July 17, 1923. 1,462,295

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 4 Sheets-Sheet 1

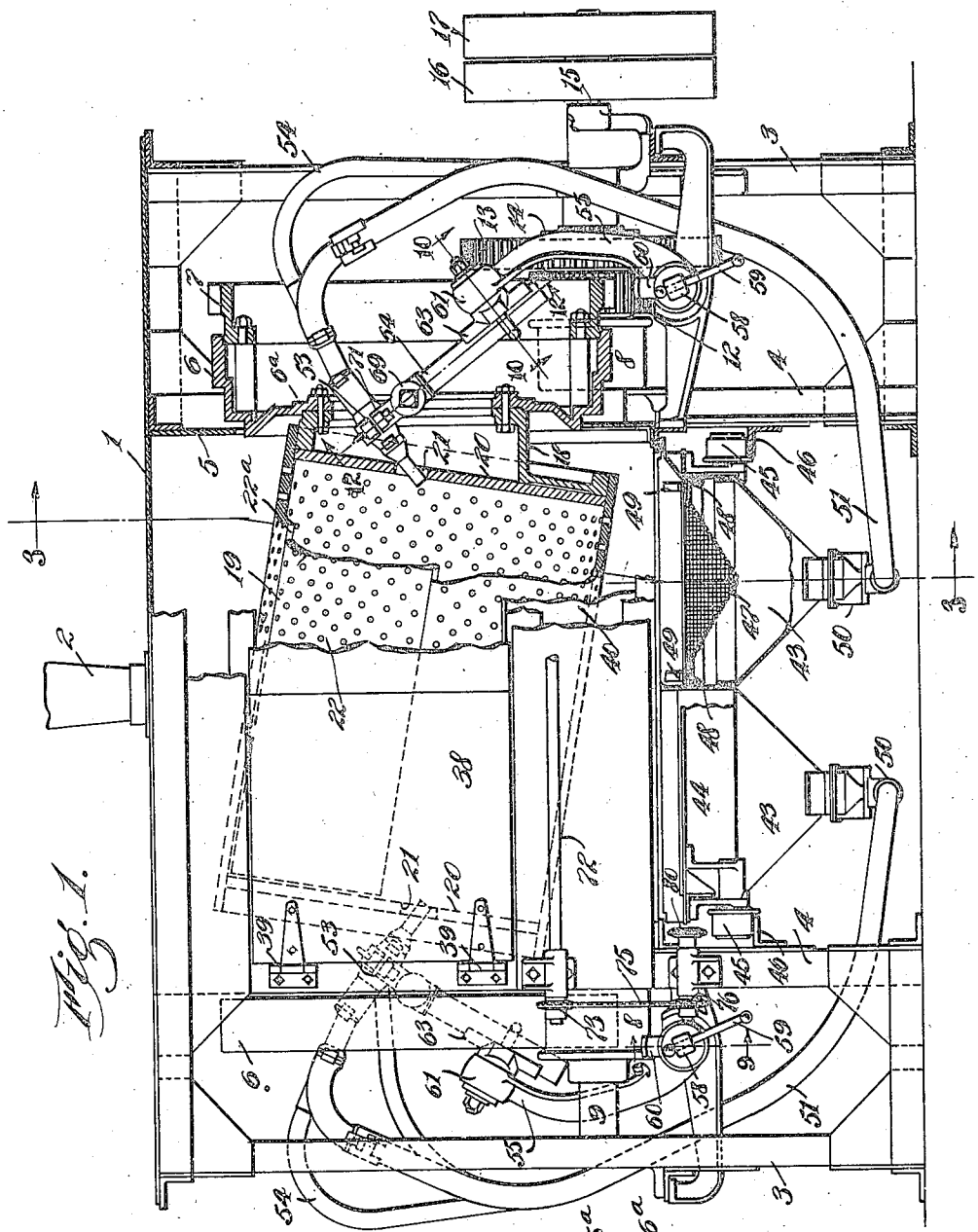


Fig. 1.

