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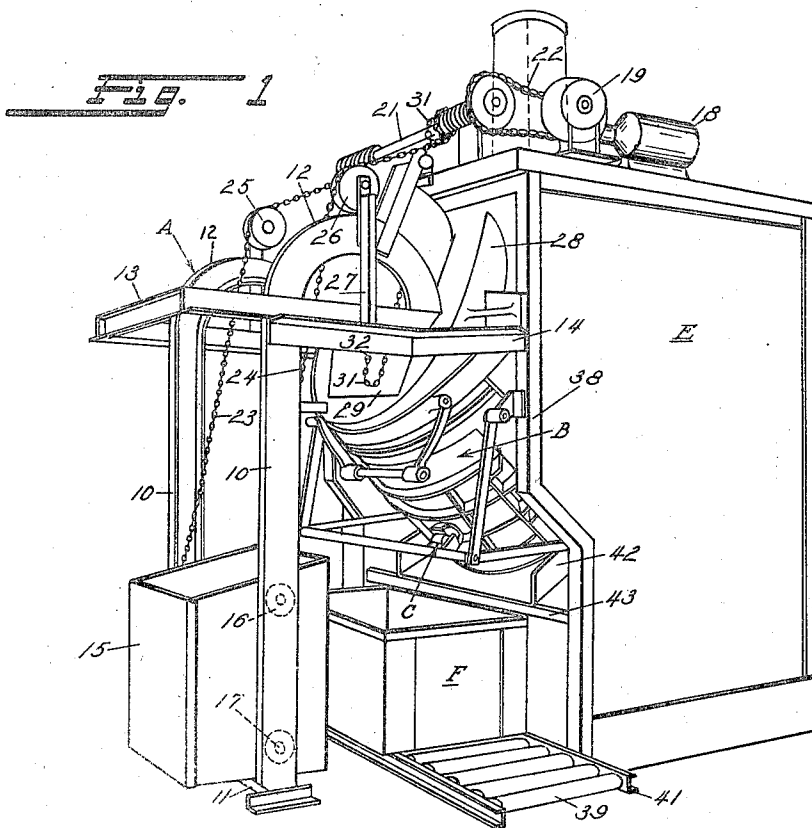
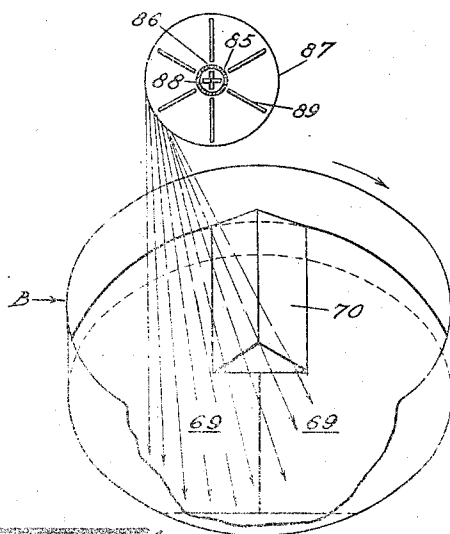
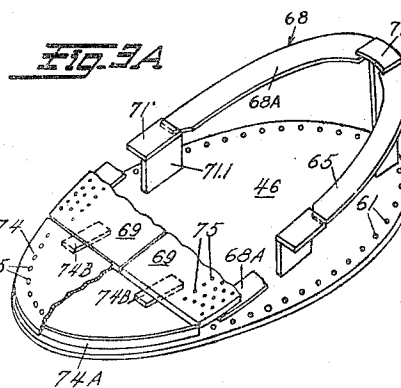
W. A. ROSENBERGER ET AL

2,116,160

ABRADING APPARATUS

Filed Oct. 22, 1935

4 Sheets-Sheet 1



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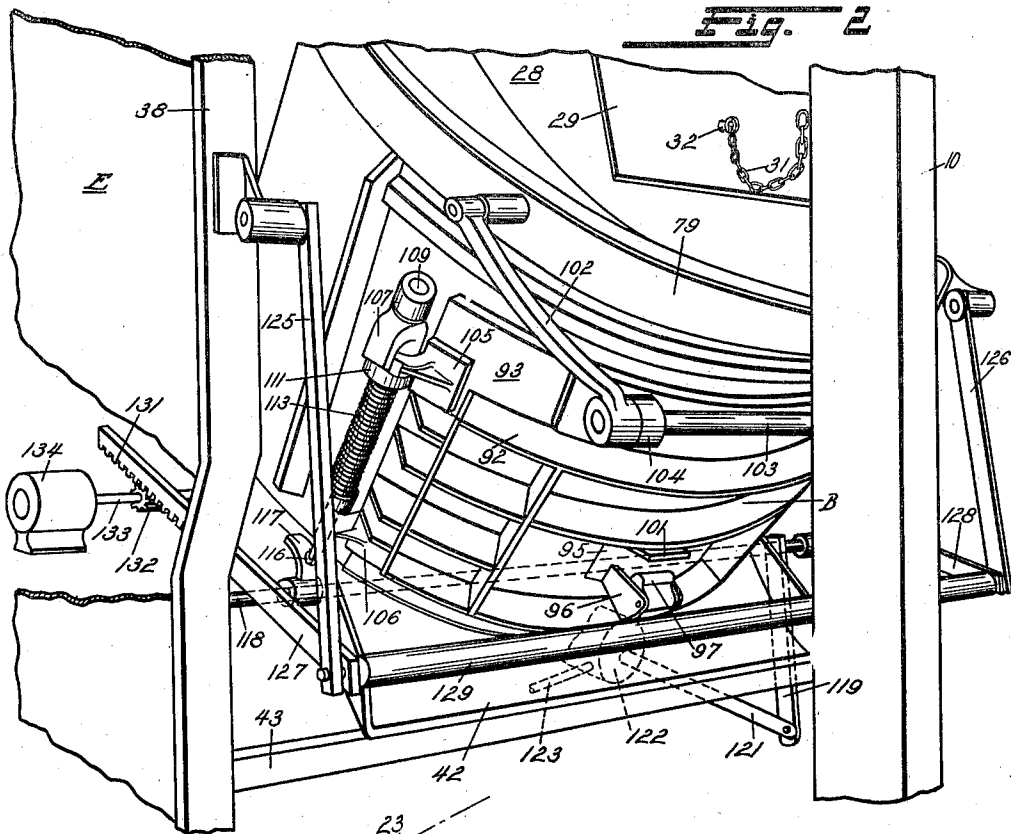
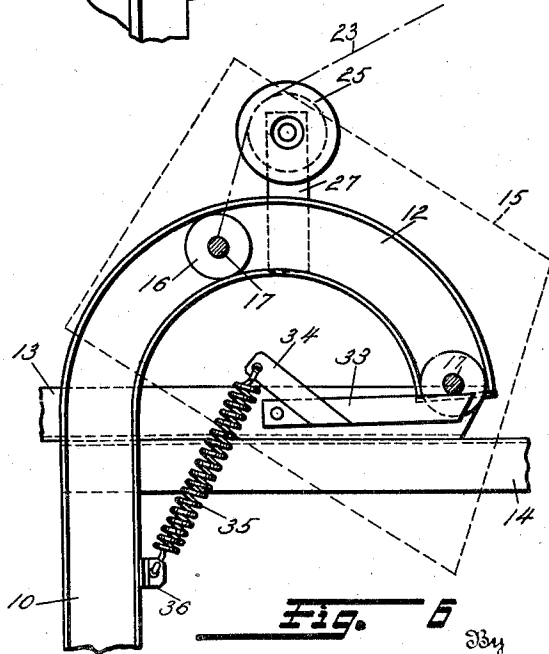
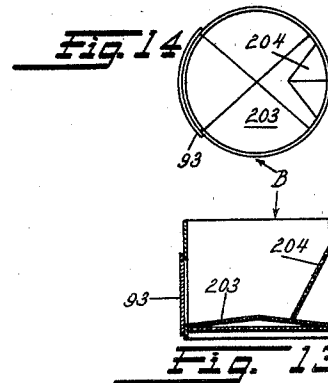
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4 Sheets-Sheet 2



