and the *b*—*b* section in FIG. **15** form an angle β when the blast wheel having the vanes according to the present invention is used with the known deflector provided with the feed slot in the shape of either square or rectangle. Then, the feed slot **20** according to the present invention should be so constructed that the line EA and the point F form a central angle corresponding to the angle β about the axis *l* of the deflector **2**, as shown in FIG. **14**. By doing so, an amount of abrasive particles can be supplied for the central portion of the vane at the time the impeller integral with the blast wheel has been rotated through the angle β after the supplying of an amount of particles for the lateral side portions of the vane. As a result, a regular blast pattern is obtained by the use of the deflector according to the present invention even when the blast wheel for presenting a widened blast pattern is employed. Accordingly, the aforesaid uneven result of processing caused by the irregularity in the blast pattern is eliminated.

As many apparently widely different embodiments of the present invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

What is claimed is:

1. A centrifugal blasting apparatus including a chute, a stationary hollow cylindrical deflector connected at one opening end thereof to said chute for receiving therewithin abrasive particles fed via said chute and provided with a feed slot formed through the peripheral wall thereof, a rotatable impeller positioned within said deflector with the axis of rotation thereof coinciding with the axis of the deflector for hurling the abrasive particles through said feed slot, a drive shaft carrying said impeller, and a rotatable blast wheel fixed to said drive shaft so as to be positioned cocentrically with said deflector and rotated together with said impeller, said blast wheel comprising:

a. a pair of disks, one of said disks being fixed to said drive shaft; and

b. a plurality of vanes extending between said disks, attached thereto and spaced equiangularly from each other, said vanes each comprising a central face of a substantially isosceles triangle configruation and a pair of substantially triangular sloping faces extending from the respective equal sides of said central face, at least a part of each of said sloping faces slanting laterally and backwards with respect to the direction of rotation of said blast wheel, the distance between a pair of apexes of said sloping faces which are opposite to the equal sides of said central face being longer than the length of the bottom edge of said central face, the distance from one of said pair of apexes of said sloping faces to the bottom edge of said central face being longer than the height of said central face between the top apex thereof and the bottom edge, and said vanes being attached to said pair of disks at the sides of the sloping faces opposite to the top apex of said central face in such a way that the bottom edge of said central face is parallel with the axis of rotation of said blast wheel and also that the top apex of said central face is positioned opposite to the axis of rotation with respect to the bottom edge of said central face.

2. A centrifugal blasting apparatus according to claim **1** in which said feed slot is of a nock-like configuration so oriented as to point to the direction of rotation of said blast wheel.

3. A centrifugal blasting apparatus according to claim **2** in which said vanes each are so constructed that said central face and said sloping faces form an obtuse included angle at the boundary lines thereof.

4. A centrifugal blasting apparatus according to claim **2** in which said vanes each are so constructed that said sloping faces are provided with convexly curved surfaces along the boundary lines between said central and sloping faces, the breadth of the convexly curved surfaces becoming gradually greater as it goes farther off the axis of rotation of said blast wheel.

5. A centrifugal blasting apparatus according to claim **2** in which said vanes each are so constructed that the free edges of said sloping faces are arcuately projected outwardly of said blast wheel.

6. A centrifugal blasting apparatus according to claim **2** in which said vanes each are so constructed that the boundary lines between said central and sloping faces are curvilinearly projected inwardly of said central face, thereby reducing very much the breadth of said central face in the vicinity of the top apex thereof.

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