April 23, 1929. C. E. BILLINGS 1,710,604

SAND BLAST APPARATUS

Filed March 26, 1923 3 Sheets-Sheet 1

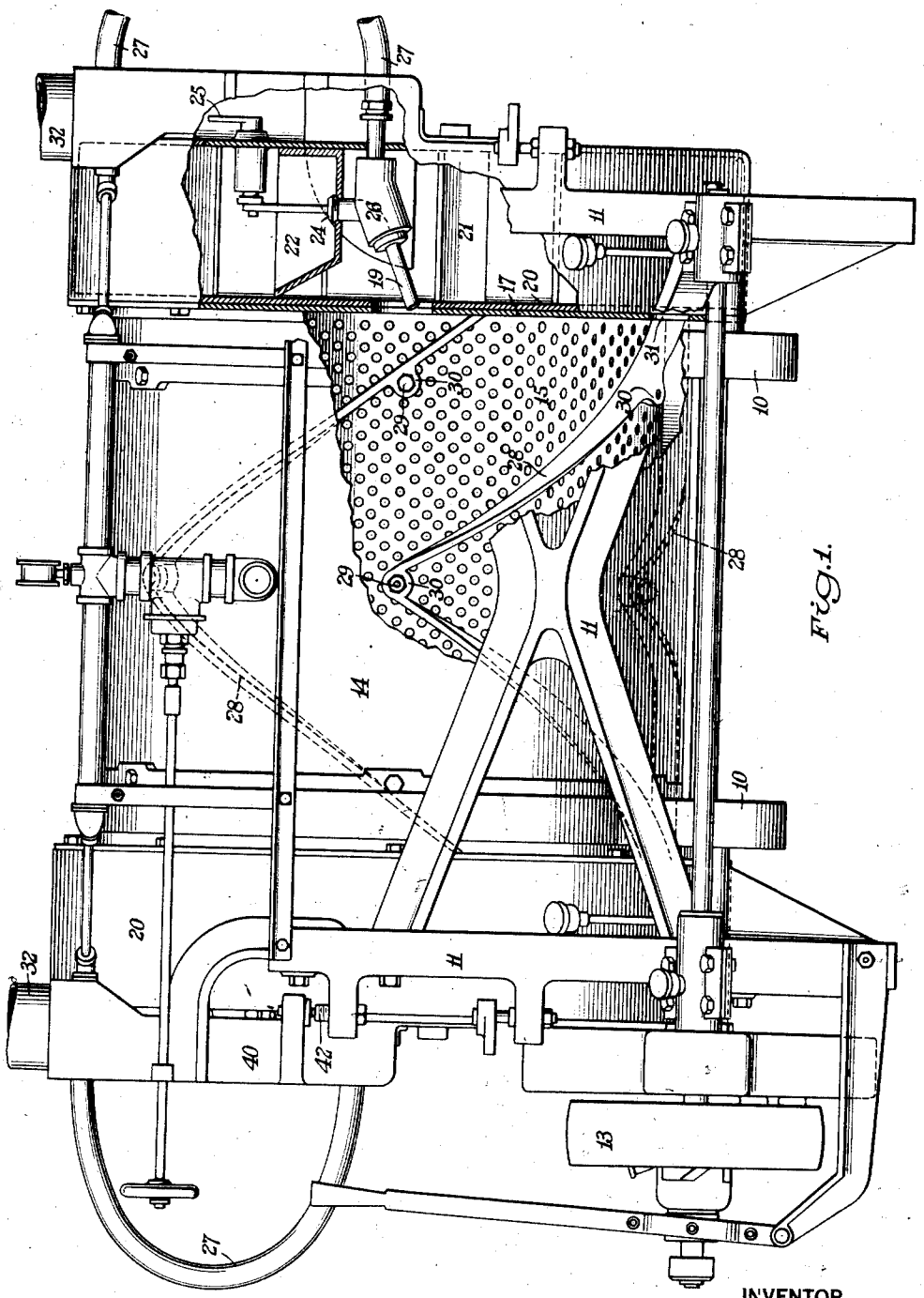


Fig. 1.