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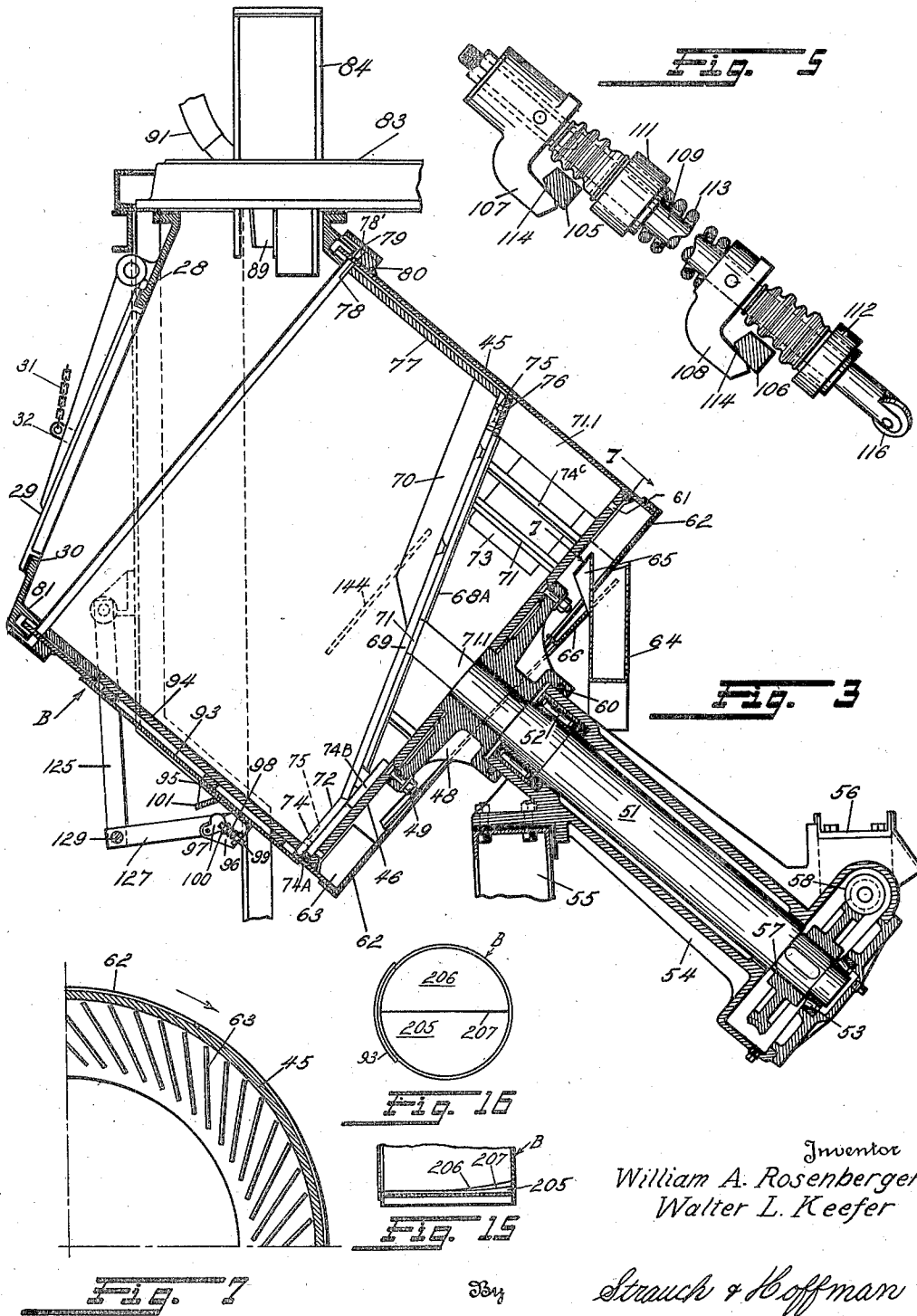
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ABRADING APPARATUS

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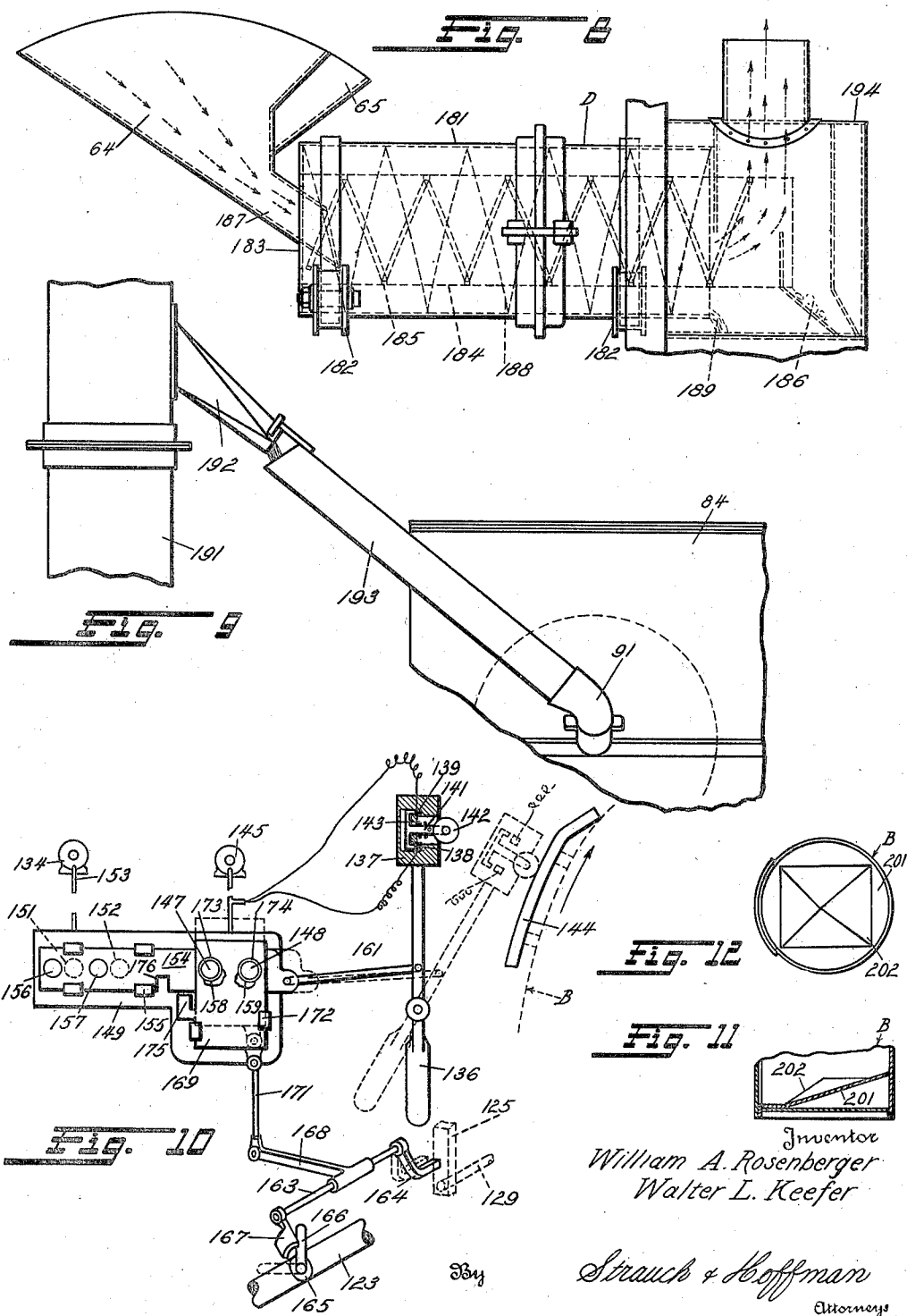
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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,116,160

ABRADING APPARATUS

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The present invention relates to apparatus for imparting a tumbling action to castings or other articles of work and simultaneously subjecting it to the action of a blast cleaning stream, and it is particularly concerned with machines of the so-called inclined barrel type, wherein a barrel is mounted for rotation about an inclined axis and the cleaning medium is directed through the open upper end of the barrel upon the work contained therein.