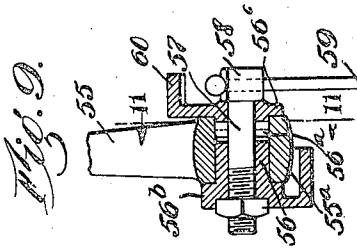


Fig. 9.

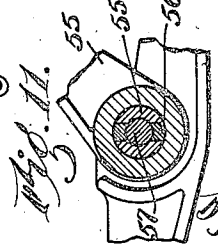


Fig. 11.

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July 17, 1923. 1,462,295

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 4 Sheets-Sheet 2

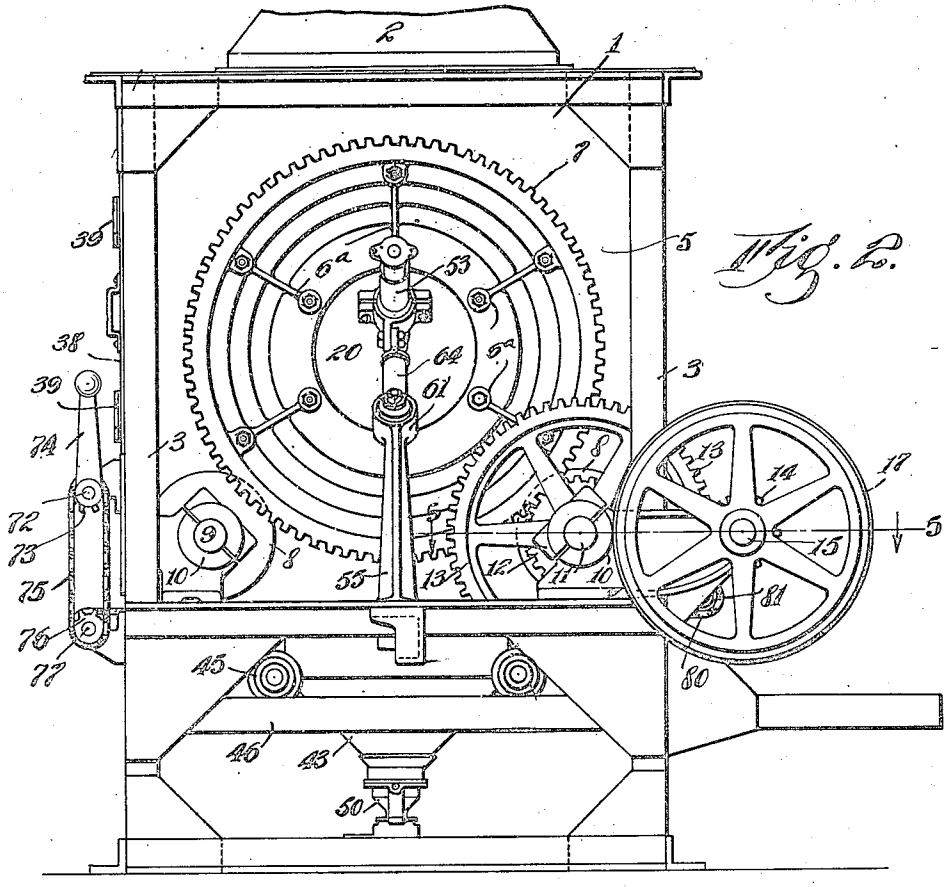


Fig. 2.

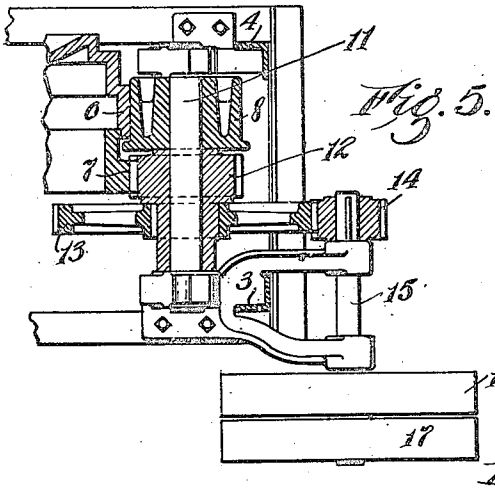


Fig. 5.