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SAND BLAST APPARATUS

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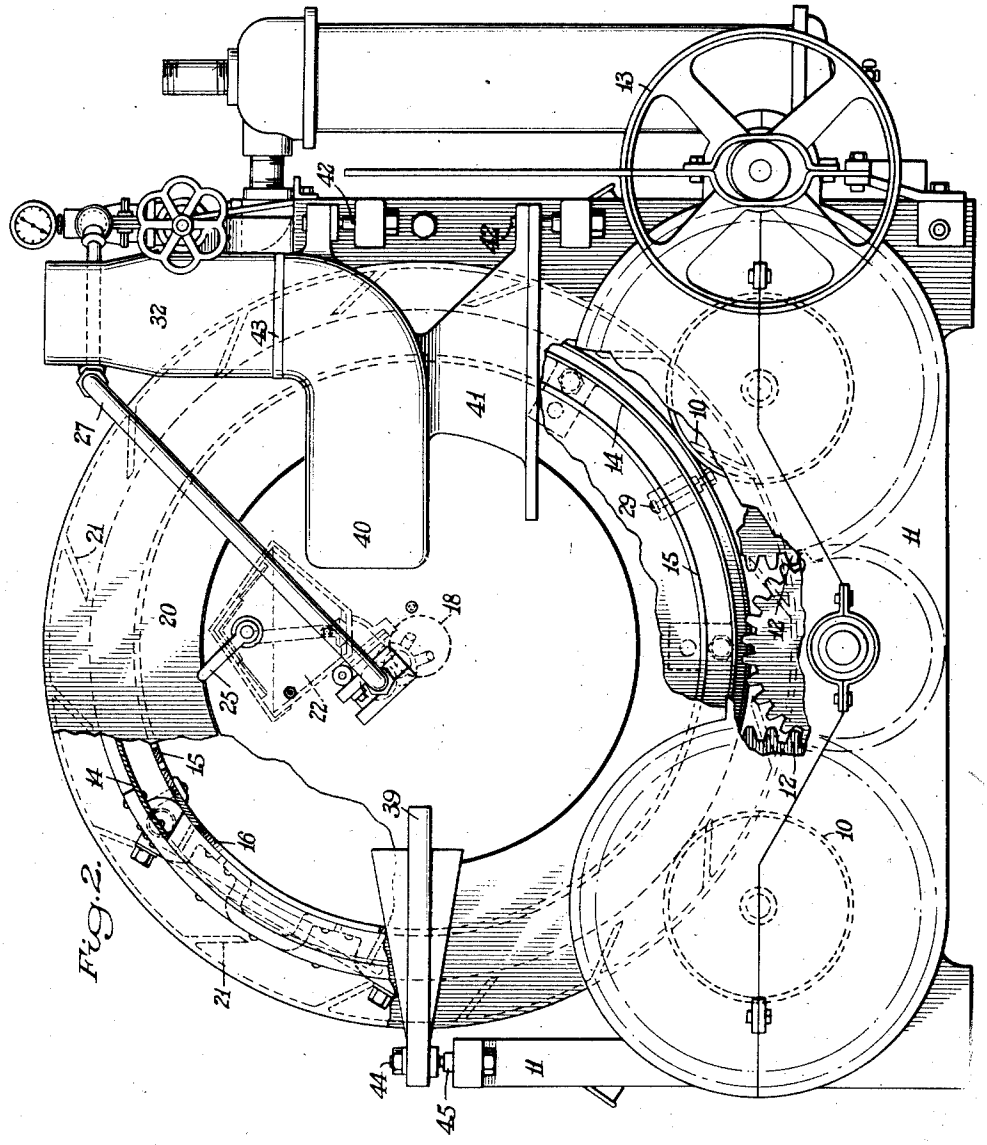


Fig. 2.

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SAND BLAST APPARATU.