Machines of this general character have been heretofore proposed and are in use today, but they are open to several serious objections. In the first place, these mills are so designed that it involves a laborious, time-consuming operation to unload them. The barrel must be stopped with the discharge door uppermost, the door must be manually unlocked and a crane must be used to lift off the door. The barrel is then rotated through 180° to bring the discharge opening facing downwardly, and often during the discharge of the work, castings are broken by reason of the violent discharge thereof. The barrel must then be rotated through 180° to bring the discharge opening uppermost, the door must then be lowered in place and manually locked. This complicated and time-consuming operation obviously increases the cost of cleaning the work, often results in broken castings, and prevents anything even remotely approaching a continuous blast cleaning operation from being carried out with the prior machines.

The prior so-called inclined barrel machines now in use today are also objectionable because they fail to uniformly and efficiently clean the work, especially when work of different sizes and shapes are handled, with the result that the work discharged from the barrel must be sorted over and the underblasted pieces returned to the barrel for further cleaning. Such machines are also difficult to load and castings or other work are often damaged during this operation, either through the nature of the machine or the construction of the loading mechanism employed or both.

It is accordingly a primary object of this invention to provide a novel inclined barrel abrading machine that will efficiently clean castings or other work of various sizes and shapes without breaking them and at the same time clean them more thoroughly and more rapidly than heretofore possible.

It is a further major object of this invention to provide an inclined tumbling barrel having a discharge door and operating mechanism which

makes it possible to open the door for work-discharging purposes and again close it with a single stop of the barrel.

Another object is to provide tumbling barrels of the character rotatable about an inclined axis, with a door and door operating assembly which is operable to completely control the discharge of work from the barrels, thereby precluding breakage of even fragile pieces of work, and yet effecting a complete discharge of all the pieces of work contained in the barrels.

It is a further object to provide a tilted mill having a discharge door and a door operating assembly for the door that is operable to unlock the door and control its opening operation thereof so as to do away with all manual operations, and which is also provided with interlocking control mechanism for preventing the discharge operations from being carried out in improper sequence.

A further object of this invention is to provide an inclined barrel abrading machine having a mechanical device for projecting abrasive into the barrel at abrading velocities for efficiently cleaning the work contained therein, and which is so mounted as to not interfere with loading and unloading of the barrel.

It is another object of this invention to provide an inclined barrel abrading machine having a device for loading it rapidly and which is operable to drop the work a minimum distance, thereby precluding damage to even fragile pieces of work.

Our invention also aims to provide a machine for simultaneously tumbling and abrading work having a novel abrasive reconditioning and recirculating mechanism built into the machine and forming a part thereof.

A further object is to provide an abrading machine of the character having an inclined barrel, with a power operated discharge door, designed to be unlocked, opened and closed without any manual operations whatsoever.

It is another object to provide an abrading machine having an inclined tumbling barrel embodying novel improved work turning, barrel supporting and driving, dust-sealing and removing, wear preventing, and work-charging and discharging features.

Further objects of the invention will become apparent as the specification proceeds in connection with the annexed drawings, and from the appended claims.

In the drawings:

Figure 1 is a perspective view of an abrading

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machine embodying the invention, and in this figure the barrel is shown stopped in discharging position and the loading mechanism is shown in lowered position ready to receive a load.

5 Figure 2 is a perspective view of our machine and illustrates the door and the door operating mechanism, with the barrel stopped in discharging position, but with the door locked and with the restraining bar in inoperative position.

10 Figure 3 is a longitudinal sectional view through the barrel of the machine shown in Figure 1 and also illustrates a part of the housing and the manner in which the abrasive projecting mechanism is related thereto. Figure 3A is a perspective view, with parts broken away, of the barrel bottom.

Figure 4 is a diagrammatic view illustrating the tumbling barrel of the machine shown in Figure 1 and the abrasive propelling device that is preferably employed in combination therewith.

20 Figure 5 is an enlarged view of one of the latch bar assemblies and illustrates the manner in which it cooperates with the lugs of the discharge door.

25 Figure 6 is a view of the top portion of the loading mechanism preferably employed with our machine and also forming part of this invention and it illustrates the work loading bucket in dotted lines and in work discharging position.

30 Figure 7 is a fragmental sectional view taken substantially on line 7-7 of Figure 3, looking in the direction of the arrows.

Figure 8 is an elevational view of the abrasive cleaning or reconditioning mechanism of the invention.

35 Figure 9 is an elevational view illustrating the manner in which abrasive is conveyed from the elevator to the abrasive projecting wheel.

40 Figure 10 is a diagrammatic view illustrating one form of mechanism for controlling the operation of our abrading machine.

Figure 11 is a longitudinal section view of a modified form of barrel forming part of our invention.

45 Figure 12 is a top plan view of the barrel shown in Figure 11 and

Figures 13 and 14; 15 and 16 are views similar to Figures 11 and 12 respectively, but illustrate further forms of barrels of this invention.

50 With continued reference to the drawings, wherein like reference characters have been employed to designate like parts throughout the several views thereof, and with the particular reference to Figure 1, the machine is preferably embodied in a unitary structure comprising a loading device A, a tumbling barrel B, wherein the work is simultaneously tumbled and abraded, a barrel discharge door operating mechanism C and an abrasive recirculating and reconditioning system D (Figure 8), and a housing E and an abrading device G.

55 In order to simplify the description and facilitate a ready understanding of the invention, the various parts of the machine will be treated separately and in conclusion a summary of the operation of the entire machine will be given.

Loading device

60 The work handled by the barrel, irrespective of whether it be castings or other articles to be abraded, is preferably loaded into the barrel by means of the loading device now to be described. Although the machine will efficiently abrade and discharge the work when the work is loaded in the barrel by hand or by other forms of load-

ing mechanism, we preferably employ the one illustrated as it is combined with the machine in a novel manner, rendering the machine compact and easy to operate, and it is peculiarly capable of loading the work in the barrel in such manner as to avoid breaking or otherwise damaging even fragile castings.

65 With reference to Figures 1 and 6, the loading or barrel charging device comprises a pair of upright channel members 10, joined at their lower ends by a member 11 and which terminate in curved portions 12 at their upper ends. Channel members 10 are braced with respect to each other and with respect to the machine housing E by a plurality of structural members 13 and 14 respectively as seen in Figure 1. Mounted for guided movement on channel members 10 is a work-lifting bucket or receptacle 15, carrying rollers 16 upon stub shafts 17. Rollers 16 ride in the flanges of members 10. As seen in Figure 1, when the work bucket is disposed in lowered position it is located at such a height that work may be readily placed therein. The upper edge of bucket 15 is preferably inclined for cooperation with the stationary barrel top or hood as will appear hereinafter.

70 The work bucket is elevated by means of a motor 18 and a speed reducing mechanism 19, connected to a shaft 21 by means of a sprocket chain drive 22. Shaft 21 is journaled upon the top of cabinet E in any suitable manner, and wound upon spirally grooved drums mounted near both ends is a pair of chains 23 and 24. Chains 23 and 24 pass over a pair of pulleys 25 and 26 supported upon a pair of arms 27 on members 10 and frame members 13 and are secured to shafts 17 of each lower roller 16.

To the front of housing E is secured a generally circular stationary top or hood 28 for the open upper end of the barrel, and pivoted thereto is a gasket-equipped cover 29 which closes a work charging opening 30 therein. Cover 29 is preferably synchronously opened when work bucket 15 is raised into discharging position by a chain 31 secured to cover 29 at 32 and which is wound upon the middle portion of shaft 21 between chains 23 and 24 as seen in Figure 1.

75 With bucket 15 loaded with work, motor 18 is started to rotate shaft 21 and thereby wind chains 23 and 24 upon it and lift the bucket upwardly in guides 10. After the bucket is moved upwardly a predetermined distance, the slack in chain 31 is taken up by reason of the chain winding upon shaft 21. When the slack is taken up door 29 starts to open and when bucket 15 has reached a predetermined position in guides 10, the door 29 has been elevated to a position to allow bucket 15 to swing therepast into the position shown in Figure 6, with the result that the work is discharged into the barrel. When the bucket is disposed in its upper position it is inclined downwardly as seen in Figure 6 to gravitationally charge the work into the barrel, and in the appended claims the term "inverted" is intended to apply to this condition of the bucket.