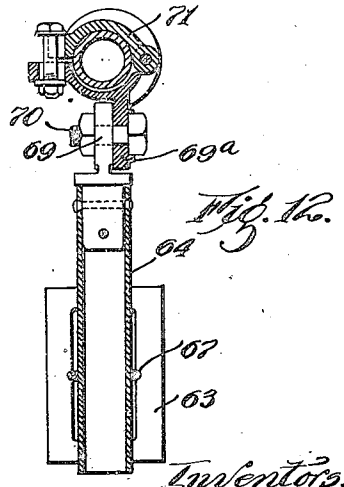


Fig. 12.

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July 17, 1923. 1,462,295

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 4 Sheets-Sheet 3

Fig. 3.

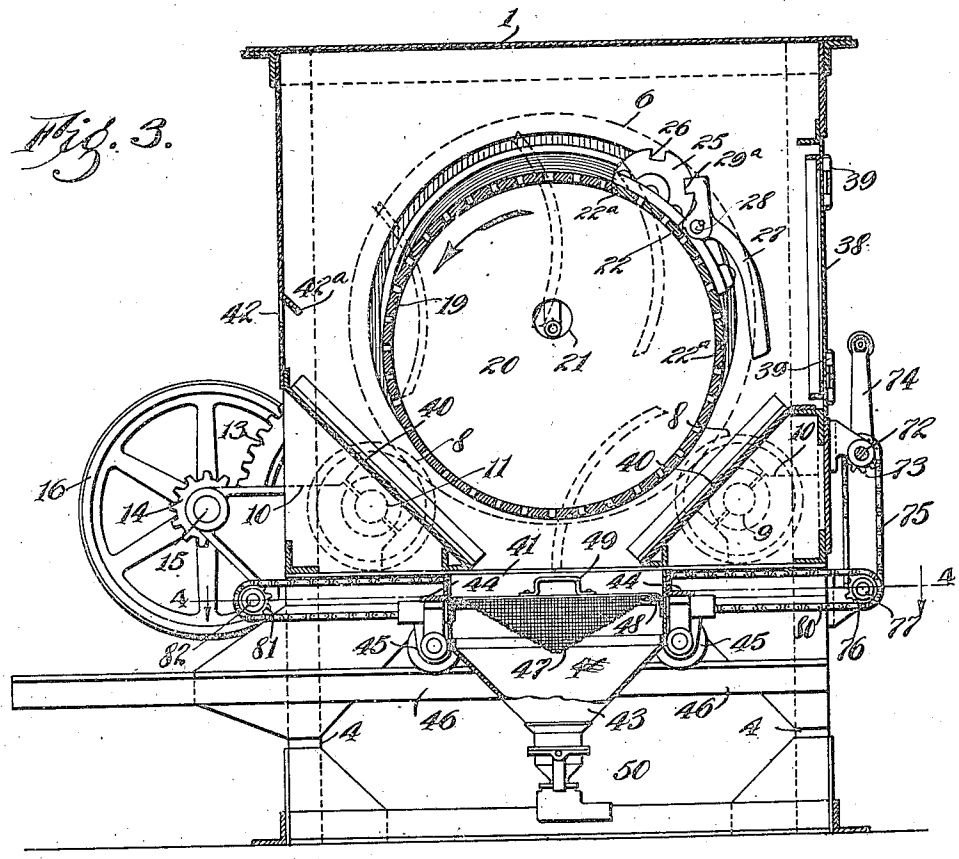


Fig. 4.

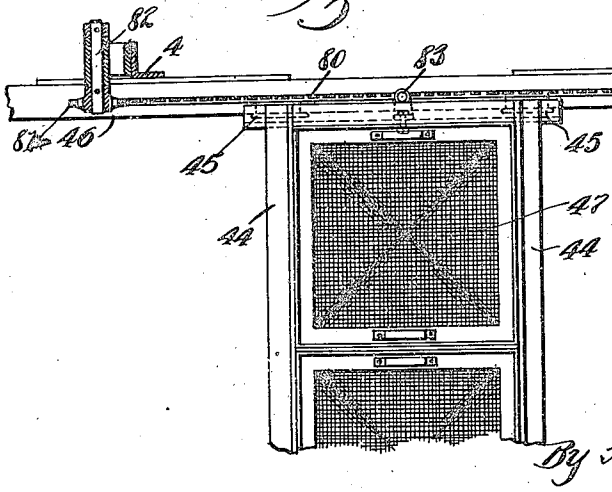
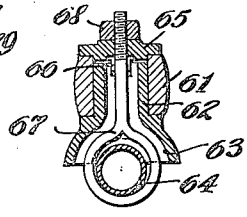


Fig. 10.



