

|      |                                                                   |           |         |                |          |
|------|-------------------------------------------------------------------|-----------|---------|----------------|----------|
| [54] | <b>WORKPIECE TREATING APPARATUS</b>                               | 1,343,350 | 6/1920  | Coburn.....    | 51/13    |
| [72] | Inventor: <b>James H. Carpenter, Jr.</b> ,<br>Hagerstown, Md.     | 1,615,622 | 1/1927  | Greene.....    | 51/164   |
|      |                                                                   | 2,263,321 | 11/1941 | Unger.....     | 51/9     |
|      |                                                                   | 3,321,016 | 6/1943  | DeBack.....    | 51/164 X |
| [73] | Assignee: <b>The Carborundum Company</b> ,<br>Niagara Falls, N.Y. | 2,441,578 | 5/1948  | Keefer.....    | 51/13    |
|      |                                                                   | 2,449,745 | 9/1948  | Jewell.....    | 51/13    |
|      |                                                                   | 3,007,285 | 11/1961 | Bigelow.....   | 51/13    |
| [22] | Filed: <b>July 17, 1970</b>                                       | 3,521,406 | 7/1970  | Carpenter..... | 51/13    |
| [21] | Appl. No.: <b>55,699</b>                                          | 3,585,758 | 6/1971  | Harper.....    | 51/13    |

### Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 687,701, Dec. 4, 1967, Pat. No. 3,521,406.

- [52] U.S. Cl.....51/13, 51/9  
[51] Int. Cl.....B24c 3/00  
[58] Field of Search.....51/9, 13, 164

### References Cited

#### UNITED STATES PATENTS

- 1,297,400 3/1919 Ransohoff.....51/164

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### [57] ABSTRACT

A workpiece treating arrangement includes a slatless rotatable drum which has centrifugal throwing wheels disposed therein for treating workpieces during rotation of the drum.

21 Claims, 4 Drawing Figures

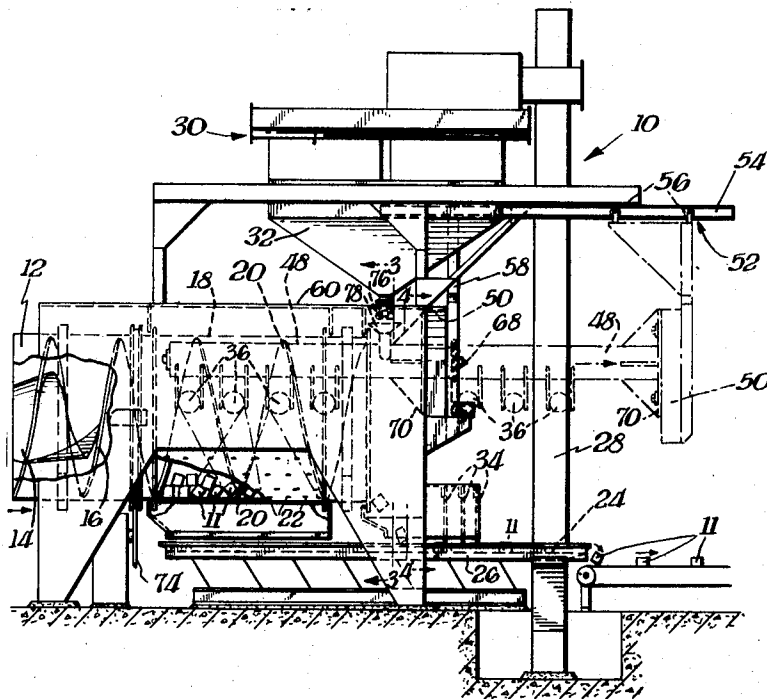


Fig. 2.