When it is desired to lower the bucket, motor 18 is reversed so as to unwind chains 23, 24, and 31 from shaft 21. In order to assist bucket 15 around the curved portion of guides 10, we preferably mount a pair of arms 33 upon brace members 13 for cooperation with shafts 17 of upper rollers 16. Arms 33 are provided with offset portions 34 to which tension springs 35 are secured. Springs 35 are anchored to guides 10 at 36, and are operable to act upon shafts 17 and

push bucket 15 back in the guides to a position where the weight of the bucket itself will restore it to its initial position adjacent the floor.

It is accordingly seen that we have provided a loading device that takes up a minimum of floor space, is spaced from the front of the barrel to provide adequate discharge space, is easily operated, is coordinated with the machine to automatically open the door thereof as it approaches barrel-charging position, and is operable to lift the entire charge of work into closed proximity to the barrel before the work is dumped into the latter whereby the work flows into the barrel at low velocity, thereby precluding damage to the fragile castings or other pieces of work.

Tumbling barrel and driving mechanism therefor

Before proceeding to the description of the barrel proper, it is desired to briefly describe the construction of housing E, seen in Figure 1. The front edge of housing E terminates in a pair of angle iron members 38, each of which is offset at its lower portion to provide a maximum working space in front of the machine. Although the work discharged from barrel B may be carried away in any suitable manner, as for instance, by means of a power operated conveyor or the like, we have shown a container F mounted upon a series of conveying rollers 39 mounted in a frame 41. In order to guide the work from the barrel into box E, a short chute 42 is provided which has an inner edge conforming to the shape of the barrel and is mounted at its front edge upon a support 43 extending between and secured to angle iron uprights 38. As seen in Figure 1, adequate space is provided between the lower part of the housing and supports 10 to enable barrel discharging operations to be carried out.

Referring now to Figure 3, the barrel proper comprises a preferably generally cylindrical shell 45, having an apertured bottom 46 secured thereto for instance by welding or the like. Bottom 46 fits over a spider 48 and is fastened thereto by bolt and nut assemblies 49 or by other suitable means.

Spider 48 is rigidly secured to the upper end of shaft 51 in any suitable manner. Shaft 51 is journaled in bearings 52 and 53 in a cylindrical housing 54 which is solidly mounted upon supports 55 and 56 mounted in housing E. Bearing 52 takes the radial load of the upper end of shaft 51 and thrust bearing 53 takes the radial and thrust loads at the lower end of shaft 51. A worm wheel 57 is rigidly secured to shaft 51 for cooperation with a worm 58 journaled in casing 54. Worm 58 may be driven in any suitable manner, but it preferably is driven by means of an electric motor through a speed reducer so as to produce a comparatively low rate of rotation of the barrel. If desired a speed changer may be associated with the driving mechanism or the motor speed may be changed to provide different speeds of rotation of the barrel. As seen in Figure 3, spider 48 terminates in a skirt in which a sealing member 60 is provided. Member 60 sealingly cooperates with the outer surface of support 54 to preclude escape of lubricant or entrance of abrasive.

Bottom 46 of the barrel is provided with a plurality of abrasive drain holes 61 through which abrasive is conveyed to the abrasive cleaning mechanism. The abrasive draining through holes 61 falls into a pan-like element 62 secured to the drum and having a plurality of abrasive lifting vanes 63 secured thereto (Figure 7). The

abrasive lifted by vanes 63, through rotation of the drum, falls into a chute 64 having a lip 65 extending into the space between the inner edges of the blades. In order to prevent the escape of abrasive that might drop from the vanes before they reach chute 64, we have provided a bifurcated chute 66, which passes around spider 48 and extends inside of member 62 at its lower end to thereby convey any escaping abrasive back into the lower vanes to be again lifted into discharge position. The abrasive is conveyed through chute 64 into an abrasive cleaning or reconditioning mechanism to be hereinafter described.

The work may be tumbled directly upon barrel bottom 46 if desired, but we preferably provide the barrel with an inclined false bottom which has been found to impart a superior tumbling action to the work. The bottom is made up of a skeleton frame 68 and an auxiliary floor or liner 69 which is preferably made in two semi-circular segments for ease of removal and replacement. A work lifting and turning member 70 is also preferably secured in place over the segments of floor 69. Frame 68 comprises a plurality of blocks 71, which are welded at their outer edges to barrel 45 and are carried by supports 71A welded to barrel bottom 46. To the under sides of blocks 71 are welded shelves 68A which are spaced from the lower side of floor 69 by the thickness of blocks 71 when the floor is in place. Floor 69 is detachably secured to blocks 71 by any suitable means such as screws. A front liner 74, having a curved piece 74A and a pair of bars 74B welded to its bottom surface, is detachably secured to bottom 46 in any suitable manner and cooperates with floor 69 to define the barrel bottom. The front edge of floor 69 rests upon bars 74B. Mounted between the removable and permanent floors in any suitable manner, as for instance by means of a plurality of supports 74C, are a plurality of weights 73, which are employed to compensate for the weight of the discharge door and thus statically balance the barrel about its axis.

The margin of floor 69 and liner 74 is provided with a plurality of abrasive drain holes 75, and the drain holes in liner 74 are preferably circumferentially offset from the drain holes 61 in permanent bottom 46, so that nails, wires and like refuse entering holes 75 will not drop through bottom 46, and yet the abrasive will drop through holes 61 and be carried into the abrasive cleaner. In a similar manner, shelves 68A prevent nails and the like from dropping through the openings 75 in floor 69, and yet they permit the abrasive to slide over their inner edges onto bottom 46. Although we have described the support for floor 69 as being a built up structure it may be made of a single or sectional casting secured to barrel bottom and/or the barrel sides. The removable floor 69 and liner 74 constitute the barrel bottom and take all of the wear, and hence main bottom 46 is of a permanent character.

The cylindrical or side wall of the barrel is also provided with several removable liner sections 77, to protect the barrel against wear. The upper edge of the barrel is provided with a plurality of abrasive drain holes 78, and a labyrinth-forming flange 79 which is secured to barrel B by a spacing and reenforcing member 80. The lower edge of hood structure 28 is provided with a pair of labyrinth-forming flanges 81, which are disposed in spaced concentric overlapped relationship to the upper edge of the barrel and flange

79 to define a tortuous passage and thereby preclude escape of abrasive from the barrel. Any abrasive finding its way into the space between the upper edge of the barrel and flange 79 automatically drains back into the barrel through openings 78 when they reach their upper position, lifters 78' being provided behind each drain hole to prevent the trapped abrasive from sliding back.

It is accordingly seen that we have provided a tumbling barrel, which, by reason of its support in dust-proof bearings solely at one end, takes up but little space at its periphery and has a long life.

Any suitable form of abrasive throwing or propelling mechanism, for instance, an air blast nozzle assembly or a mechanical abrasive throwing device of any character may be associated with a tumbling barrel for cleaning the work therein, but we preferably employ a mechanical device comprising a bladed wheel whose axis is substantially horizontal and preferably parallel to a vertical plane containing the axis of rotation of the barrel. With reference to Figures 3 and 4, the centrifugal wheel comprises a base 83; a housing 84; an abrasive feed conduit 85 having a discharge slot 86 therein; a rotor 87 having a plurality of impeller blades 88 and a plurality of propeller blades 89 secured thereto, the impeller blades being located within conduit 85 and operable to discharge the abrasive outwardly through opening 86 onto the inner ends of blades 89; and a feed spout 91. Rotor 87 is mounted on a shaft and is adapted to be rotated at a comparatively high speed. By reason of the construction of the centrifugal wheel, it discharges all of the abrasive fed thereto at high abrading velocities downwardly upon the tumbling work in the manner generally indicated in Figures 3 and 4, and it is apparent that the fan-like abrasive discharge is operable to efficiently clean the work as it cataracts upon itself in the barrel. Because of the particular manner in which the centrifugal wheel is mounted in the housing and related to the barrel, it does not interfere with the loading or unloading operations in any way.

Discharge door and operating means therefor

As seen in Figures 1 and 2, the discharge door is of curved shape to conform to the shape of the barrel, and it comprises a door proper 93 and a removable and replaceable liner 94 (Figure 3) detachably secured thereto.