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July 17, 1923. 1,462,295

E. J. MOORE ET AL

SAND BLAST APPARATUS

Filed Nov. 14, 1918 4 Sheets-Sheet 4

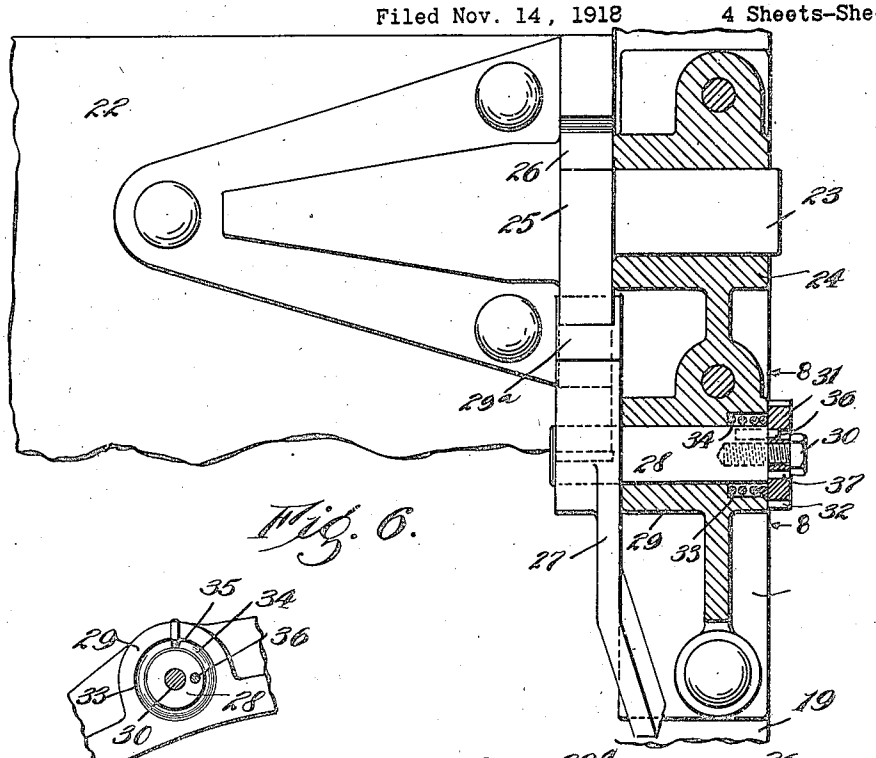


Fig. 6.

Fig. 8.