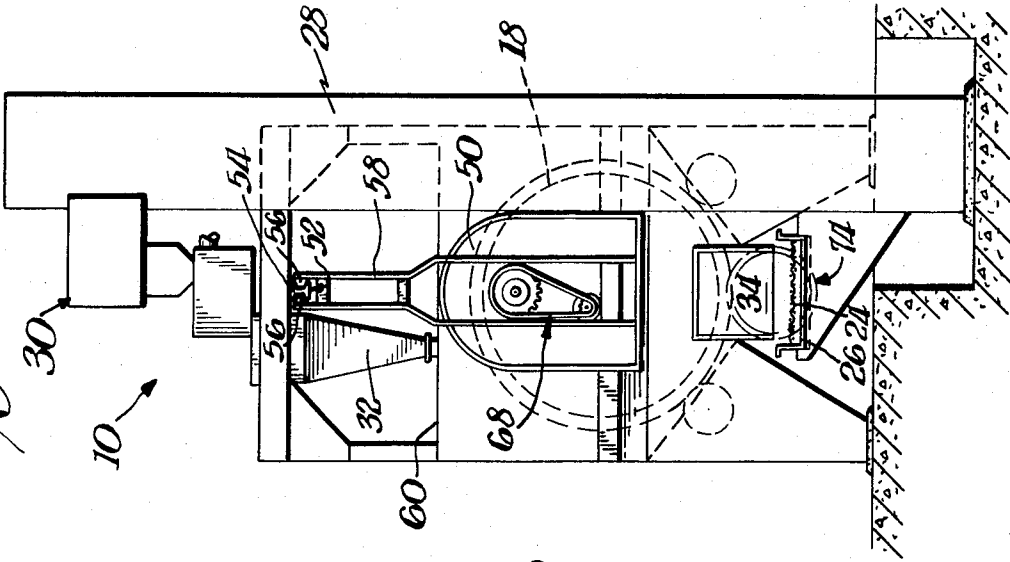


Fig. 1.