Filed March 26, 1923 3 Sheets-Sheet 3

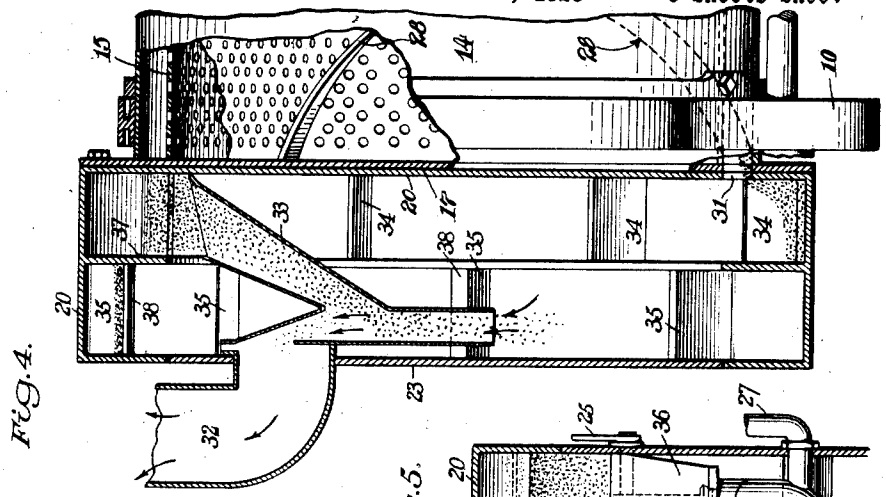


Fig. 4.

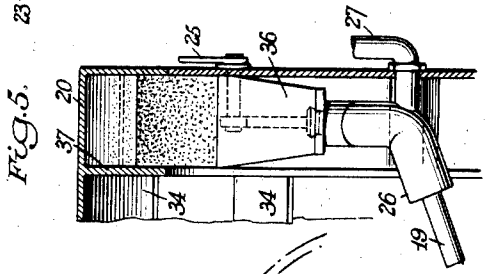


Fig. 5.

