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⑰ **Airless centrifugal blast device.**

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Description

This invention relates to airless abrasive blast wheels for projecting metallic and non-metallic particulate media for impact upon surfaces in such processes as shot peening, descaling, deburring, and other abrasive blast applications.

Generally speaking, such blast wheels comprise a simple wheel formed of two blades extending diametrically in opposite directions from a central hub mounted on a motor driven, belt driven, or the like shaft for rotational movement about a central axis of the shaft. A centrifugal two-bladed airless blast wheel of the type described is marketed under the name Delta type wheel (R.T.M.). Certain aspects of the invention, also have application to other types of single or multiple bladed wheels, wherein the particulate media is introduced for engagement with the inner portion of the blade surface for projecting from the ends thereof in response to centrifugal force imparted by rotation of the blades at high speed about the central axis.

Delta type wheels of the type heretofore produced have been found to be deficient in a number of respects. Blade change to replace worn out blades has been awkward and sometimes very difficult, and the mounted blades are inadequately supported on the central shaft. Further, the assembly is subject to vibrations, which

bring about increased wear and reduction in strength of the assembly.

The feed from the tubes used to introduce the particulate media into the path of the blades provides for an erratic flow rate which not only reduces the output efficiency of the wheel but results in lack of control of the blast pattern.

One important feature of this invention resides in the configuration of the feed means through which the particulate media is fed to the wheel. In US—A—2 204 637 and US—A—2 363 437 a tubular member of uniform cross section extending from the end of a hopper to a level which is near the inner edges of the blades.

Because of the increasing velocity of the particulate media as it falls gravitationally downwardly through the feed tube particulate media which fills the tube at the inlet only partially fills the tube at the outlet. It has been found that when the discharge end of the tube is only partially filled, erratic patterns result from the wandering action of the particulate media out of the feed tube.

The following tabulation gives the velocity and the density determinations made with the same particulate media for various lengths of fall through a feed tube having a 1.5 inch (3.8 cm) orifice and from an initial velocity of 92 ft/min (28.04 m/min) and a K factor for the friction of the tube walls of 0.5.

Distance of Fall	(cm)	Velocity out of Discharge End of Tube	(m/min)	Exit Density out of Tube
3"	(7.62)	193.5 ft/min	(58.98)	47.5%
6"	(15.2)	257.7 ft/min	(78.55)	35.7%
9"	(22.9)	308.9 ft/min	(94.15)	29.8%
12"	(30.5)	352.9 ft/min	(107.56)	26.1%
24"	(61.0)	490.2 ft/min	(149.4)	18.8%

The erratic action has been overcome, in accordance with one aspect of this invention, by the use of a feed tube having a prescribed configuration in order to provide for a smooth feed of particulate media at a uniform rate which calculates out to be a maximum rate with

According to the present invention as defined in Claim 1 there is provided a device for airless blast with particulate material comprising a wheel having wheel blades which extend outwardly from an axial portion of the wheel, means for driving the wheel in rotational movement at high speed, and feed means having one or more supply inlets each in communication with a discharge opening aligned with and closely adjacent to the inner end portions of the blades for feeding particulate material to the inner end portions of the wheel blades for engagement by the blades during rotational movement of the wheel where-

by said engaged particulate material is displaced outwardly over the surfaces of the blades for projection at high velocity from the outer ends of the blades, said discharge openings collectively having a dimension in the direction of rotation of the wheel which is greater than the transverse dimension, characterized in that between each supply inlet and discharge opening of the feed means the feed means is tubular and has a decreasing cross-section from said inlet toward said discharge opening.

US—A—2 204 637 and US—A—2 363 437 disclose airless blast devices having the features of the pre-characterizing part of Claim 1. Preferred embodiments of the invention are defined in Claims 2 to 10.

By forming the feed means with a configuration which diminishes in cross section from the inlet end to the discharge end, the density of the

particulate media at the discharge end is at substantially maximum density which assures a smooth feed at a uniform rate.

Furthermore, it has also been found that the pattern thrown by the blades can be markedly lengthened to provide for greater coverage and more efficient operation by configuration of the discharge from the feed means to lengthen the discharge of particulate media somewhat in the direction of rotation of the blades. This has the effect of increasing the time flow of particulate media onto the face of the blade with a resultant longer particulate blast pattern. In other words, the same inner area of the blade is adapted to engage successive amounts of particulate media during its rotational movement thereby to increase the length of the blade covered by particulate media during any one instant, with corresponding increase in the angle for projection of the particulate media from the blade.