The exterior of door 93 is provided with external reinforcing flanges 92 and with a restraining-bar-receiving assembly comprising a bracket 95 providing a pair of spaced ears 96 in which a detent 97 is pivoted. Detent 97 is urged upwardly by a compression spring 98 (Figure 3), and its upward movement is limited by pin 99 connected to a link 100 pivoted to detent 97. The bracket also provides a plate 101 defining an abutment face which cooperates with the restraining bar in a manner to be hereinafter pointed out.

Door 93 is pivotally connected to the upper edge of barrel B by means of a pair of links 102, which are preferably pivoted to flange 79 to thereby derive rigid support by reason of reinforcing member 80. Links 102 are secured to a shaft 103 journaled in bearings 104 provided on door 93.

The discharge door is securely locked in place on the barrel by means of a latch mechanism having a remote control, whereby it is unnecessary

for the operator to perform any manual latching or unlatching operation whatsoever. This structure will now be described.

With reference to Figures 2 and 5, a pair of upper and lower latch lugs 105 and 106 respectively are secured to door 93 and cooperate with a pair of latch members 107 and 108 secured to a latch bar 109 mounted for reciprocation on barrel B by means of a pair of apertured lugs 111 and 112. A compression spring 113 encircles bar 109 and bears against lug 111 and latch member 108 to urge bar 109 downwardly, so as to urge latch members 107 and 108 into latching cooperation with lugs 105 and 106, respectively, and lugs 105 and 106 are preferably provided with inclined faces 114 so that spring 113 is capable of exerting a powerful closing action upon the door.

An identically similar latching assembly is provided on the other edge of door 93, and in order to simplify the disclosure it has not been shown and the description of it will not be given.

Journalled in the lower end of each latch bar 109 is a roller 116, each of which is adapted to cooperate with an unlatching cam or finger 117 rigidly secured to a shaft 118 journaled in housing E in any suitable manner. With reference to Figure 2, a lever 119 is secured to shaft 118 and is connected to a piston rod 121. Rod 121 cooperates with a conventional piston and cylinder assembly designated generally as 122, having a conduit 123 connected with a suitable source of compressed air. The flow of air to assembly 122 is controlled in a manner to be hereinafter described, and by admitting air to cylinder 122, rod 121 is pulled inwardly and lever 119 is rocked clockwise (Figure 2) thereby causing cams 117 to lift bars 109 against the action of springs 113 and unlocking the door.

Opening and closing movements of the discharge door are positively controlled at all times by a restraining bar or operating bar assembly. Pivotaly secured to the front of housing E are a pair of links 125 and 126 which are pivotally connected at their lower ends to a pair of restraining bars 127 and 128 respectively and a restraining bar 129. Bar 129, when swung about the upper ends of links 125 and 126 as an axis, contacts detent 97, rocking it downwardly and engaging abutment plate 101. When bar 129 contacts plate 101 detent 97 rises behind it and thus yieldingly but firmly holds it in position against the door. When bar 129 has been brought into engagement with the door as just described, and when the door has been unlatched, the door may be swung outwardly, the door being supported by bar 129 undergoes a lifting action as it opens by reason of bar 129 and swinging about the axis of links 125 and 126.

Bar 129 may be actuated into door opening and door closing positions by any suitable means, but we preferably provide bars 127 and 128 with teeth 131, and mesh them with a pair of pinions 132 carried by a shaft 133. Shaft 133 is driven by motor 134 or any other suitable prime mover either directly or through a speed reducing mechanism. Motor 134 is provided with a conventional push button stop-start control and also included in the circuit are limit switches automatically actuated by movements of bars 127 and 128 into their extreme door opening and door closing positions (not shown) to automatically break the motor circuit.

Any suitable form of control mechanism may be employed for controlling the circuits of the

various motors and for operating the valve for the door unlatching cylinder, and for interlocking the parts so that they cannot be improperly actuated, but we preferably use a control assembly of the character diagrammatically illustrated in Figure 10, which has proven to be entirely satisfactory in our device. With continued reference to Figure 10, a hand lever 136 is pivotally supported in any suitable manner upon housing E and carries at its upper end a switch assembly 137 comprising a pair of contacts 138 and 139, which are adapted to be electrically connected by a T-shaped contact arm 141 carrying a roller 142 and urged into contacting position by a spring 143. Lever 136 is adapted to be swung into the dotted line position illustrated in Figure 10 wherein it may cooperate with a cam 144 adjustably carried by barrel B. Contacts 138 and 139 are connected in series with the circuit of the motor employed to drive the barrel, and which is designated diagrammatically as 145. Motor 145 is also connected to a push button start-stop control circuit having start and stop buttons 147 and 148 respectively, mounted in a switch block 149.

When it is desired to stop the barrel for discharging, lever 136 is rocked into the dotted line position shown in Figure 10, and when the barrel is brought approximately into discharging position, cam 144 will engage roller 142 and push contact arm 141 into the dotted line circuit breaking condition indicated in Figure 10. The current for motor 145 is accordingly cut off and if desired an automatic brake may be employed to quickly stop the barrel when the circuit is broken. Magnetic brakes are well known in the art, for instance, they are used on elevators and comprise a spring engaged brake, which is held in released position by magnets energized by the motor circuit, and a brake of this character may be employed for stopping the barrel in discharging position, and the appended claims are intended to embrace the invention when it assumes this form. When it is desired to restart, the barrel lever 136 is swung into its full line position and button 147 is pushed to make the circuit of motor 145.

Also mounted on block 149 are push-buttons 151 and 152 which are connected to the circuit of motor 134, as indicated at 153. By pushing button 151, motor 134 rotates in a direction to move restraining bar 129 outwardly, whereas pushing button 152 causes motor 134 to move bar 129 inwardly.

In view of the fact that it is undesirable to have bar 129 disposed inwardly when the barrel is rotating, as the barrel would strike it each revolution, we preferably provide a device for preventing push buttons 151 and 152 from being actuated unless the barrel is in discharging position, and this mechanism preferably assumes the form of a plate 154 mounted for reciprocation on base 149 by a plurality of guides 155 and having apertures 156, 157, 158, and 159 provided therein. Plate 154 is preferably connected to hand lever 136 by means of a link 161, so that when lever 136 is swung into dotted line position, plate 154 is moved to the right into the dotted line position indicated.

As illustrated in Figure 10, plate 154 is disposed in its left hand position, with the result that openings 158 and 159 expose start-stop buttons 147 and 148 for motor 145, but plate 154 prevents actuation of buttons 151 and 152 of motor 134 as openings 156 and 157 are disposed out of registry therewith. Therefore, motor 134, and hence bar

129, cannot be actuated unless hand lever 136 is rocked into dotted line barrel stopping position shown in Figure 2. Conversely, when lever 136 is disposed in its dotted line position, plate 154 covers the push buttons for motor 145, with the result that motor 145 cannot be restarted while plate 154 is disposed in a position to expose buttons 151 and 152 for motor 134.

In order to prevent the discharging door from being unlocked when the bar 129 is disposed in its outer position, which would result in a violent discharge of work from the barrel, we have provided a shaft 163, suitably journaled on housing E in any suitable manner, and having a lever 164 secured thereto. Lever 164 is mounted in the housing so as to lie in the path of movement of link 125, and the parts so designed that when bar 129 is moved into the inner position in firm contact with door 93, link 125 will engage lever 164 and rock it into the dotted line position shown in Figure 10.

The compressed air supplied cylinder 122 is controlled by a valve 165 connected to conduit 123 having an operating handle 166, which, when swung into its dotted line position, will open conduit 123 and allow the assembly 122 to rock shaft 118 into door unlocking position. When handle 166 is disposed in its full line position, valve 165 places cylinder 122 in communication with the atmosphere. Rigidly mounted on shaft 163 is a segment-shaped member 167, which in the full line position shown precludes valve handle 166 swinging into open position, or if handle 166 is disposed in the dotted line position, segment 167 prevents moving the valve into closed position. Also secured to shaft 163 is a lever 168 which is connected to a plate 169 by means of a link 171. Plate 169 is mounted for sliding movement on plate 149 by means of guides 172 and is provided with openings 173 and 174, which in the position shown, register with control buttons 147 and 148 for motor 145. Plate 169 is also provided with a finger 175 adapted to seat in a recess 176 provided in plate 154.