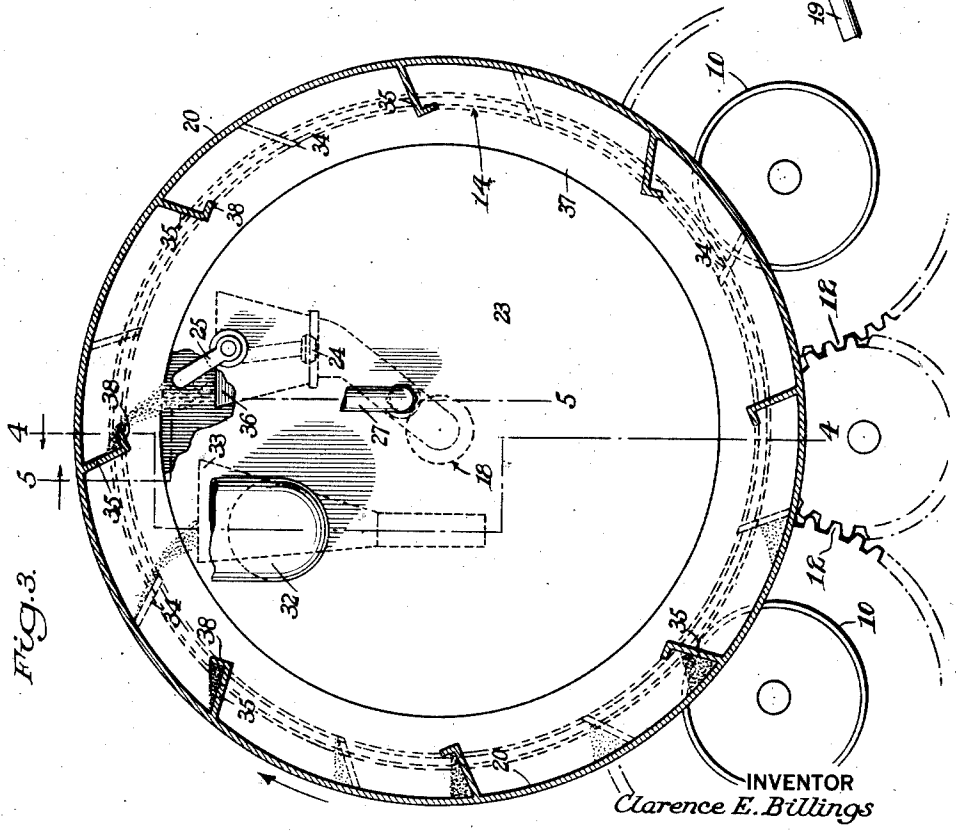


Fig. 3.

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UNITED STATES PATENT OFFICE.

CLARENCE E. BILLINGS, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE NEW HAVEN SAND BLAST COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

SAND-BLAST APPARATUS.

Application filed March 26, 1923. Serial No. 627,693.

My invention relates to sand blast apparatus and particularly to a sand blast tumbling barrel, the object of my invention being to provide an improved device of the general character shown in the Dreisbach Patent No. 948,270, but adapted to hold castings of larger size and to operate upon the same from nozzles arranged at the ends of the barrel instead of inside the tumbling chamber. A further object of my invention is to clean the sand by means of a counter-blast device arranged to cooperate with the automatic sand recovery scoops in the ends of the barrel.

A sand blast machine of the same general type to which the present invention relates is described and claimed in the copending joint application of George C. Fatscher and the present applicant filed concurrently herewith and serially numbered 627,680. Some of the features claimed in this copending application are disclosed in one form in the present case.

In the accompanying drawings—

Fig. 1 is a broken front elevation of a tumbling barrel in which my invention is illustratively embodied in one form;

Fig. 2 is a broken end elevation of the same;

Fig. 3 is a diagrammatic vertical section of a drum end in which my dust-separating mechanism is arranged;

Fig. 4 is a section on the line 4—4, Fig. 3; and

Fig. 5 is a partial section on the line 5—5, Fig. 3.

The barrel in the form here shown is supported on rollers 10 mounted in the frame 11 and driven in unison by any suitable mechanism, such as a train of gears 12 operated from the belt wheel 13. The barrel comprises an outer shell 14 and within the same and spaced therefrom a perforated cylindrical screen 15 into which the castings are introduced through a door 16. The opposite ends 17 of the drum are solid and rotate therewith, being provided however with axial openings 18 through which the blast nozzles 19 project the blast sand, grit or the like. Heads 20 of greater diameter than the body of the barrel rotate therewith and are provided on their inner faces with scoops 21 for the automatic recovery of the sand in a manner similar to that described in the Dreisbach patent above referred to. These scoops lift the sand during the rotation of the barrel and deliver to a hopper 22 carried by the stationary head 23 at each end of the barrel. A valve 24, controlled exteriorly by the valve handle 25 permits the escape of the sand from the hopper 22 into the mixing chamber 26 of the blast nozzle 19. The air or steam under pressure is conducted to the mixing chamber through a flexible pipe 27.

In order to deflect the sand from the body of the tumbling barrel to the recovery heads, at each end thereof, I arrange a series of guide plates or ribs 28 between the perforated screen 15 and the shell 14 so that the sand falling through the former is deflected by the ribs 28, as the barrel rotates, to the heads 20 at the opposite ends of the barrel. These ribs 28 may be secured in position by any suitable means, such as bolts 29 passing through flanges 30 on the ribs and through both the shell 14 and the screen 15. An aperture 31 in the plate 17 adjacent the end of each rib 28, permits the discharge of the sand as it slides down the latter into the head 20. I have shown a head at each end of the barrel in the present construction, but obviously it would be possible to carry the ribs across the length of the barrel and deflect the sand to one end alone.