Other features and advantages of this invention will hereinafter be described with reference to a number of preferred embodiments of the invention as shown in the accompanying drawings, in which:

Figure 1 is a side elevational view of a wheel assembly embodying the features of the invention, with portion broken away to show elements in the interior thereof;

Figure 2 is a sectional view taken along line 2—2 of Figure 1;

Figure 3 is a top plan view of the two-bladed wheel shown in Figure 1;

Figure 4 is a side elevational view of the two-bladed wheel of Figure 3;

Figure 5 is a sectional view taken along the line 5—5 of Figure 4;

Figure 6 is a sectional view taken along the line 6—6 of Figure 4;

Figure 7 is a sectional view taken along the line 7—7 of Figure 4;

Figure 8 is a perspective view of a feed tube embodying the features of this invention;

Figure 9 is a perspective view of a modification in a feed tube embodying the features of this invention;

Figure 10 is a perspective view of a further modification in a feed tube embodying the features of this invention;

Figure 11 is a front elevational view showing the wheel and feed mounted for rotational movement about a horizontally disposed axis; and

Figure 12 is a sectional side elevational view showing the relation between the wheel blades and the feed opening taken along line 12—12 in Figure 11.

Referring now to the drawings, illustration is made of the two-bladed wheel comprising a central hub 10 and a pair of blades 12 and 14 extending outwardly in parallel relation in opposite directions from the hub 10, from portions of the hub on opposite sides of the axis and spaced from the axis by an equal amount to provide a balanced wheel.

The two-bladed wheel is mounted for move-

ment about an axis by means of a bushing 16 which is received in fitting relation within an axial bore 18 through a portion of the hub and which, in turn, is mounted on the end of a motor driven shaft 20 which extends through an axial opening 22 in the hub in contiguous relation with the bore 18. The bushing is provided with a key 24 adapted to be received in fitting relationship within a keyway 26 in the hub for replaceably mounting the two-bladed wheel on the bushing for rotational movement therewith.

The surfaces 28 of the blades 12 and 14, facing in the direction of rotational movement, indicated by the arrow in Figure 2, constitute the front face adapted to engage the particulate media and over which the particulate media is displaced outwardly for projection from the ends of the blades in response to rotational movement of the wheel at high speed.

The front face 28 of each blade 12 and 14 is formed with a rib 30 which projects from the front face along the lower edge substantially throughout the length thereof. A similar rib 32 of lesser depth extends from the upper edge of the front face substantially throughout the length thereof except for a short inner section adjacent the hub 10 in circumferential alignment with the outlet from the feed tube through which particulate media flow into the path of the inner end portion of the blades for engagement thereby during rotational movement of the wheel.

Preferably, the two-bladed wheel is formed in one piece to enable easier assembly while providing a stronger wheel which remains well balanced during use and thereby to provide for greater stability and less vibration during operation.

The blades 12 and 14 are usually straight members of rectangular shape having a width within the range of 1.5—4 inches (3.81—10.2 cm) and a length within the range of 3—10 inches (7.62—25.4 cm). The ribs or flanges 30 and 32 operate to confine the particulate media for travel along the face of the blade and to minimize stray of particulate media over the edges of the blades.

As illustrated in Figures 1 and 2, the two-bladed wheel is mounted within a shroud 40 having an open side 42 through which particulate media is projected by the wheel. In the illustrated modification, the shroud is of trapezoidal shape with a back wall 44, angularly extending side walls 46 and 48 and trapezoidally shaped top and bottom walls 50 and 52.

A bracket 54 mounts an electric motor 56 from the bottom wall 52 of the shroud with the shaft 20 of the motor extending through the bottom wall for receipt of the bushing 16 on the through extending portion thereof and which is adapted to be secured thereon, as by means of a cap screw 60. A rubber seal 62 is provided between the motor housing and the wall 52 of the shroud and a sealing gasket 64 is provided about the shaft portion extending through the wall 52 for protection from the abrasive media.

As illustrated in Figures 1, 2 and 8, one preferred configuration for the particulate feed means

comprises a feed tube 66 which tapers inwardly from the entrance end 68 to the discharge end 70 with the discharge end defining an orifice of crescent shape arranged to extend circumferentially to the axis of rotation of the wheel or to extend lengthwise in the direction of rotation of the blade.

The desired effect could also be obtained with a feed tube 66 of the type shown in Figure 9, in which the feed tube tapers inwardly from the inlet end 72 to the discharge end 74 with the outlet opening at the discharge end being of oblong or other geometric shape with the major dimension extending in the direction circumferentially of the axis or in the direction of rotation of the blade.

As of a further modification, the feed means can be formed of two or more separate tubular members 76 and 78 of circular or polygonal cross section, each of which tapers inwardly from their inlet end 80 to the discharge 82 with the tubular members arranged circumferentially with respect to the axis of the wheel to discharge particulate media at variable distances from the blade for continuous engagement by the blade over a period of time during its rotational movement.