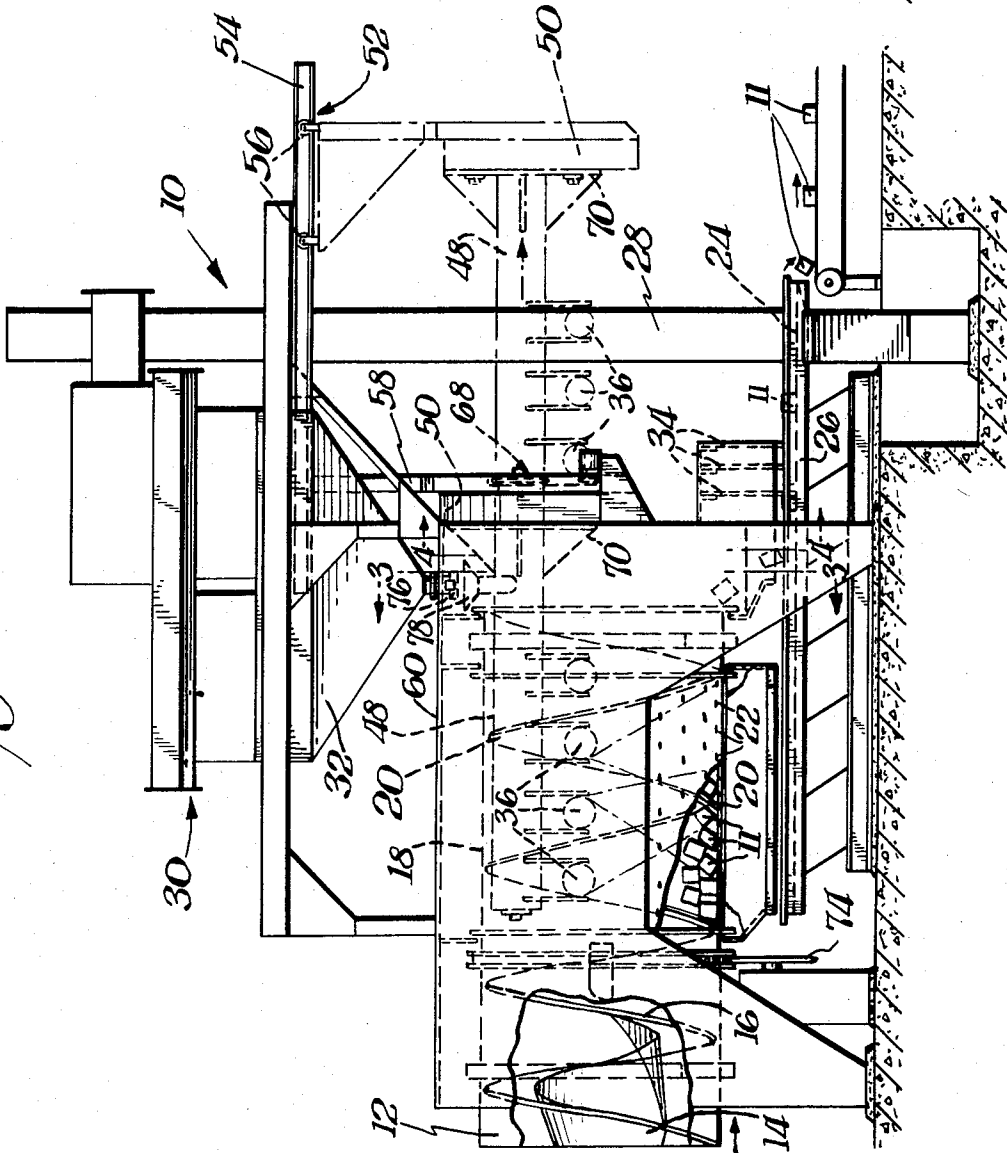


*Fig. 3.*

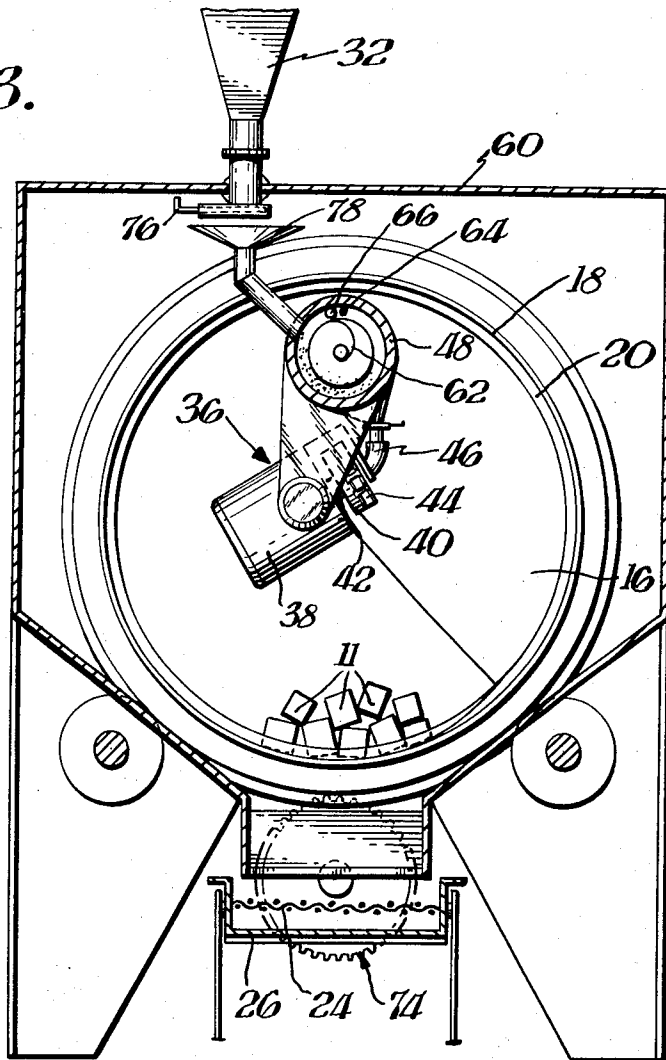
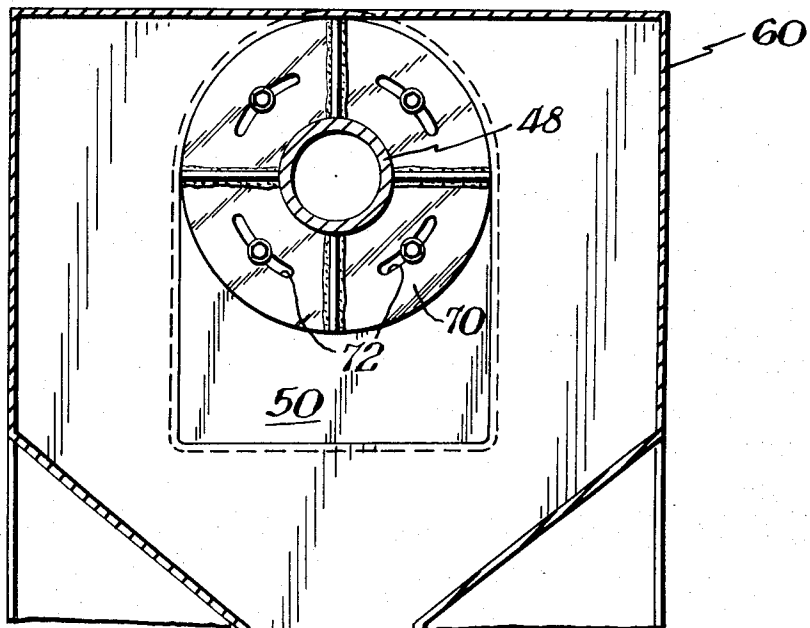