In the construction shown in Figs. 1 and 2, I have shown no means for separating the dust from the sand save the ordinary draw-off dust pipe 32 which opens into the plate 23 at each end of the apparatus. The sand may be automatically cleaned of dust however by the counter-blast arrangement shown in Figs. 3, 4 and 5. In this modification I have arranged a supplemental hopper funnel 33 through which the sand lifted by the scoops 34 is discharged again within the area of the head 20. The sand travelling down this hopper funnel 33 is counter-blasted by the exhaust passing up to the dust pipe 32 with which the lower leg of the funnel 33 communicates. The sand is then lifted by the scoops 35 and discharged to the hopper 36 from which it is led to the blast nozzle 19 in the usual manner. To secure

these results the head 20 is divided by a peripheral partition 37 of sufficient width to prevent the sand, discharged into the head from the ribs 28, from passing to the opposite side of the partition. The scoops 34 are of such angle that as the barrel rotates the sand lifted thereby discharges to the funnel hopper 33, the latter being on the opposite side of the vertical axis of the barrel from the hopper 36. The clean sand discharged through the lower leg of the hopper 33 drops on the opposite or outer side of the partition 37 and is there lifted automatically by the scoops 35. The latter are so shaped that they carry their load to a point above the hopper 36 before they discharge. A convenient construction of the scoops to this end is shown in Fig. 3, in which the scoops 35 are provided with a supporting ledge 38 at their inner ends.

As a matter of convenience, the stationary plate 23 for each of the heads 20 may be swung upon supporting bracket 41 pivoted at 42 to one of the uprights of the frame 11. A section 40 of the exhaust pipe 32 is rigid with the plate 23 and swings open with the latter, making a lap joint 43 with the main exhaust pipe when the end closure is shut. A latching bar 39 is carried by the plate and is provided with a locking bolt 44 which is screwed down in a socket 45 carried by a frame element at the front of the machine, when the end plate 23 is closed.

The operation of the barrel is readily understood. After the barrel has been brought to a position in which the charging door 16 is readily accessible, the door is removed by loosening its bolts and the castings to be cleaned are introduced within the screen barrel 15. The door is then closed and fastened and the apparatus set in motion. As the blast sand or grit passes through the screen 15 and falls upon the shell 14, it is delivered by the ribs 28 to the lower portions of the head 20 at each end of the barrel. In the construction shown in Fig. 1 the scoops 21 lift the sand automatically and drop it into the hopper 22 from which it discharges to the blast nozzle 19 in such quantity as may be determined by the extent to which the valve 24 is opened by the handle 25.

In the modified construction of Figs. 3 to 5 inclusive the sand is first lifted by the scoops 34 and discharged to the funnel hopper 33 through the lower leg of which passes the counter-blast exhaust into the dust pipe 32. The clean sand drops to the scoops 35 and is lifted by them to the hopper 36 whence it discharges to the nozzles 19 in a manner similar to that just described for the construction shown in Figs. 1 and 2.

Should it be necessary to obtain access to the nozzle or other mechanism within the head 20, it is possible to do so by loosening the locking bolt 44 and swinging open the end plate 23. The extent to which the latter may be opened is of course limited by the length of the flexible blast connection 27.

Various modifications of construction which embody my invention will readily suggest themselves to those skilled in the art, without departing from what I claim as my invention.

I claim—

1. A sand blast machine comprising a rotary drum, an inner screen spaced therefrom and rotating therewith and having an end plate centrally apertured for the admission of a blast to the interior of the screen, a rotary head at the end of the drum, means arranged between the screen and drum to deflect to the rotary head the sand passing through the screen, and means carried by said rotary head to lift the sand for return to the blast devices.

2. A sand blast machine comprising a rotary tumbling barrel having an outer shell and an inner screen spaced therefrom, spiral sand deflecting ribs fixed with relation to and arranged between said screen and shell for leading the blast sand to the end of the drum, blast mechanism exterior to the tumbling body of the drum and means at the end of the drum for lifting the deflected sand and delivering it to the blast mechanism.