All of these arrangements have the effect of making increased use of the blade thereby to increase the output of the wheel, while, at the same time, increasing the area covered by the abrasive blast.

As shown in Figures 1 and 2, the feed tube 66 extends through an opening in the top plate of the shroud to a level immediately above the upper inner edge of the blade. The feed tube 66 is supported by a plate 84 that is fastened to the top wall 50 by means of lock washers 86 held down by cap screws 88. Particulate media is fed to the inlet of the feed tube 66 from a hopper (not shown) in communication therewith for gravity flow of particulate media from the hopper into the feed tube.

In operation, the wheel is rotated at high speed. The article to be treated by particulate media thrown from the wheel is positioned in front of the open side 42 of the shroud. Particulate media which falls from the discharge end of the tube 66 is engaged by the face of the blades rotating at high speed. Upon engagement with the face of the rotating blades, the particulate media is centrifugally displaced over the face of the blade and is thrown with high centrifugal force from the ends thereof, through the open side 42 onto the article in front thereof.

It will be understood that the wheel shaft can be driven in rotational movement by convention means other than an electrical motor, for example, as by an internal combustion engine, magnetic drive, or by indirect belt or gear drive. Similarly, the shroud can vary in shape as long as it substantially encloses the wheel except for the open side wall for projection of the particulate media therethrough. The wheel can be mounted for rotational movement about a vertical axis or a horizontal axis or any angle in between.

The wheel assembly described constitutes a

low cost airless blast device which is easy to operate and which utilizes minimum space and supporting equipment. The spent abrasive or other particulate media can be recovered in the usual manner for reuse, preferably after removing dust and dirt as by means of a screen, air wash, and/or magnetic separator.

When it is desired to remove the wheel for replacement or repair, it is only necessary to remove the wheel from the shaft, with or without the bushing, and to replace the wheel by reversal of the operation.

The described features are not restricted to a vertical feed to wheel blades mounted for rotational movement in a horizontal plane. It has been found that similar results can be obtained with a wheel mounted to rotate about a substantially horizontally disposed axis or along any angle between vertical and horizontal. It is required, however, to divert the vertical flow of particulate material from downward flow through the tubular member and through a hollow member which extends crosswise and which includes the concept of decreasing cross sections to a discharge opening of the type described which faces laterally in the direction towards the adjacent outer edge of the blades to feed the particulate material onto the blades in circular alignment with the inner end portions of the blades.

Figures 11 and 12 illustrate a two-bladed wheel of the latter type mounted for rotational movement of the wheel about a horizontal axis for rotation of the blades in a vertical plane. As shown in these Figures 11 and 12, the blades 12, 14 extend radially outwardly from the hub 10, are mounted on shaft 20 for rotational movement by the electrical driving motor 56 about their horizontal axis. It will be understood that the angle of the wheel can be varied for rotation about a vertical or horizontal axis or any angle therebetween.

In the modification shown in Figures 11 and 12, the particulate material is fed into the funnel 100 which directs the particulate material into the open end 104 of a feed tube 102, in the form of a tubular member having a circular opening 106 in the inner side wall in crosswise alignment and in full communication with an outer open end 108 of a conically shaped hollow body 110 having a discharge opening 112 at its inner apex end in facing relation with the blades 14. At least a portion of the hollow body 110 leading into the discharge opening is of the diminishing cross section, as heretofore described for maintaining uniform flow and control of the particulate material fed onto the blades 12, 14.

The discharge opening 112 is of a configuration of the type heretofore described to prolong the feed of particulate material onto the inner end portions of the blades 12, 14. Thus, the blades 12, 14 engage successive portions of the particulate material issuing from the feed opening 112 during rotational movement of the blades 12, 14 thereby to enlarge the pattern of particulate material projected from the ends of the blades. The vari-

ous shapes of the feed openings elongated in the direction of rotational movement of the blades are illustrated in Figures 8, 9 and 10.

The conically shaped hollow body 110 is preferably mounted on the tubular member for rotational adjustment relative thereto about an axis substantially in alignment with the axis of the wheel with the outlet opening 112 offset for crosswise alignment with the inner end portions of the blades 12, 14 to feed the particulate material onto the inner end portions of the blades 12, 14. The conically shaped hollow body 110 can be adjusted for rotational movement about its axis to locate the feed opening 112 in any desired circumferential relation relative to the wheel thereby to enable substantially precise control over the direction of the particulate material thrown from the ends of the blades 12, 14. For example, when the conically shaped hollow body is rotated to position the feed opening 112 at the location shown in Figure 12, the particulate material will be thrown in a spread pattern in a lateral direction. By rotation of the hollow body 110 to located the feed opening 112 above the axis of the wheel, the pattern of particulate material thrown from the ends of the blades 12, 14 will be in a downward direction. Similarly, the hollow body 110 can be rotated to vary the direction which will normally be in a direction about diametrically opposite the radial direction of offset of the feed opening 112 from the axis of the wheel.