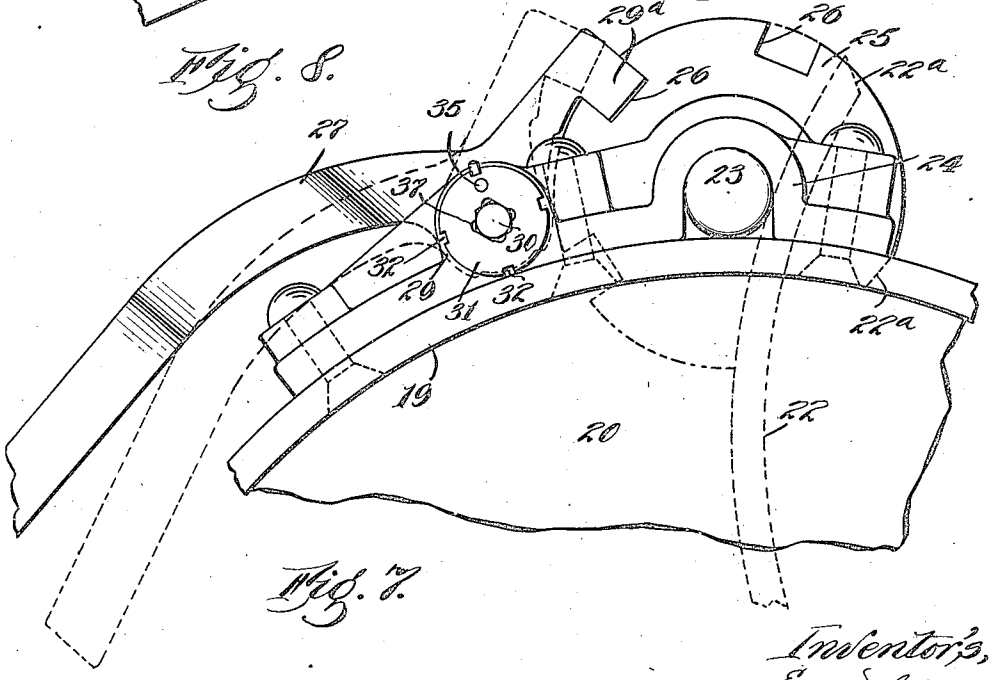


Fig. 7.

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Patented July 17, 1923. 1,462,295

UNITED STATES PATENT OFFICE.

EDWARD J. MOORE AND RAYMOND H. MOORE, OF CLEVELAND, OHIO, ASSIGNORS TO THE W. W. SLY MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SAND-BLAST APPARATUS.

Application filed November 14, 1916. Serial No. 131,507.

To all whom it may concern:

Be it known that we, EDWARD J. MOORE and RAYMOND H. MOORE, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Sand-Blast Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to sand blast apparatus, and more particularly to apparatus of the type wherein sand blast guns are used in conjunction with a rotary tumbling barrel for the purpose of cleaning castings contained therein. The following general objects will be realized by our invention:—providing an apparatus of this character which will enable the castings or other articles in such barrels to be cleaned in a particularly efficient manner; providing in such apparatus means for conveniently adjusting the sand blast guns with reference to the barrel and the work therein; providing an efficient door for the barrels of such apparatus; and providing in such apparatus means whereby the sand may be cleaned of dust, the sediment removed therefrom, and the clean sand be used repeatedly. Further and more limited objects of the invention will appear hereinafter and will be realized in and through the combinations of elements embodied in the claims and illustrated in the drawings, wherein: Fig. 1 represents a view, partly in longitudinal section and partly in side elevation, of an apparatus constructed in accordance with our invention; Fig. 2 an end elevation of such apparatus; Fig. 3 a transverse sectional view corresponding to the line 3—3 of Fig. 1; Fig. 4 a sectional view corresponding to the line 4—4 of Fig. 3; Fig. 5 a similar view corresponding to the line 5—5 of Fig. 2; Fig. 6 an enlarged sectional detail through the fastening and supporting means for the barrel door; Fig. 7 an elevation of the parts shown in Fig. 6; Fig. 8 a sectional detail corresponding to the line 8—8 of Fig. 6; Figs. 9 and 10 sectional views corresponding respectively to the lines 9—9 and 10—10 of Fig. 1; Fig. 11 a sectional view corresponding to the line 11—11 of Fig. 9; and Fig. 12 a sectional view corresponding to the line 12—12 of Fig. 1.

Describing the parts by reference characters, 1 denotes a housing, preferably rectangular in transverse section, and provided at the upper central portion thereof with an exhaust flue 2 leading to a dust arrester (not shown). This housing and the parts associated therewith are supported by a suitable frame work comprising the uprights 3 and 4. The opposite ends of the housing are open for the reception and operation of the sand blast guns and the various parts for operating the mill. The central portion of the housing is substantially closed by means of transverse partitions 5, said partitions having each a central circular opening for the bull rings 6, the bull ring at the right hand end of Fig. 1 having a large gear 7 connected thereto and both of the bull rings being supported on rollers 8. Four such rollers are shown, two within each end of the housing. Three of these rollers are mounted on short shafts 9 shown as mounted in split bearings 10 suitably supported from the brackets 3. The fourth roller (see Figs. 1, 2 and 5) is mounted on a shaft 11 having rotatably mounted thereon a pinion 12 meshing with and driving the gear 7. The hub of the pinion 12 is shown as extended and has keyed thereupon a gear 13 meshing with a pinion 14 on the pulley shaft 15, the last mentioned shaft being provided with the usual fast and loose pulleys 16 and 17.