*Fig. 4.*



## WORKPIECE TREATING APPARATUS

### CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of copending application Ser. No. 687,701, filed Dec. 4, 1967, now Pat. No. 3,521,406, dated July 21, 1970.

### BACKGROUND OF INVENTION

Conventional universal type blast cleaning machines are suitable for high volume cleaning of small to medium size castings wherein the machines are of the continuous flow barrel type. These machines can handle large tonnages of the same parts or miscellaneous parts and handle them automatically. A particularly effective machine is disclosed in copending application Ser. No. now U.S. Pat. No. 3,585,758 dated June 22, 1971, which includes a spiral infeed tube and a spiral exit tube with the intermediate blast section being of the conventional slat conveyor construction. The machine disclosed in this application includes such refinements and improvements that it is capable of handling a large variety of castings. More particularly this machine has solved the problem of breakage and thrust inherent in previous designs. Despite the effectiveness of the machine a serious problem still exists. In this respect the slat conveyor, while working satisfactorily, is a constant maintenance problem. Also, the design is a complex system of individual slats, chains, sprockets, bearings, etc., all requiring extensive engineering and creating manufacturing and maintenance problems. In addition, another problem of increasing importance is noise level. The present noise level being approximately 100 decibel on the "C" scale. Federal legislation is presently being considered which will require industrial noise levels to be 90 decibel on the "A" scale. Noise pollutes the air the same as particulate matter and legislation will presently require lower noise levels.

### SUMMARY OF INVENTION

An object of this invention is to provide a workpiece treating arrangement which is particularly designed to overcome the above problems.

In accordance with this invention in place of the conventional slat construction the blasting section is a slatless drum and centrifugal throwing wheels of the type disclosed in U.S. Pat. No. 3,521,406 are disposed within the drum for treating workpieces therein during rotation of the drum.

The centrifugal throwing wheels may be mounted on a cantilevered tube which includes an elongated screw for distributing abrasive particles fed into the tube to the individual throwing wheels. The tube and its throwing wheels may be mounted for oscillatory movement and may be connected to a structural member which is suspended from an overhead monorail to facilitate the insertion of the tube into the drum and its removal therefrom for maintenance purposes.