For rotational adjustment, the outlet opening 106 of the tubular member 102 and the inlet opening 108 of the hollow body 110 are formed of circular cross section with an annular flange 114 about the inlet in telescoping relation with an annular shroud 116 about the outlet opening 106 to support the hollow body 110 on the tubular member 102. The telescoping portions can be provided with openings (not shown) through which locking pins (not shown) can be inserted when aligned to interlock the members in their assembled and adjusted relation. Alternatively, the elements may be secured in the assembled relation by suitable clamps or other locking means.

Claims

1. A device for airless blast with particulate material comprising a wheel having wheel blades (12, 14) which extend outwardly from an axial portion of the wheel, means (56) for driving the wheel in rotational movement at high speed, and feed means (66; 76—78; 110—66) having one or more supply inlets (68, 72, 80, 108) each in communication with a discharge opening aligned with and closely adjacent to the inner end portions of the blades (12, 14) for feeding particulate material to the inner end portions of the wheel blades (12, 14) for engagement by the blades during rotational movement of the wheel whereby said engaged particulate material is displaced outwardly over the surfaces of the blades for projection at high velocity from the outer ends of

the blades, said discharge opening (70; 74; 82; 112) collectively having a dimension in the direction of rotation of the wheel which is greater than the transverse dimension, characterized in that between each supply inlet and discharge opening of the feed means the feed means (66; 76—78; 110—66) is tubular and has a decreasing cross-section from said inlet toward said discharge opening.

2. A device according to claim 1, characterized in that the feed means includes a vertically disposed tubular supply member (102) and a hollow body having an inlet end (108) in registry with an opening (106) in the side wall of said tubular supply member (102), and having said discharge opening (112) facing the wheel blades (12, 14) for flow of particulate material through the tubular supply member (102) and hollow body (110—66) onto the inner end portions of each blade (12, 14).

3. A device according to claim 2, characterized in that the hollow body (110—66) is of conical shape having its axis substantially horizontally disposed with the inlet end (108) at the base in communication with the opening (106) in the side wall of the tubular member (102) and with the discharge opening (112) at the apex and laterally offset from the blades (12, 14).

4. A device according to claim 2 or 3, characterized in that the wheel is mounted for rotation about a horizontal axis, and the hollow body (110—66) is rotatably mounted in said device for movement about its axis to enable adjustment of the discharge opening (112) circumferentially relative to the blades (12, 14).

5. A device according to claim 2, characterized in that the hollow body (110) is mounted by means of an annular shroud (116) about the opening (106) in the side wall of the tubular member (102) in a telescoping, rotatable relation.

6. A device according to claim 1, characterized in that the wheel is mounted for rotation about a vertical axis within a housing (40) having a horizontally disposed top and bottom walls (50, 52) and an open side (42), and said feed means comprises a vertically disposed tube (66) extending downwardly from an opening through the top wall (50) to a discharge opening (70, 74) at a level immediately above the upper edge of the wheel blades (12, 14) and in circumferential alignment with an inner end portion thereof but offset from the rotational axis thereof the centrifugally displace particulate materials over the face (28) of the blades (12, 14) and project such materials through the open side (42).

7. A device according to any one of claims 1 to 6, characterized in that said feed means comprises at least two separate hollow members (76, 78) arranged with their discharge openings (82) circumferentially aligned in the direction of rotation of the wheel.

8. A device according to any one of claims 1 to 6, characterized in that said discharge opening (70, 112) is of crescent shape with an elongate dimension extending in the direction of rotation of the wheel.

9. A device according to any one of claims 1 to 6, characterized in that said discharge opening (74, 82, 112) is oblong shaped with the major dimension in the direction of rotation of the wheel.

10. A device according to any one of claims 1 to 9, characterized in that the blades (12, 14) have a format face (28) and a flange portion (32) rising perpendicularly from the edge of the blade front face (28) adjacent the discharge opening (70, 74, 82, 112) and extending from an inner end spaced a short distance from the hub (10) to the outer end of the blade (12), (14), and a flange portion (30) rising perpendicularly from the opposite edge of the blade front face (28) and extending substantially the length of the blade (12, 14).