The bull rings support, through inwardly directed annular flanges 6^a and eccentric rings 18, an inclined cylindrical barrel, indicated generally at 19, said rings being conveniently secured to the heads 20 of said barrel. Each of these heads is provided with an opening 21. The centers of the openings 21 coincide with the axis of rotation of said barrel, which, because of the inclination of the barrel, makes an angle with the longitudinal central axis of the barrel. In Fig. 1 one of these openings is shown as above and the other below the axis of the barrel. The axis about which the bull rings and the barrel rotate is horizontal.

The barrel is provided with a door, indicated generally at 22. This door is rectangular in plan and the sides of the door and its opening extend longitudinally of the barrel substantially the full distance between the heads 20. Each side edge of the door and its opening is beveled, as indicated at 22^a—Figs. 3 and 7. The door is pivoted on an

axis parallel to the edge of the door opening and located near one side of the latter but within such opening. This axis is provided by means of a pair of stud shafts 23 projecting from each end of the door parallel with, adjacent to and equidistant from one of the side edges of the same, said shafts being supported in journals 24 carried by the body of the barrel adjacent each end thereof. Both of these shafts are provided with means for locking the door in open and closed position. This means comprises a locking disk 25 rigid with each of the shafts 23 and having the peripheral notches 26 therein. Cooperating with said disk is a locking pawl 27 keyed to a shaft 28 which is mounted in a journal 29 which may conveniently form an extension of the journal 24. Mounted on the outer end of said disk 28, as by means of a lag screw 30, is a disk 31, said disk being provided with a plurality of peripheral notches 32. The outer end of the interior of the journal 29 is provided with an annular recess 33 in which is mounted a helical spring 34 having one end connected with said journal and its opposite end projecting into an aperture in the disk 31, as indicated at 35. The disk 31 is adjustably connected to the shaft 28 by means of a pin 36 and a plurality of apertures 37 in said disk, adjacent to the lag screw 30. By applying a wrench to the notches 32 after having withdrawn the pin 36, the disk may be rotated in an appropriate direction to adjust the torsion of the spring 34 and thereby insure the efficient operation of the pawl 27 by said spring. By operating the pawl handle, the detent 29^a thereof may be disengaged from the locking notch of the disk 25, permitting the door to swing inward by gravity to the position shown in dotted lines in Fig. 7, when the detent 29^a is pressed into the notch 26 which will hold it in such position. As the barrel continues its rotation, the door will assume the positions shown in dotted lines in Fig. 3, being in position to expose the full width of the door opening by the time the latter reaches the bottom position. At this time, the door forms a shedding surface for discharging the castings, one surface of the door engaging an edge of the opening. Further rotation of the mill brings the door opening in position for loading. After the loading operation, the door may be closed and may be locked in closed position by means of the detent 29^a and the appropriate notch in the disk 25.

In order to permit the loading of the barrel, the part of the housing enclosed by and between the partitions 5 is provided with a pair of doors 38, each hinged adjacent to one of the partitions 5—see 39, Fig. 1. Extending longitudinally of the enclosure provided by the outer wall of the housing and the partitions 5 are the downwardly inclined floor plates 40, which extend from each side wall of the housing to the adjacent side edge of the central longitudinal opening 41 in the bottom of the enclosure. Above the plate which is opposite the door 38—see Fig. 3— is a slot 42 by means of which air may be drawn into the enclosure. Above this slot is a downwardly inclined shelf 42^a, which tends to direct the air entering the slot downwardly and around the barrel, whence it is conducted through the exhaust connection 2, thereby to remove from the sand discharged through the perforations in said barrel any dust that may be present therein. This dust can be collected in any suitable dust arrester with which the exhaust 2 may communicate. The enclosure for the barrel 20 insures the proper delivery of the sand down the inclined floor plates 40 and into the collecting mechanism therefor, which will now be described.