Assuming that hand lever 136 has been moved into its dotted line position, and that the barrel is stopped in discharge position, button 152 may be pressed to cause motor 134 to bring bar 129 into abutting cooperation with the door. When bar 129 is moved into this position, link 125 will have rocked shaft 163 into dotted line position to bring segment 167 out the path of movement of valve lever 166. Accordingly, valve 166 may now be rocked into its dotted line position to energize cylinder 122 and unlock the discharge door. Button 151 may now be operated to cause motor 134 to move bar 129 into its outer position and allow the work to be discharged from the drum. As soon as bar 129 has been moved in a slight distance, it will allow lever 164 to be restored to its full-line position, thereby bringing segment 167 into the position shown in Figure 10 to accordingly prevent latch bars 109 from being rocked into locking position while the door is away from the discharge opening. When the work has been discharged from the barrel, button 151 is pushed to cause motor 134 and bar 129 to bring the door into closed position. When the door is completely closed link 125 rocks shaft 163 to bring segment 167 out of cooperation with valve handle 166, and accordingly the latter may then be swung into its full line position to vent the air from cylinder assembly 122 and allow springs 113 to bring latch bars 109 into locking position.

When the parts are in the discharge position just described, with the door open, it is impossible to start the barrel because shaft 163, in rocking into the dotted line position, brings plate 169 into its upper dotted line position, with finger 175 in engagement with recess 176. Engagement of finger 175 with plate 154 through link 161 prevents hand lever 136 from being rocked back into its full line position and therefore it is impossible to start the barrel while the door is open. When shaft 163 is disposed in its full line position, it is also impossible for the operator to tamper with the device and attempt to rotate shaft 163 by grasping parts 164 or 167, because finger 175 will engage the side edge of plate 154 and lock the parts.

It is therefore apparent that the control mechanism of our machine provides truly a push-button control of all operations and yet the parts are, so interlocked as to render it entirely "fool-proof".

Abrasive reconditioning and recirculation

Although any suitable mechanism may be employed to take the abrasive from chute 64 (Figure 3) and free it from dust and casting fragments or other extraneous matter and return it to the centrifugal wheel, we preferably employ the mechanism shown in Figures 8 and 9 for this purpose, as it has proved to be entirely satisfactory. With continued reference to these figures, an imperforate drum 181 is mounted for rotation in housing E in any suitable manner, as for instance by means of rollers 182. The right-hand end of the drum is open, and the left-hand end of the drum is provided with an end plate having an opening 183 therein. Mounted within drum 181 and spaced from the walls thereof is a cylindrical screen 184 having a helical refuse-propelling element 185 secured to its inner wall. Screen 184 projects beyond the right end of drum 181 and is adapted to discharge refuse therefrom into a chute 186, which leads to a suitable receptacle or container.

Chute 64, associated with barrel B is provided with a spout portion 187 which projects into drum 181 for discharging the spent abrasive upon screen 184. Secured to the inner wall of drum 181 is a helical abrasive propelling member 188 which is adapted to propel the abrasive along the drum to the right hand end thereof wherein it discharges at 189 into a chute or the like into the boot of a conveyor designated generally in Figure 9 as 191. Cleaned abrasive is discharged from conveyor 191 to a spout 192 and then into a conduit 193 connected to the centrifugal wheel spout 91.

Drum 181 is driven in any suitable manner and its right-hand end is enclosed by hood structure 194 which is preferably connected to a suction fan, preferably embodying a dust collector, with the result that as spent abrasive is fed through spout 187 and discharged into screen 184, it is agitated and dust developed by the agitation is drawn from left to right into hood 194, and thence to the fan and dust collector. The cleaned abrasive drops into the space between drum 181 and screen 184, and is propelled by helical member 188 to the right end of the drum which discharges it at 189. The extraneous matter or refuse which is too large to pass through the mesh or screen 184 is propelled to the right end of the screen by member 185, where it is discharged into chute 186.

A part of the air drawn into the suction fan just described is drawn through an opening in cover 28 (not shown) through a separate ventilating connection suitably baffled to prevent excessive amounts of abrasive entering the ventilating system. By drawing air from barrel B a slight sub-atmospheric pressure is developed therein, which causes air to be sucked into the barrel through the labyrinth at the top of the barrel, thereby precluding escape of dust into the room where the machine is located. The air is sucked into the abrasive reconditioning system at the junction of chute 64 with the barrel B and the junction of spout 187 with drum 181, thereby preventing dust from escaping at these points.

Operation

The work to be cleaned is loaded into bucket 15 with the parts in the position shown in Figure 1, and wherein the bucket is conveniently loaded for easy handling. If desired, bucket 15 may be made detachable so that it may be loaded elsewhere and inserted in the machine during the time that another load is being cleaned. For instance, the four roller assemblies may be mounted in a cradle to which bucket 15 may be detachably connected. Also, members 10 may be extended downwardly into a pit, so as to bring the upper edge of bucket 15 approximately level with the floor, and thereby permit easy dumping of work into it from a wheelbarrow or the like.

After the bucket 15 has been loaded, motor 18 is operated to simultaneously raise the bucket and lift cover 29. As the bucket reaches substantially work unloading or barrel charging position it discharges the work into the barrel, and in view of the fact that the bucket is closely adjacent the barrel before it is inverted, the castings or work pass into the barrel with a minimum initial velocity, thereby minimizing the possibility of breaking fragile castings or the like during the loading operation. After the loading operation is completed, motor 18 is reversed to restore bucket 15 to the lower part of guides 10 as in the manner previously described. In connection with the loading operation, it should be particularly observed that by reason of the construction of the machine ready access is provided for the loading bucket thereby making it easy to load it, and the bucket completely discharges its load in a single operation, doing away with the necessity for any door-opening or other preparatory operations.

Cleaning

After the work has been loaded into the barrel in the manner just described, and assuming that hand lever 136 is disposed in its full line position shown in Figure 10, with door 93 closed, button 147 may be pushed to start barrel motor 145, because plate 154 uncovers the control buttons for this motor under these conditions. The operator then starts the suction fan associated with the abrasive reconditioning drum and also starts the motor which drives rotor 87 of the centrifugal wheel. After the centrifugal wheel has been brought up to speed, the abrasive is admitted to spout 91 to start the abrasive blast stream. The work is now being simultaneously tumbled or cataracted upon itself within barrel B, and the blast of abrasive is being directed upon it generally as indicated in Figures 3 and 4, where it is seen that a fan-like stream of abrasive is discharged into the drum. As the barrel rotates the work is picked up by the inclined

floor, assisted by piece 70, and thrown and gravitated at a given velocity through the blast stream toward the lower cylindrical wall, depending upon the position of the barrel. When the barrel is in the position shown in Figure 3, the work will rapidly gravitate from the inclined floor, whereas when the inclined bottom is disposed in a position 180° removed, the work will migrate at a lower rate of speed. It is therefore apparent that the work is efficiently tumbled and blasted, and although we prefer to use an inclined bottom in the barrel, it is to be understood that any form of the barrel bottom may be employed without detracting from the other features of the machine. For instance, work turning or tumbling pieces of other forms may be built up on the floor of the barrel, or if desired the end of the barrel may be pressed into a suitable formation to properly tumble the work. Moreover, although we have shown the barrel floor as constituting a false bottom, it is to be understood that the barrel end 46 may be omitted and the spider 48 directly connected to frame 68 if desired without departing from the spirit of the invention.

When it is desired to stop the cleaning operation and discharge work, the abrasive is cut off from spout 91, the centrifugal wheel is stopped, and hand lever 136 is moved into the dotted line position shown in Figure 10, with the result that barrel B only makes part of a complete revolution before it brings cam 144 into cooperation with roller 142 and breaks the circuit of motor 145 as previously described. In this connection it is observed that as cam 144 is secured to barrel B by bolts passing through slotted holes therein (not shown) the location of the cam may be varied so as to vary the point at which the barrel will stop.

The door cannot be now unlocked because segment 167 blocks valve handle 166. Button 152, which is now uncovered by the openings in plate 154, is now pushed to bring bar 129 into cooperating engagement with the door, as previously described. This action automatically swings segment 167 out of the way and air valve handle 166 may now be rocked into the dotted line position shown in Figure 10 to unlock the door. When the door has been unlocked in this manner it is nevertheless held in secure contact with drum B by bar 129.