Revendications

1. Dispositif pour la projection sans air d'une matière particulaire, comprenant une roue qui présente des pales (12, 14) qui s'étendent vers l'extérieur à partir d'une portion axiale de la roue, des moyens (56) servant à imprimer à la roue un mouvement de rotation à vitesse élevée, et des moyens d'alimentation (66; 76, 78; 110, 66) ayant une ou plusieurs entrées d'alimentation (68, 72, 80, 108), dont chacune est en communication avec une ouverture de sortie (70, 74, 82, 112), alignée sur les parties terminales intérieures des pales (12, 14) et au voisinage immédiat desdites parties terminales, pour acheminer la matière particulaire aux parties terminales intérieures des pales (12, 14) de la roue de manière qu'elle soit attaquée par les pales pendant le mouvement de rotation de la roue, de sorte que la matière particulaire attaquée est déplacée vers l'extérieur sur la surface des pales pour être projetée à grande vitesse au-delà des extrémités extérieures des pales, ladite ouverture de sortie ayant collectivement une dimension, mesurée dans la direction de la rotation de la roue, qui est plus grande que sa dimension transversale, caractérisé en ce que, entre chaque entrée d'alimentation et chaque ouverture de sortie, les moyens d'alimentation (66; 76, 78; 110, 66) sont tubulaires et possèdent une section décroissante de ladite entrée vers ladite ouverture de sortie.

2. Dispositif selon la revendication 1, caractérisé en ce que les moyens d'alimentation comprennent un élément d'alimentation tubulaire (102) disposé verticalement, et un corps creux (110, 66) ayant d'une part une extrémité d'entrée (108) en coïncidence avec une ouverture (106) ménagée dans la paroi dudit élément d'alimentation tubulaire (102) et présentant d'autre part une ouverture de sortie (112) faisant face aux pales (12, 14) de la roue de façon que soit assuré l'acheminement de la matière particulaire par l'élément d'alimentation tubulaire (102) et le corps creux (110, 66) vers la partie terminale intérieure de chaque pale (12, 14).

3. Dispositif selon la revendication 2, caractérisé en ce que le corps creux (110, 66) est de forme conique avec un axe disposé sensiblement hori-

zontalement, l'extrémité d'entrée (108) au niveau de la base communicant avec l'ouverture (106) ménagée dans la paroi de l'élément tubulaire (102), et l'ouverture de sortie (112) étant située au niveau du sommet, dans une position décalée latéralement par rapport aux pales (12, 14).

4. Dispositif selon l'une des revendications 2 et 3, caractérisé en ce que la roue est montée pour tourner autour d'un axe horizontal, et le corps creux (110, 66) est monté tournant dans ledit dispositif pour pouvoir être déplacé autour d'un axe, ce qui permet le réglage de la position radiale de l'ouverture de sortie (112) par rapport aux pales (12, 14).

5. Dispositif selon la revendication 2, caractérisé en ce que le corps creux (110) est monté au moyen d'un épaulement annulaire (116) entourant l'ouverture (106) ménagée dans la paroi de l'élément tubulaire (102), le montage étant effectué avec un mouvement télescopique, et tournant.

6. Dispositif selon la revendication 1, caractérisé en ce que la roue est montée pour tourner autour d'un axe vertical à l'intérieur d'un carter (40) ayant des parois supérieure et inférieure (50, 52) disposées horizontalement et un côté ouvert (42), et en ce que les moyens d'alimentation comprennent un tube (66) disposé verticalement, qui s'étend vers le bas, entre une ouverture formée à travers la paroi supérieure (50) et une ouverture de sortie (70, 74) située à un niveau immédiatement au-dessus du bord supérieur des pales (12, 14) de la roue, et dans l'alignement circconférentiel d'une partie terminale intérieure de ces pales, mais avec un décalage par rapport audit axe de rotation, ce qui permet de faire circuler les matières particulaires sur la face (28) des pales (12, 14) par la force centrifuge et de projeter ces matières par côté ouvert (42).

7. Dispositif selon l'une quelconque des revendications 1 à 6, caractérisé en ce que les moyens d'alimentation comprennent au moins deux éléments creux séparés (76, 78) dont les ouvertures de sortie (82) sont alignées circconférentiellement autour de l'axe de rotation de la roue.

8. Dispositif selon l'une quelconque des revendications 1 à 6, caractérisé en ce que l'ouverture de sortie (70, 112) présente une forme en croissant, avec une courbure allongée s'étendant dans la direction de rotation de la roue.

9. Dispositif selon l'une quelconque des revendications 1 à 6, caractérisé en ce que l'ouverture de sortie (74, 82, 112) est de forme oblongue, avec la grande dimension orientée dans la direction de la rotation de la roue.

10. Dispositif selon l'une quelconque des revendications 1 à 9, caractérisé en ce que les pales (12, 14) possèdent une face avant (28) et un premier rebord (32) qui s'étend perpendiculairement à partir d'un bord de la face avant (28) de la pale, dans la région adjacente à l'ouverture de sortie (70, 74, 82, 112), à partir d'une extrémité intérieure espacée d'une petite distance du moyeu (10) jusqu'à l'extrémité extérieure de la pale (12, 14), et un deuxième rebord (30) qui s'étend

perpendiculairement à partir du bord opposé de la face avant (28) de la pale, sensiblement sur la longueur de la pale (12, 14).