The collecting mechanism comprises a pair of hoppers 43 shown as supported by angle irons 44 carrying rollers 45 mounted on rails 46. Four such rollers are shown, two at each end of the hopper carriage. Above each hopper is a downwardly inclined screen 47, shown as supported within the upper end of each hopper by angle bars 48. Each screen is shown as provided with a pair of handles 49 by which it may be conveniently removed and any scale or sediment collected thereupon may be conveniently removed, the sifted sand dropping into the hoppers and thence into discharge ducts 50, respectively connected with flexible tubing 51 leading to the sand blast guns 53. Two such guns are shown, each adapted to discharge sand through an opening 21 into the barrel. These guns may be of the type shown in the application of Edward J. Moore and Raymond H. Moore, Serial No. 237,226, filed May 29, 1918, and each is shown as provided with an air pressure hose 54. Each gun is mounted in a manner which will secure a convenient and efficient means for adjusting the same relatively to the barrel.

55 denotes an arm, the lower end of which is formed as a hub 55^a pivoted upon a hollow transversely split shaft 56 the two parts whereof are united by means of a bolt 57, one of the shaft sections being provided with projections 56^a adapted to enter corresponding notches in the other section and each section having a flange 56^b, 56^c adapted, by the adjustment of the plate 57, to bear against opposite sides of the hub 55^a. The bolt is shown as provided with a head 58 having an operating handle 59, one of the shaft sections being provided with a stop 60 cooperating with said handle to prevent the latter from being thrust into the teeth of the gear 7. At its upper end, the arm 55 is provided with a hub 61 adapted to receive and form a journal for the upper end

of a sleeve 62 carrying at its lower end a curved bearing plate 63 for the upper surface of a tubular shaft 64. Cooperating with the upper end of the sleeve 62 is a head 65 adapted to bear on top of the hub 61 and provided with a pair of projections 66 adapted to enter corresponding recesses in the top of said sleeve. The head 65 provides a support for an eye-bolt 67 which supports the tubular shaft 64, the upper end of said bolt being threaded through an opening in said head and there provided with a nut 68. Pivoted on the upper end of each tubular shaft 64 and secured thereto by means of clamping lugs 69, 69a and a bolt 70 (see Fig. 12) is a two-part clamp 71 in which the body of the sand blast gun is mounted.

By the construction of the parts supporting the sand blast guns, it will be evident that they may each be swung in a vertical plane by the arm 55, that the effective lengths of the supporting arms for the guns may be varied through the tubular shaft 64 and the connections 61—68; that the guns may be rotated about the axis of the tubular shafts 64; and that they may be adjusted about the bolts 70 as pivots. By these various adjustments, each of the guns may be withdrawn from operative relation to and inserted within its opening 21 and may be positioned with reference to the barrel in such manner as to insure the most efficient operation upon the contents thereof.

The carriage supporting the hoppers 43 and the parts associated with the hoppers may be moved along the rails 46 by means of a shaft 72 having sprockets 73 on opposite ends thereof and provided at one end with an operating handle lever 74. Chains 75 connect the sprockets 73 with sprockets 76 on short shafts 77. Each shaft 77 is provided with a sprocket 79 thereon, there being a chain 80 extending around said sprocket and a sprocket 81 on a shaft 82. One branch of the chain is connected with one end of the hopper carriage, as shown at 83—see Fig. 4. It will be understood that the parts 76—83 will be duplicated at the opposite end of the hopper carriage; wherefore, by operating the handle lever 74, the hopper carriage may be moved into and out of register with the central longitudinal opening 41 in the bottom of the enclosure.

In operation, the doors 38 will be opened and the castings loaded into the barrel through the door 22. The guns will be placed in proper relation to the openings 21 in the barrel head and the barrel rotated through the pulley 16 and the parts connected therewith. A light suction being maintained in the exhaust 2, air drawn through the slot 42 will remove dust from the sand falling through the openings in the barrel. The sand will be discharged through the floor opening 41 into the hoppers, the screens 47 removing scale and other sediment. From the hoppers the sand is conducted to the guns and re-discharged into the barrel. When the cleaning operation has been completed, the handle lever 74 is operated to withdraw the hoppers from beneath the central opening 41. A truck may be brought beneath such opening, the barrel door 22 opened and, by rotation of the barrel, the castings will be discharged through the door opening and the opening 41.