The drum may advantageously include an infeed tube at its entrance end of the type disclosed in U.S. Pat. No. 3,585,758 which includes a center feed tube. The infeed tube and slatless drum may advantageously be of one-piece construction with each section including a spiral conveyor although the spiral conveyor in the work treating section would be of greater internal

diameter than the spiral conveyor in the infeed tube. Drain holes may be provided to permit abrasive particles or other treating media to drain into an oscillator conveyor which in turn may have a screen deck at the exit end of the drum to receive the treated parts.

### THE DRAWINGS

FIG. 1 is a side elevation view of a workpiece treating arrangement in accordance with this invention;

FIG. 2 is an end elevation view of the apparatus shown in FIG. 1; and

FIGS. 3-4 are cross-sectional views taken through FIG. 1 along the lines 3-3 and 4-4, respectively.

### DETAILED DESCRIPTION

FIGS. 1-4 show the workpiece treating apparatus 10 in accordance with this invention. As indicated therein the apparatus 10 includes an infeed tube 12 incorporating the center feed tube 14 of the type disclosed in U.S. Pat. No. 3,585,758, the details of which are incorporated herein by reference thereto. Parts 11 are fed through the center feed tube 14 and move longitudinally during the rotation of feed tube 12 by means of spiral conveyor 16. As pointed out in detail in U.S. Pat. No. 3,585,758 this infeed tube arrangement includes the bridging element or center feed tube 14 connected to the first flight of spiral conveyor 16 so that the parts or workpieces that are fed therein will not be struck by the first flight of the spiral conveyor, thereby minimizing the possibility of breakage.

From the infeed tube 12 the parts are conveyed to the treating drum 18. Drum 18 and infeed tube 12 are of one-piece construction and differ from each other in that drum 18 includes a spiral conveyor 20 which is merely of sufficient width or projects into the drum only an amount sufficient to convey the workpieces therethrough whereas spiral conveyor 16 in the infeed tube 12 projects a substantial amount into the infeed tube as described in U.S. Pat. No. 3,585,758. A plurality of openings 22 are provided about the periphery of drum 18 to permit drainage of the abrasive particles and sand. Conversely, if the drum is of solid construction the flight of spiral conveyor 20 would function to move the abrasive particles and sand to the exit end of drum 18.

In addition to the many advantages obtained by utilizing the slatless drum 18 in place of the conventional slat conveyor or trough of prior art devices is the avoidance of the problem frequently attendant with prior art devices wherein with a slat conveyor some parts do not move across the conveyor to the exit end at a uniform speed and, at times, some parts even stay in the slat conveyor for hours. This problem is overcome with slatless drum 18 since, because of its cylindrical shape, the drum can include spiral conveyor 20 to insure a uniform and continuous movement of the parts through the drum.

A further advantage with the inventive arrangement is that with prior arrangements the infeed spiral must push the parts or workpieces onto and across the slat conveyor. This creates additional thrust loads on the infeed tube section. With the inventive arrangement, however, the spiral 20 in the slatless drum, as noted above, uniformly moves all parts to the exit end of the machine. Since the infeed tube 12 and the blast drum

18 are of one-piece construction no high thrust loads are present other than the normal thrust required to screw the parts to the exit end of the drum.

At the exit end of the blast drum 18 the parts are dumped onto the screen deck 24 of suitable oscillating conveyor 26. The abrasive particles fall through screen deck 24 and are recirculated in a conventional manner by elevator 28 through separating system 30 into feed hopper 32. A plurality of rubber curtains 34 act to prevent the abrasive particles from being deflected out of drum 18. The cleaned parts are carried by the oscillating conveyor 26 by any suitable means such as a further conveyor disposed at the discharge end of conveyor 26.

A feature which enables apparatus 10 to function so effectively is the recent development of the type of centrifugal throwing wheels described in U.S. Pat. No. 3,521,406, the details of which are incorporated herein by reference thereto. In this respect slat conveyors had been necessary because the trough-like arrangement created an opening through which the blast wheels could project the abrasive particles. With a solid drum such as drum 18 no such openings are present. The development of the throwing wheels described in U.S. Pat. No. 3,521,406 wherein each wheel is mounted directly on its motor shaft, however, permitted the wheels to be inserted into the drum from either the open exit end or from the entrance end if desired.