Patentansprüche

1. Vorrichtung zum luftlosen Strahlen mit feinteiligem Material mit einem Flügelrad, dessen Flügel (12, 14) sich von einem axialen Teil des Rades auswärts erstrecken, einer Einrichtung (56) zum Antrieb des Flügelrades mit hoher Drehzahl, und einer Zuführeinrichtung (66; 76—78; 110—66), die einen oder mehrere Zuführeinlässe (68, 72, 80, 108) besitzt, die mit je einer Austragöffnung in Verbindung stehen, die in nächster Nähe der inneren Endteile der Flügel (12, 14) mit diesen Endteilen fluchtend angeordnet sind und zum Zuführen von feinteiligem Material zu den inneren Endteilen der Flügel (12, 14) dienen, so daß bei der Drehung des Flügelrades dessen Flügel das feinteilige Material erfassen und das erfaßte feinteilige Material über die Oberflächen der Flügel auswärtsbewegt und von deren äußeren Enden mit hoher Geschwindigkeit abgeschleudert wird, wobei die Gesamtabmessung der Austragöffnungen (70; 74; 82; 112) in der Drehrichtung des Flügelrades größer ist als die Querabmessung, dadurch gekennzeichnet, daß zwischen jedem Zuführeinlaß und der Austragöffnung der Zuführeinrichtung (66; 76—78; 110—66) diese rohrförmig ist und ihr Querschnitt von dem Einlaß zu der genannten Austragöffnung hin abnimmt.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Zuführeinrichtung ein vertikal angeordnetes, rohrförmiges Zuführelement (102) und einen Hohlkörper besitzt, der ein Eintrittsende (108) hat, das mit einer Öffnung (106) im Mantel des rohrförmigen Zuführelements (102) korrespondiert, und der mit der genannten Austragöffnung (112) ausgebildet ist, die den Flügeln (12, 14) zugekehrt ist, so daß das feinteilige Material durch das rohrförmige Zuführelement (102) und den Hohlkörper (110—66) auf die inneren Endteile jedes Flügels (12, 14) gelangt.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Hohlkörper (110—66) konisch und seine Achse im wesentlichen horizontal angeordnet ist, daß das Eintrittsende (108) an der Basis angeordnet ist und mit der Öffnung (106) in der Seitenwand des rohrförmigen Gliedes (102) in Verbindung steht und die Austragöffnung (112) an der Spitze angeordnet und gegenüber den Flügeln (12, 14) seitwärts versetzt ist.

4. Vorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß das Flügelrad um eine hori-

zontale Achse drehbar gelagert ist und der Hohlkörper (110—66) in der genannten Vorrichtung um seine Achse drehbar gelagert ist, so daß die Austragöffnung (112) in der Umfangsrichtung gegenüber den Flügeln (12, 14) verstellbar ist.

5. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Hohlkörper (110) mittels eines die Öffnung (106) im Mantel des rohrförmigen Gliedes (102) umgebenden Deckringes (116) teleskopartig verschiebbar und drehbar gelagert ist.

6. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Flügelrad um eine vertikale Achse drehbar in einem Gehäuse (40) drehbar gelagert ist, das eine horizontale Decke (50) und einen horizontalen Boden (52) sowie eine offene Seite (42) besitzt, und daß die Zuführeinrichtung ein vertikal angeordnetes Rohr (66) besitzt, das sich von einer Öffnung in der Decke (50) abwärts zu einer Austragöffnung (70, 74) erstreckt, die knapp oberhalb des oberen Randes der Flügel (12, 14) angeordnet ist und in der Umfangsrichtung mit einem inneren Endteil der Flügel fluchtet, aber gegenüber der Drehachse der Flügel versetzt ist, so daß feinteiliges Material über die Oberfläche (28) der Flügel (12, 14) bewegt und durch die offene Seite (42) weggeschleudert wird.

7. Vorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Zuführeinrichtung mindestens zwei voneinander getrennte Hohlkörper (76, 78) besitzt, deren Austragöffnungen (82) in der Umfangsrichtung in der Drehrichtung des Flügelrades miteinander fluchten.

8. Vorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Austragöffnung (70, 112) mondsichelförmig ist und sich in ihrer Längsrichtung in der Drehrichtung des Flügelrades erstreckt.

9. Vorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Austragöffnung (74, 82, 112) ein sich in der Drehrichtung des Flügelrades erstreckendes Langloch ist.