3. A sand blast machine comprising a rotary tumbling barrel having an outer shell and an inner screen spaced therefrom, a blast nozzle arranged at the end and outside of the screen and directing its blast inwardly and downwardly into the screen, and means affixed to and rotating with the barrel to automatically gather and return to the blast mechanism the sand discharged into the screen.

4. A sand blast mechanism comprising a rotary sand blast barrel having a shell, and spaced within the same a screen container for castings or the like, a rotary head at the end of the barrel, scoops on the interior of said head, deflecting means arranged between the screen and shell for deflecting to the scoops in said head the sand passing through the rotary screen, and a blast device to which said scoops deliver the sand lifted thereby.

5. A sand blast mechanism comprising a rotary sand blast barrel having a shell, and spaced within the same a screen container for castings or the like, a rotary head at the end of the barrel, scoops on the interior of said head, deflecting means arranged between the screen and shell for deflecting to the scoops in said head the sand passing through the rotary screen, and a blast device to which said scoops deliver the sand lifted thereby, together with a stationary end plate for supporting a blast nozzle.

6. In a sand blast apparatus, a rotary tumbling barrel, a rotary head at the end thereof, a blast nozzle discharging through

said head into the barrel, means for leading to said head the blast sand discharged into the barrel, and scoops mounted on the inner periphery of said head for lifting and returning the sand to the blast mechanism.

7. In a sand blast apparatus, a tumbling barrel having a rotary shell and a screen within the same, a blast nozzle at the end of the screen, and means affixed to and rotating with the shell for deflecting the sand passing through the screen, to the end at which the blast nozzle is arranged.

8. In a sand blast apparatus, a tumbling barrel having a rotary shell and a screen within the same, blast nozzles at the opposite ends of the screen, and means affixed to and rotating with the shell for deflecting the sand passing through the screen, to the opposite ends thereof at which the blast nozzles are arranged.

9. In a sand blast apparatus, a rotary tumbling barrel having a head rotating therewith, means carried by said head for lifting the sand delivered thereto, a sand hopper to which the lifted sand is eventually discharged, and a counter-blast device for freeing the sand of entrained dust before it reaches the hopper.

10. In a sand blast apparatus, a tumbling barrel having a rotary head, a sand blast nozzle arranged within said head, means carried by said head for lifting and discharging sand delivered thereto, together with means within the head for freeing the sand of entrained dust between its delivery to said head and its discharge by the latter.

11. In a sand blast apparatus, a tumbling barrel having a rotary head, an exhaust from the latter having a passage within said head, means for leading the blast sand from the body of the barrel to said head, and means within said head for lifting the sand and discharging the same through said exhaust passage counter to the draft therethrough to remove its entrained dust.

12. In a sand blast apparatus, a tumbling barrel having a rotary head, an exhaust from the latter having a passage within said head, means for leading the blast sand from the body of the barrel to said head, and means within said head for lifting the sand and discharging the same through said exhaust passage counter to the draft therethrough to remove its entrained dust, and a hopper to which the cleaned sand is delivered by said head.

13. In a sand blast apparatus, a tumbling barrel having a rotary head, a plurality of series of scoops mounted on the inner periphery and adapted to lift sand delivered thereto, the scoops of one series being adapted to carry the sand beyond the peripheral point at which the other series discharges.

14. In a sand blast apparatus, a tumbling barrel having a rotary head, a plurality of series of scoops mounted on its inner periphery and adapted to lift sand delivered thereto, the scoops of one series being adapted to carry the sand beyond the peripheral point at which the other series discharges, in combination with means within the head to receive the sand from each series of scoops.

15. In sand blast apparatus, a tumbling barrel having a rotary sand recovery head, comprising a plurality of series of lifting scoops, a counter-blast funnel hopper into which one series of scoops discharges and a hopper to which the other series discharges.