With the parts in the position just described, button 151 is now depressed to allow door 93 to swing into open position under the influence of gravity and under the control of motor 134. Motor 134 positively controls the rate at which the door is opened, irrespective of how heavy the particular load may be. The work contained in the barrel is accordingly discharged over apron 42 into receptacle F at low velocity. The circuit for motor 134 is preferably equipped with a start-stop push button control (not shown) in order that the door may be alternately opened and stopped so as to open the door by increments and positively control the discharge of work from the barrel. If desired, a speed controlling means may be embodied in circuit of motor 134 in order to open the door at various speeds.

With the discharge door moved into open position in the manner just described, it is impossible to actuate the valve handle 166 and bring it into its full line position shown in Figure 10 because segment 167 blocks it. It is therefore impossible to allow latch bars 109 to drop into lower position unless door 93 is in completely

closed position. Although we have shown and prefer to employ a pair of rack bars 127 and 128 for operating bar 129, it is to be understood that if desired other operating means may be employed without departing from the spirit of the present invention. For instance, bars 127 and 128 may be connected to a pair of crank arms driven by an electric motor or the like through a speed reducing unit, the length of the cranks being determined by the desired travel of the bar 129 between its door-opening and door-closing positions. With this structure it will be unnecessary to reverse motor 134 to effect the door-closing and door-opening operations as bars 127 and 128, as they attain one extreme position, will pass "dead center" and start a reverse movement. Moreover, latch bars 109 may be provided with automatic trips to automatically maintain them in raised position during the periods that door 93 is swung away from the barrel, and the appended claims are intended to embrace our mechanism when it assumes this form.

Since the door 93 is pivoted about a compound arrangement of two axes, namely the axes of links 125 and 126 and the shaft 103, the top of the door does not swing outwardly on a small radius but opens much more widely as it opens by rising under the lifting action of link 125 and 126. This is a very desirable feature especially when large castings of awkward shapes are handled by the machine. If desired, however, under some conditions door 93 may be hinged to barrel B at its top, one of its sides or its bottom edges without sacrificing the advantages of restraining bar 129 and its operating mechanism.

While the cleaning operation just described is being carried out, the spent abrasive, together with dust and other sufficiently small material dislodged by the work drains through the holes in the barrel floors and is picked up by the lifting vanes carried by the barrel and discharged into the cleaning drum, where it is cleaned and the abrasive returned to the centrifugal wheel or other abrasive propelling device, as previously described.

The parts are preferably so designed that when the machine is stopped the abrasive elevator is also stopped, so that when the machine is again started, a uniform flow of abrasive will be fed to the wheel. When the machine is stopped it should be observed that as the lower edge of the discharge opening is substantially flush with the floor of the barrel, any refuse too large to pass through the drain holes in the barrel will be discharged from the machine when door 93 is opened.

In Figures 11 to 16 inclusive we have illustrated modified forms of barrel bottoms which may be used with the machine just described, and the selection of a particular bottom will, of course, depend upon the nature of the work handled by the machine and the tumbling action desired.

In Figure 11, barrel B is provided with an inclined bottom 201, similar to the auxiliary bottom of the machine first described, upon which is mounted a pyramid-shaped work lifting and turning member 202, the pyramid preferably having four sides, as seen in Figure 12. In Figure 12 the relation of member 202 with respect to door 93 is shown.

The barrel B shown in Figures 13 and 14 is provided with a cone-shaped bottom 203, and mounted thereupon, preferably diametrically opposite the discharge door 93 of the barrel, is a work lifting and turning member 204, which is secured

to the inner wall of barrel B and to the upper surface of floor 203. Two members 204 may be used if desired.

In Figures 15 and 16 we have shown a barrel B having a two-part bottom comprising sections 205 and 206, which are made in halves as seen in Figure 16. Sections 205 and 206 have different degrees of inclination, thereby providing a step 207 over which the work is abruptly tumbled once each revolution of the barrel. The barrel is preferably rotated in a direction to cause the work to tumble down over step 207, but if desired, it may be rotated in the opposite direction to cause the work to tumble up, or be lifted by step 207.

In all of the forms of tumbling barrel bottom assemblies described it is to be understood that the sizes and proportions of the work turning and lifting pieces may be varied to suit the particular work and the desired condition involved. Also the inclination of the floors may be increased or decreased as desired.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, means for rotating said barrel to cause it to tumble work contained therein, the upper edge of said barrel terminating in at least two upstanding annular flanges, a stationarily supported hood structure mounted adjacent the top of said barrel and having at least one downwardly extending annular flange disposed in overlapped nested but spaced relationship to the flanges of said barrel for preventing extraneous material from escaping from said barrel, said barrel being provided with a plurality of passages communicating with the interior of said barrel and with the space between the flanges on said barrel, for returning extraneous material to the barrel interior.

2. In an abrading machine, a generally cylindrical barrel mounted for rotation about an axis disposed at a considerable angle with the horizontal, said barrel having an open top and a closed bottom, power means for rotating said barrel to tumble work contained therein, a stationarily supported hood structure mounted adjacent the top of said barrel and closing the upper end thereof, said hood structure providing a charging door through which work may be charged into the barrel, a discharge door pivotally connected to said barrel and forming a part of the cylindrical wall of the barrel, said barrel being operable to gravitationally discharge its contents when it is stopped in a discharge position with said discharge door disposed below the axis of rotation of the barrel, and said discharging door is open, and means for opening and closing said door when said barrel is disposed in said discharge position, whereby said barrel may be unloaded and loaded with a single barrel stop.

3. The abrading machine described in claim 2, together with selectively operable means for caus-

ing said power means to automatically stop said barrel in discharge position.

4. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and open top, power means for rotating said barrel to thereby tumble work located therein, said barrel having a discharge opening located in the cylindrical wall thereof through which said work may gravitationally discharge, a discharge door adapted to close said discharge opening, latch means carried by said barrel for locking said discharge door in closed position, and stationarily supported means located adjacent said barrel for selectively operating said latch means to unlock said door.

5. The abrading machine described in claim 4, wherein said stationarily supported means is so constructed as to only cooperate with said latch means and unlock said door when said barrel is disposed in a predetermined discharge position.

6. The abrading machine described in claim 4, together with stationarily supported means for cooperating with said door and controlling its opening movement under the influence of gravity.

7. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work located therein, said barrel having a discharge opening in the cylindrical wall thereof through which said work may gravitationally discharge, a discharge door pivotally connected to said barrel and operable to close said discharge opening, latch means carried by said barrel and operable to lock said door in closed position, stationarily supported means mounted adjacent said barrel for selectively operating said latch means to unlock said door when said barrel is disposed in a predetermined discharge position, and means for preventing said last named means from being operated until said barrel is disposed in discharge position.

8. The abrading machine described in claim 7, together with controlling means, movable into cooperating relationship with said door, for controlling movement thereof toward open position under the influence of gravity, and having means for preventing said door from being unlocked until said controlling means is moved into cooperating relationship with said door.

9. The abrading machine described in claim 7, together with means for preventing said barrel from being rotated by said power means when said discharge door is unlocked.

10. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work contained therein, said barrel having a discharge opening in the cylindrical wall thereof through which said work may be gravitationally discharged, a discharge door pivoted at its upper end to said barrel and operable to close said discharge opening, latch means carried by said barrel for locking said door in closed position, means, stationarily supported adjacent said barrel, for operating said latch means to unlock said door, and restraining means, movable into engagement with said door, for controlling movement thereof towards open position under the action of the load of the work contained in said barrel, comprising an element rockable about an axis adjacent said barrel and selectively controlled by power means to allow said door to open at any desired degree, to thereby

control the rate of discharge of work from said barrel.

11. The abrading machine described in claim 10, wherein said door is connected to said barrel by at least one link member, and said restraining element is operable to support said door when it is opened and for compelling said door to rock about a shifting horizontal axis remote from said link member.