10. Vorrichtung nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß die Flügel (12, 14) eine vordere Fläche (28) und einen Flanschteil (32) besitzen, der sich von dem der Austragöffnung (70, 74, 82, 112) benachbarten Rand der vorderen Fläche (28) des Flügels vertikal aufwärts erstreckt und der sich von einem in geringem Abstand von der Nabe (10) angeordneten, inneren Ende bis zum äußeren Ende der Schaufel (12, 14) erstreckt, und einen Flanschteil (30), der sich von dem entgegengesetzten Rand der vorderen Fläche (28) des Flügels vertikal aufwärts erstreckt und der sich im wesentlichen über die ganze Länge des Flügels (12, 14) erstreckt.

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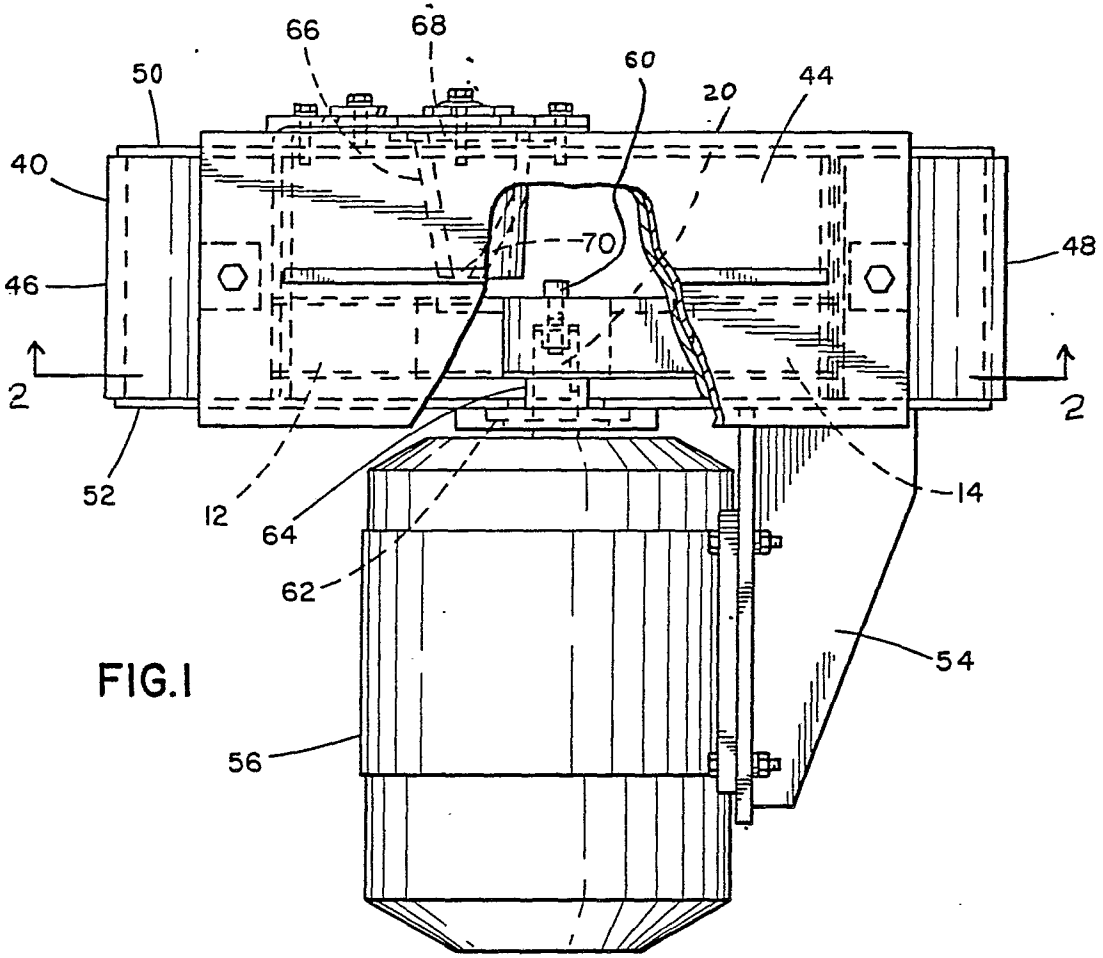