16. In sand blast apparatus, a tumbling barrel having a rotary sand recovery head, comprising a plurality of series of lifting scoops, a counter-blast funnel hopper into which one series of scoops discharges and a feed hopper into which the other series discharges, the sand passing through the counter-blast funnel hopper being delivered to the scoops which deliver to the feed hopper.

17. In sand blast apparatus, a tumbling barrel having a rotary sand recovery head, comprising a plurality of series of lifting scoops, a counter-blast funnel hopper into which one series of scoops discharges, and a feed hopper into which the other series discharges, together with a means for delivering sand from the feed hopper to a blast nozzle.

18. In sand blast apparatus, a tumbling barrel having a rotary sand recovery head, comprising a plurality of series of lifting scoops, a counter-blast funnel hopper into which one series of scoops discharges and a feed hopper into which the other series discharges, said hoppers being independent of each other.

19. A sand blast machine comprising a rotary tumbling barrel having an outer shell and an inner screen spaced therefrom, said shell and screen being rigid with relation to each other and rotating together, a blast mechanism arranged outside the screen but adapted to play upon objects carried by the screen, in combination with a plurality of spaced spiral ribs arranged between shell and screen and rotating therewith for leading the blast sand by gravity to the end of the drum, and means at the end of the drum for returning the deflected sand to the blast mechanism.

20. Sand blast apparatus, comprising a tumbling barrel, a sand blast mechanism for playing upon articles within the barrel, an exhaust at one end of the barrel, means for returning the used sand to the exhaust end of the barrel, and means for lifting and cascading the sand counter to the current of exhaust air to remove entrained dust, together with means for lifting and returning the cleaned sand to the blast mechanism.

21. A sand blast machine, comprising a rotary drum, mechanism for directing a sand blast from the end of the drum upon contained articles within the latter, means rotat-

ing with the drum for deflecting the spent sand to one end of the drum, and means arranged on and rotating with said end of the drum for lifting the deflected sand, and for delivering the same for re-use.

22. A sand blast machine, comprising a rotary drum, mechanism for directing a sand blast from the end of the drum upon contained articles within the latter, means rotating with the drum for deflecting the spent sand to one end of the drum, and means arranged on and rotating with said end of the drum for lifting the deflected sand, and for delivering the same for re-use, together with means for cleaning said sand before its delivery for re-use.

23. A sand blast machine comprising a hollow rotary member, sand blasting means for sand blasting articles in said rotary member, an outer shell or casing receiving sand from said hollow rotary member; means carried by said rotary member for lifting the sand after use in said rotary member to redeliver it to the sand blasting means said lifting means being on the sides of said rotary member and devices between the rotary member and the outer shell or casing for shifting the sand laterally to direct it into said lifting devices.

24. A sand blast machine comprising a hollow rotary member, sand blasting means for sand blasting articles in said rotary member, an outer shell or casing surrounding the hollow rotary member; means carried by said rotary member for lifting the sand for use in the rotary member to redeliver it to the sand blasting means, said lifting means being on the sides of said rotary member and devices for shifting the sand laterally to direct it into said lifting devices, said sand shifting means comprising vanes carried by the periphery of the rotary member and arranged at an inclination.

25. In a sand blast apparatus, a rotary member having a sand collecting chamber, sand blast devices at the ends of said member sand carrying compartments externally of the rotary member carried thereby and in communication with said collecting chamber, stationary sand containers to receive sand from said compartments, and deflectors in said collecting chamber for discharging sand therefrom into said sand carrying compartments when the rotary member is rotated.

26. The combination of a hollow rotary member for use in sand treating articles, said member being provided with apertures through which used sand may pass, a shell or casing outside of said rotary member, said shell or casing being arranged to receive sand through the apertures of said rotary member and having a substantially imperforate construction so as to hold and retain all of the sand received, sand shifting means located in the chamber formed by the shell or casing and arranged to shift sand laterally and sand elevating means rotating with said rotary member and casing and adapted to receive sand from said chamber and elevate and return it for re-use.

In testimony whereof I have signed my name to this specification.

CLARENCE E. BILLINGS.