12. In an abrading machine, an open ended barrel mounted for rotation about an inclined axis for tumbling work contained therein, a hood structure supported adjacent the open end of said barrel and having a charging opening therein through which work may be charged into the barrel, a cover mounted on said hood and operable to close said charging opening, a charging device comprising a receptacle mounted for movement from a loading position to an unloading position adjacent said charging opening, power means for lifting said receptacle into loading position, and means, controlled in accordance with movements of said receptacle, for opening said cover as said receptacle is brought into unloading position.

13. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having an open top and a closed bottom, an inclined hood structure mounted adjacent, and overlying the top of said barrel and sealingly associated therewith, said hood structure having an upper opening and a lower opening provided therein, said lower opening defining a barrel-charging opening and having a door cooperating therewith, a mechanical abrasive propelling mechanism mounted above said hood structure and operable to discharge at least one stream of abrasive through said upper opening and upon the work contained in said barrel, said abrasive propelling mechanism embodying a structure rotatable about a substantially horizontal axis and which is substantially parallel to a vertical plane containing the axis of said barrel, said abrasive projecting mechanism being operable to project a fan-shaped stream of abrasive into the barrel at an angle of approximately 90 degrees to said vertical plane.

14. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, means for rotating said barrel to tumble work contained therein, said barrel bottom comprising a work supporting floor of substantially plane configuration and of comparatively large area, said floor being disposed at an angle to a plane normal to the axis of said barrel, to cause work contained therein to move rapidly across the barrel bottom when the latter is disposed in one position and to effect a less rapid migration of work across the barrel bottom when said barrel is disposed in a second position, the cylindrical wall of said barrel being provided with a work discharging door adapted to discharge work when the barrel is disposed in said one position, said door being located in said barrel so as to have its lower end adjacent the low side of said floor.

15. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work contained therein, said barrel having a discharge opening in the cylindrical wall thereof through which work may be gravitationally discharged, a discharge door

pivotaly connected to said barrel and operable to close said discharge opening, means for locking said door in closed position, and restraining means for controlling movement thereof toward open position under the action of the load of the work contained in said barrel, comprising a bar mounted for movement toward and away from said barrel and movable into engagement with a portion of said door, and selectively controlled power means for controlling the rate of movement of said bar away from said barrel, to thereby control the rate of opening of said door under the influence of the work contained in said barrel.

16. The abrading machine described in claim 15, wherein said bar is pivoted for rocking movement about a substantially horizontal axis adjacent said barrel, and wherein said bar and power means are operable to move said door into closed position.

17. The abrading machine described in claim 15, wherein said bar is mounted for rocking movement toward and away from said barrel about a substantially horizontal axis located adjacent said barrel, together with a link member connected to each end of said bar and operable by said power means to move said bar toward and away from said barrel.

18. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work contained therein, said barrel having a discharge opening in the cylindrical wall thereof through which said work may be gravitationally discharged, a discharge door pivoted at its upper end to said barrel and operable to close said discharge opening, latch means carried by said barrel for locking said door in closed position, comprising means for forcing each side edge of said door against said barrel, and means for simultaneously unlatching said latching means.

19. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work contained therein, said barrel having a discharge opening in the cylindrical wall thereof through which said work may be gravitationally discharged, a discharge door pivotaly connected to said barrel and operable to close said discharge opening, latch means carried by said barrel for locking said door in closed position, comprising at least one latch bar mounted for sliding movement longitudinally of the barrel and engageable with one side edge of said door, resilient means for urging said latch bar toward latching position, and means for moving said latch bar into unlatching position against the action of said resilient means.

20. The abrading machine described in claim 19, wherein said last-named means comprises a shaft mounted for rocking movement adjacent said barrel and having a cam portion engageable with said latch bar for moving the latter longitudinally of the barrel against the action of said resilient means when it is rocked in one direction, said shaft being movable to bring it out of the path of rotation of said barrel to avoid interfering with the latter.

21. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, power means for rotating said barrel to thereby tumble work contained therein, 75

said barrel having a discharge opening in the cylindrical wall thereof through which said work may be gravitationally discharged, a discharge door pivoted at its upper end to said barrel and operable to close said discharge opening, said door being connected to said barrel by means of at least one link member which is pivoted to the door and to the barrel, said door having a downwardly facing abutment, a bar member mounted for movement toward and away from said barrel and adapted to cooperate with said abutment for controlling movement of said door toward open position under the action of the load of work contained in said barrel, said door being adapted to be supported on said bar member by said abutment wall when said door is being opened, for compelling said door to rock about a shifting horizontal axis, and means for yieldingly coupling said door to said bar member when it is engaged therewith.

22. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, an inclined floor assembly mounted in said barrel and supported by the closed bottom thereof, power means for rotating said barrel to thereby tumble work contained therein, said floor assembly being supported on a plurality of standards connected to said closed bottom, a plurality of connecting members bridging the upper ends of said standards but being spaced below said floor, said floor having a plurality of apertures therein adjacent the margin thereof, and overlying said connecting members.

23. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having a closed bottom and an open top, barrel means for rotating said barrel to thereby tumble work contained therein, said barrel having a discharge opening in the cylindrical wall thereof through which said work may be gravitationally discharged, a discharge door pivoted to said barrel and operable to close said discharge opening, and at least one counterweight secured to said barrel at a point substantially diametrically opposite said door for counter-balancing the weight of the latter.

24. In an abrading machine, a tumbling barrel having a discharge door mounted for movement toward and away therefrom, latching means for holding said door in closed position, restraining means engageable with said door for controlling the opening movement thereof, means for preventing said barrel from being rotated when said door is in open position, and means for preventing said latching means from being moved into latching position when restraining means is engaged with said door and the latter is in open position.

25. The abrading machine described in claim 24, wherein said latching means embodies a fluid pressure, valve-control mechanism for releasing it, and said restraining means is provided with an interlocking mechanism for preventing said valve from being operated into latching position when said restraining means and said door are in open position.

26. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having an open top and a closed bottom, an inclined hood structure mounted adjacent, and overlying the top of the barrel and secured to a stationary support, said hood struc-

ture having an elongated opening provided therein adjacent the upper edge of said barrel, a mechanical abrasive propelling mechanism mounted upon said hood structure and operable to discharge a stream of abrasive through said elongated opening in said hood and upon the work contained in said barrel, said abrasive propelling mechanism embodying a rotor mounted for rotation about a substantially horizontal axis and which is substantially parallel to a vertical plane containing the axis of said barrel, said abrasive projecting mechanism being operable to project a fan-shaped stream of abrasive into the barrel at an angle of approximately ninety degrees to said vertical plane.

27. In an abrading machine, a housing structure comprising a top wall, a rear wall and a pair of side walls, a generally cylindrical tumbling barrel disposed in said housing structure and mounted for rotation about an axis which is inclined considerably to the horizontal, said axis being inclined toward the front of said housing structure, said barrel having a closed bottom and an open top and adapted to tumble work contained therein when it is rotated, said barrel having a door opening in the cylindrical wall thereof together with a door mounted for movement in the open position, said housing having an inclined front wall disposed approximately normal to the axis of said barrel and covering the open top of the latter, said housing side walls having their front edges relieved so as to dispose them rearwardly of the upper part of the barrel, to provide a large space defining a barrel discharging station and being sufficiently large to allow a container to be placed below the level of the bottom of said barrel for receiving work for gravitating therefrom when said barrel door is opened.

28. In an abrading machine, a generally cylindrical barrel mounted for rotation about an inclined axis and having an open top, means located adjacent the open top of said barrel for projecting abrasive upon work as it catarracts upon itself in said barrel, said barrel having a closed bottom for supporting the work, said bottom having a plurality of apertures therein through which spent abrasive may drain, means located below said bottom for preventing elongated objects from passing through said apertures, an elevator structure disposed below the bottom of said barrel and secured to said barrel for synchronous rotation therewith, said elevator structure providing a plurality of abrasive receiving pockets into which said abrasive may gravitate from said apertures, said pockets being operable to discharge their abrasive when they attain a predetermined position above the axis of said barrel, stationarily supported chute means for conveying abrasive as it is discharged from said pockets to an abrasive cleaning mechanism, a hood structure sealingly associated with the upper edge of said barrel but being spaced therefrom, means for drawing air currents between said hood structure and the upper edge of said barrel for removing dust from said barrel and for preventing leakage of dust into the atmosphere at the top of the barrel, and means for drawing air currents through said chute means.

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