FIG. 1

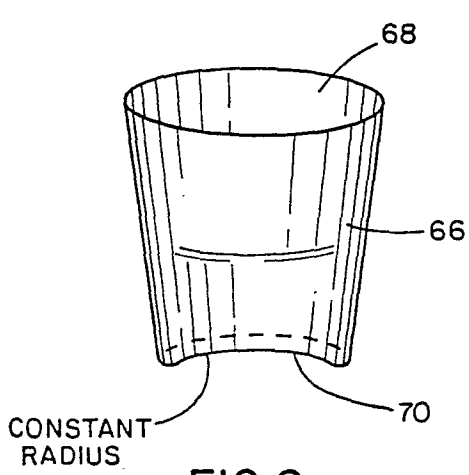


FIG. 8

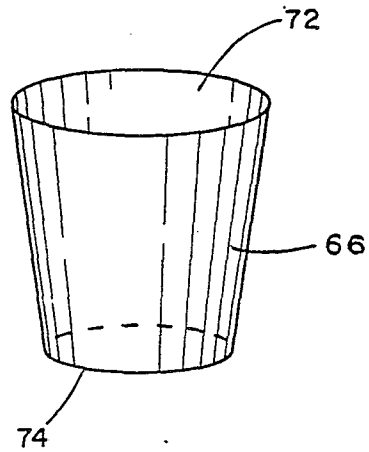


FIG. 9

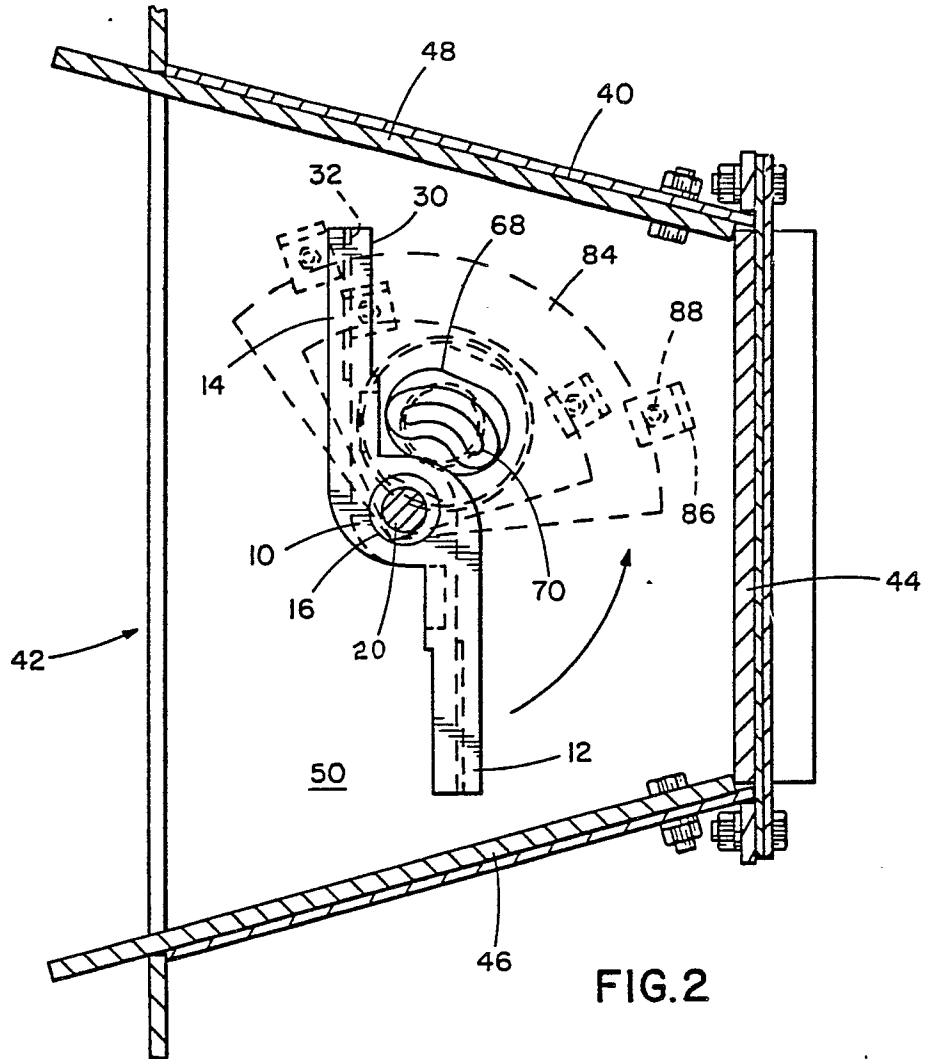


FIG. 2

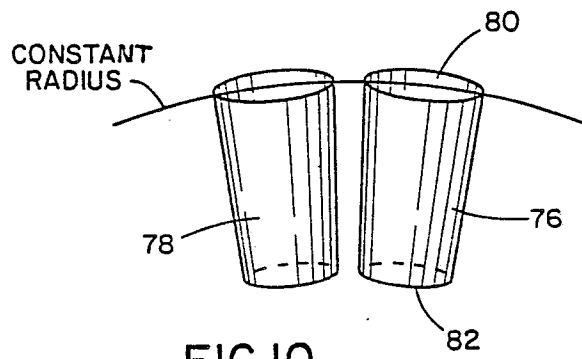


FIG. 10