As shown in FIG. 3 each throwing wheel 36 includes a motor 38 with a runnerhead 40 mounted directly on the motor shaft 42 and a plurality of throwing vanes 44 radially mounted on runnerhead 40. Abrasive particles are supplied through spout 46 from support tube 48. The throwing wheel 36 is mounted for universal movement about a plurality of axes as described in U.S. Pat. No. 3,521,406.

As shown in FIG. 1 the individual throwing wheels 36 are mounted on a cantilevered tube 48 which in turn is secured to a structural member 50. Structural member 50 is suspended from a monorail system 52 which includes horizontal track 54, wheels 56 and vertical mounting member 58. In this manner the entire unit comprising tube 48 and wheels 36 may be easily moved into blast drum 18 during operation and out of the drum for maintenance or other purposes. Structural member 50 is so designed in shape as to conform to the size and shape of an opening at the exit end of the cabinet 60 so that when the tube 48 is inserted inside drum 18 the opening in cabinet 60 is closed by structural member 50 to prevent abrasive particles from ricocheting out of the blast drum. During use structural member 50 is rigidly secured to the cabinet by bolts or other suitable fastening means.

As shown in FIG. 3 mounted within hollow tube 48 is an elongated screw conveyor 62 or any other suitable conveying means to convey the abrasive particles fed into the tube to the spouts 46 of the individual throwing wheels 36. The space between the screw conveyor 62 and the inner surface of tube 48 is advantageously utilized to house electrical cables 64 to the motors 38 and also to carry hoses 66 for feeding cooling air to motors 38. Additionally, drive means 68 (FIG. 2) are provided to oscillate the entire unit of tube 48 and wheels 36 to give better blast coverage. This oscillation means may take any suitable form and as shown in FIG. 4 may in-

clude a bearing surface 70 to which tube 48 is mounted, with arcuate slots 72 being in the bearing surface to control the amount of oscillation of tube 48.

As shown in FIGS. 1-3 infeed tube 12 and drum section 18 may be rotated by any suitable means such as by gear drive 74 to tumble the workpieces 11 being fed therethrough. During this rotation abrasive particles are supplied to the hollow interior of tube 48 from feed hopper 32 through an opening in cabinet 60 and through any suitable valve such as gate valve 76 into elongated feed spout 78. Because of the widened feed spout 78 the falling abrasive particles drop into the spout even during oscillating of tube 48.

The workpiece treating arrangement 10 in accordance with this invention has a number of distinct advantages over the conventional prior art slat conveyor arrangements. For example the inventive arrangement eliminates the slat conveyor with its complex system of chains, sprockets, drives, rollers, slats and costly maintenance problems. Additionally, with the inventive arrangement there is continuous and positive movement of all work through the barrel. Moreover, a much lower noise level is obtained by mounting the blast wheels inside the blast drum 18 which in turn is within housing 60. Additionally, better and more uniform cleaning may be obtained by oscillating the throwing wheels. Further a complete unit is less expensive than an equivalent slat type continuous barrel.

What is claimed is:

1. A workpiece treating arrangement comprising a drum having an inner surface, means for rotating said drum, a centrifugal throwing wheel for treating workpieces within said drum, a cantilevered tube for supporting said centrifugal throwing wheel, a spiral conveyor connected to the inner surface of said drum and extends over substantially the length of said drum, an infeed tube connected to the entrance end of said drum, a second spiral conveyor being connected to the inner surface of said infeed tube.
2. An arrangement as set forth in claim 1 wherein said second spiral conveyor projecting into said infeed tube a greater distance than the first spiral conveyor projects into said drum.
3. An arrangement as set forth in claim 2 wherein said drum and said infeed tube are of one piece construction.
4. An arrangement as set forth in claim 3 wherein a center feed tube is connected to said second spiral conveyor coaxial with said infeed tube.
5. An arrangement as set forth in claim 3 wherein a plurality of drain holes are provided in said drum.
6. An arrangement as set forth in claim 3 wherein an oscillating conveyor is disposed at the exit end of said drum, a screen deck being on said oscillating conveyor, and rubber abrasive retaining curtains being above said oscillating conveyor.
7. A workpiece treating arrangement comprising a drum, means for rotating said drum, a plurality of throwing wheels for treating workpieces within said drum, a cantilevered tube having a hollow interior, said cantilevered tube supporting said centrifugal throwing wheels within said drum, feed spouts for said throwing wheels communicating with the interior of said cantilevered tube, means for distributing the treating particles through said cantilevered tube to said feed spouts.