It has been found that, by inclining the barrel 19 and directing the blast through the guns in the manner shown, a rapid and efficient cleaning of the castings is accomplished and with a minimum consumption of sand.

The arrangement of the hopper carriage with reference to the opening 41 is such that the hoppers and the carriage form in effect a bottom closure for the room or enclosure in which the barrel is rotating whereby air may be drawn through the slot 42 in such manner as to remove the dust from the sand discharged through the perforations in the barrel.

Having thus described our invention what we claim is:—

1. In an apparatus of the character described, the combination of a perforated rotatable barrel and means for rotating the same, an enclosure for said barrel having a discharge opening in the bottom thereof, a hopper carriage movably supported beneath said opening, a pair of hoppers on said carriage, a sand blast gun connected with each hopper and adapted to conduct sand therefrom to and discharge the same into opposite ends of the barrel, and means for removing dust from the sand discharged through the barrel.

2. In an apparatus of the character described, the combination of a perforated rotatable barrel and means for rotating the same, an enclosure for said barrel having an opening in the bottom thereof, a carriage movably supported beneath the opening in said enclosure, a pair of hoppers supported by said carriage, a screen above each hopper, a sand blast gun arranged to discharge into each end of said barrel, connections for supplying sand from said hoppers respectively to said guns, an exhaust connection leading from the upper portion of said enclosure, and downwardly inclined walls extending from the sides of said enclosure to the bottom opening thereof.

3. In an apparatus of the character described, the combination of an enclosure having an outlet in the bottom thereof a perforated rotatable barrel in said enclosure, a hopper, a carriage on which said hopper is supported, rails beneath said enclosure on which said carriage is movably mounted,

means for moving said carriage, a sand blast gun adapted to discharge into the barrel, and connections for supplying sand from said hopper to said gun.

4. In an apparatus of the character described, the combination of a rotatable perforated barrel, an arm pivoted adjacent each end or head of said barrel, a rotatable and longitudinally movable extension of said arm adjustably connected thereto, a sand blast gun carried by each such extension, means for collecting sand discharged through the perforations in said barrel, and connections for supplying sand from such collecting means to said guns.

5. In an apparatus of the character described, the combination of a rotatable perforated barrel, an arm pivoted adjacent to each end of said barrel, an extension for each of said arms longitudinally and rotatably connected thereto, a clamp rotatably connected with each such extension, a sand blast gun supported by each clamp, means for collecting the sand discharged from the perforations in said barrel, and connections for supplying sand from such collecting means to each of said guns.

6. The combination, with a barrel of an arm pivoted adjacent to said barrel, an extension of said arm rotatably and longitudinally adjustable with respect thereto, a clamp pivotally connected to such extension, a sand blast gun supported by said clamp, and connections for supplying sand to said gun.

7. A cylindrical rotary barrel having an opening therein, the side edges whereof extend substantially parallel to the length of said barrel, pivotal supports located intermediate of and adjacent to one of such edges of the opening, a door mounted on said supports, and means for locking said door in closed position, the door being adapted by virtue of its pivotal mounting when unlocked, to open by gravity and to swing to a position to bring one side thereof adjacent to an edge of the barrel opening to form a shedding discharge with said opening.

8. An inclined cylindrical rotary barrel having an opening therein, the side edges whereof extend substantially parallel to the length of said barrel, a pivotal support beyond each end of said opening, each of said pivotal supports being located intermediate said side edges of the opening and spaced from but located adjacent to one of said side edges, a door mounted on said supports, and adapted to drop by gravity toward and with an edge in substantial contact with the interior cylindrical wall of the barrel and form a shedding surface for material within the barrel during rotation of said barrel, and means for locking said door in closed position.

In testimony whereof, we hereunto affix our signatures.

EDWARD J. MOORE.
RAYMOND H. MOORE.