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8. An arrangement as set forth in claim 7 including traversing means for moving said cantilevered tube into and out of said drum.

9. An arrangement as set forth in claim 8 including feed means for feeding treating particles into said cantilevered tube, and wherein said distributing means includes an elongated rotatable screw in said cantilevered tube for distributing the treating particles therein to said feed spouts.

10. An arrangement as set forth in claim 9 including electrical cables and hose means for said wheels disposed within the interior of said cantilevered tube.

11. An arrangement as set forth in claim 9 including oscillating means for rotating said cantilevered tube and its throwing wheels.

12. An arrangement as set forth in claim 9 including a plurality of motors for driving said wheels, each motor having a drive shaft, each of said wheels being mounted directly on the shaft of a respective motor.

13. An arrangement as set forth in claim 9 wherein said drum includes an exit end for the removal of workpieces and including a structural member for closing the exit end of said drum, and said cantilevered tube being secured to said structural member.

14. An arrangement as set forth in claim 13 wherein said structural member is suspended from a horizontal monorail for horizontal movement toward and away from said drum.

15. A workpiece treating arrangement comprising a drum, means for rotating said drum, feed means for feeding work pieces into said drum, throwing wheel means disposed within said drum for treating the workpieces during the rotation of said drum, said throwing wheel means includes a plurality of centrifugal throwing wheels each having a runnerhead, a plurality of throwing vanes radially mounted on each runnerhead, drive means for rotating said runnerheads and said vanes, particle feed means for supplying treating particles to said runnerheads to be discharged from said vanes, and universal mounting means for permitting each wheel to pivot about a plurality of axes.

16. A barrel for use in a workpiece treating arrangement comprising a drum having an inner face and having a plurality of drain holes, a first spiral conveyor on the inner face of said drum along the length of said drum, an infeed tube at one end of said drum, said infeed tube having an inner face and an entrance end, said infeed tube and said drum being of one piece construction, a second spiral conveyor on the inner face of said infeed tube projecting into said infeed tube a greater distance than said first spiral conveyor projects into said drum, a center feed tube connected to said conveyor, said center feed tube being coaxial with said infeed tube, said second spiral conveyor comprising a plurality of flights, said flights including a first flight being disposed near the entrance end of said infeed tube and at least the first flight of said second spiral conveyor having an axial opening, and a bridging element disposed at the entrance of said infeed tube and extending to said axial opening of said first flight and connected thereto.

17. An arrangement as set forth in claim 15 wherein said throwing wheel means is mounted on a cantilevered tube.

18. An arrangement as set forth in claim 17 including traversing means for moving said cantilevered tube into and out of said drum.

19. An arrangement as set forth in claim 17 wherein said cantilevered tube has a hollow interior and including a feed spout on each throwing wheel communicating with the interior of said cantilevered tube, and means for distributing the treating particles through said cantilevered tube to each feed spout.

20. An arrangement as set forth in claim 18 wherein said drum includes an inner surface and an entrance end and said arrangement includes an infeed tube connected to the entrance end of said drum and a second spiral conveyor being connected to the inner surface of said infeed tube.

21. An arrangement as set forth in claim 20 wherein a center feed tube is connected to said second spiral conveyor coaxial with infeed tube.

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