Oct. 26, 1954 E. E. LAWRENCE 2,692,458

APPARATUS FOR CLEANING AND DESCALING TUBULAR ARTICLES BY ABRASIVE BLASTING

Filed Dec. 12, 1951 3 Sheets-Sheet 1

FIG. 1.

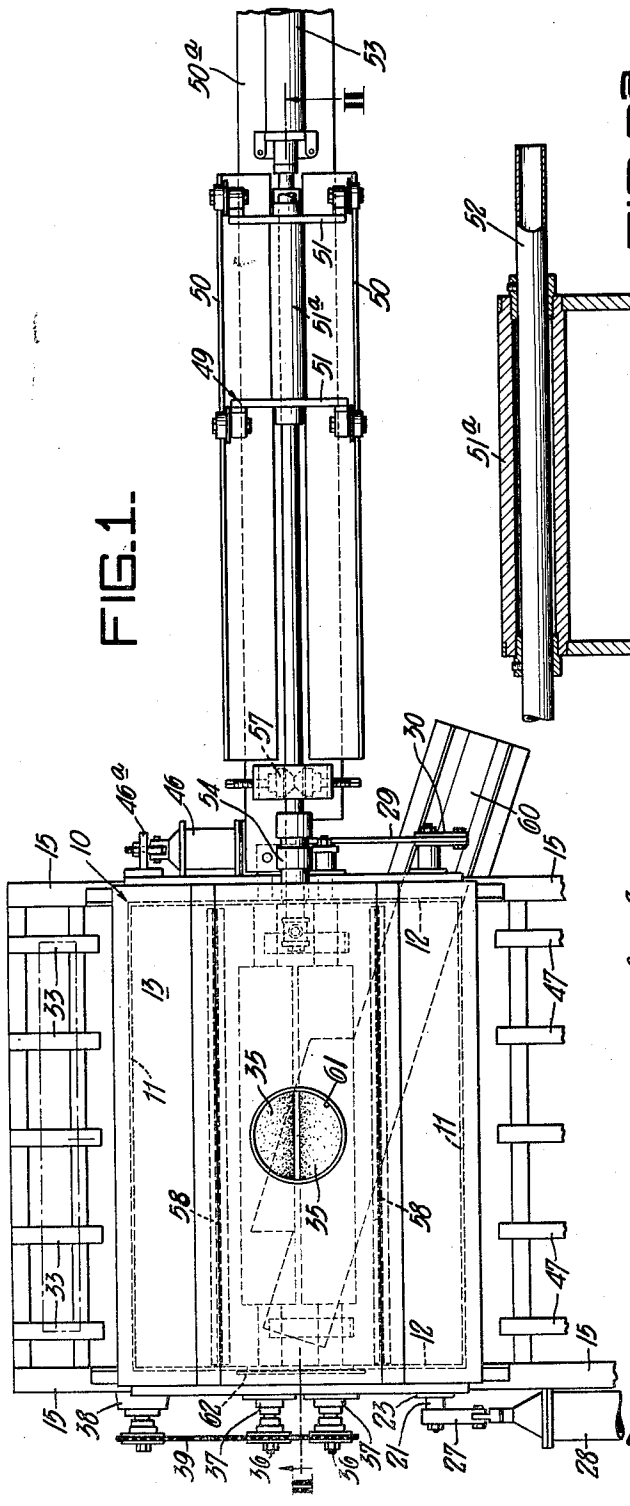


FIG. 2a.

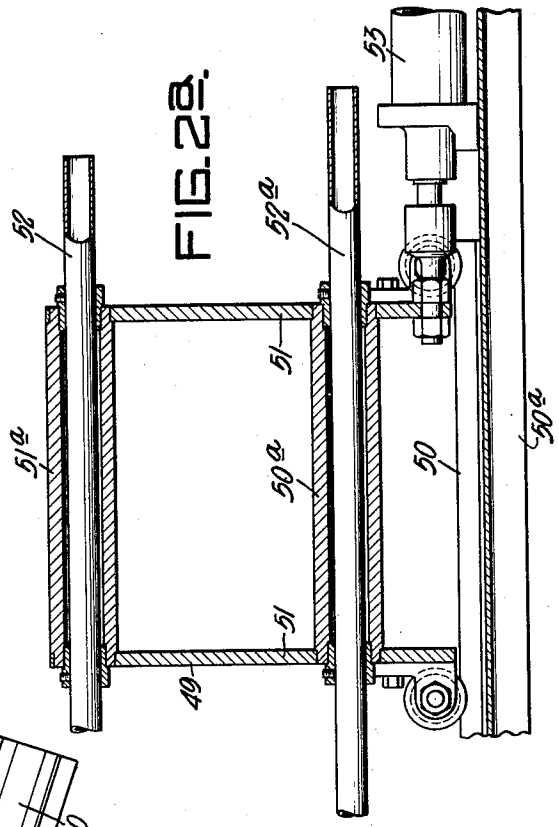
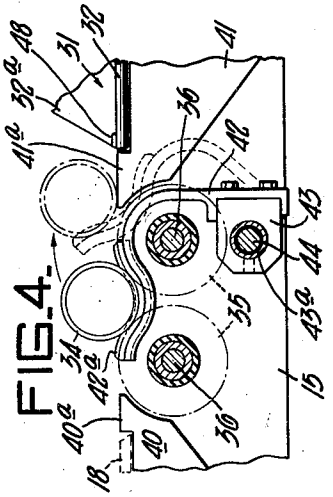


FIG. 4.



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APPARATUS FOR CLEANING AND DESCALING TUBULAR ARTICLES BY ABRASIVE BLASTING

Filed Dec. 12, 1951 3 Sheets-Sheet 2

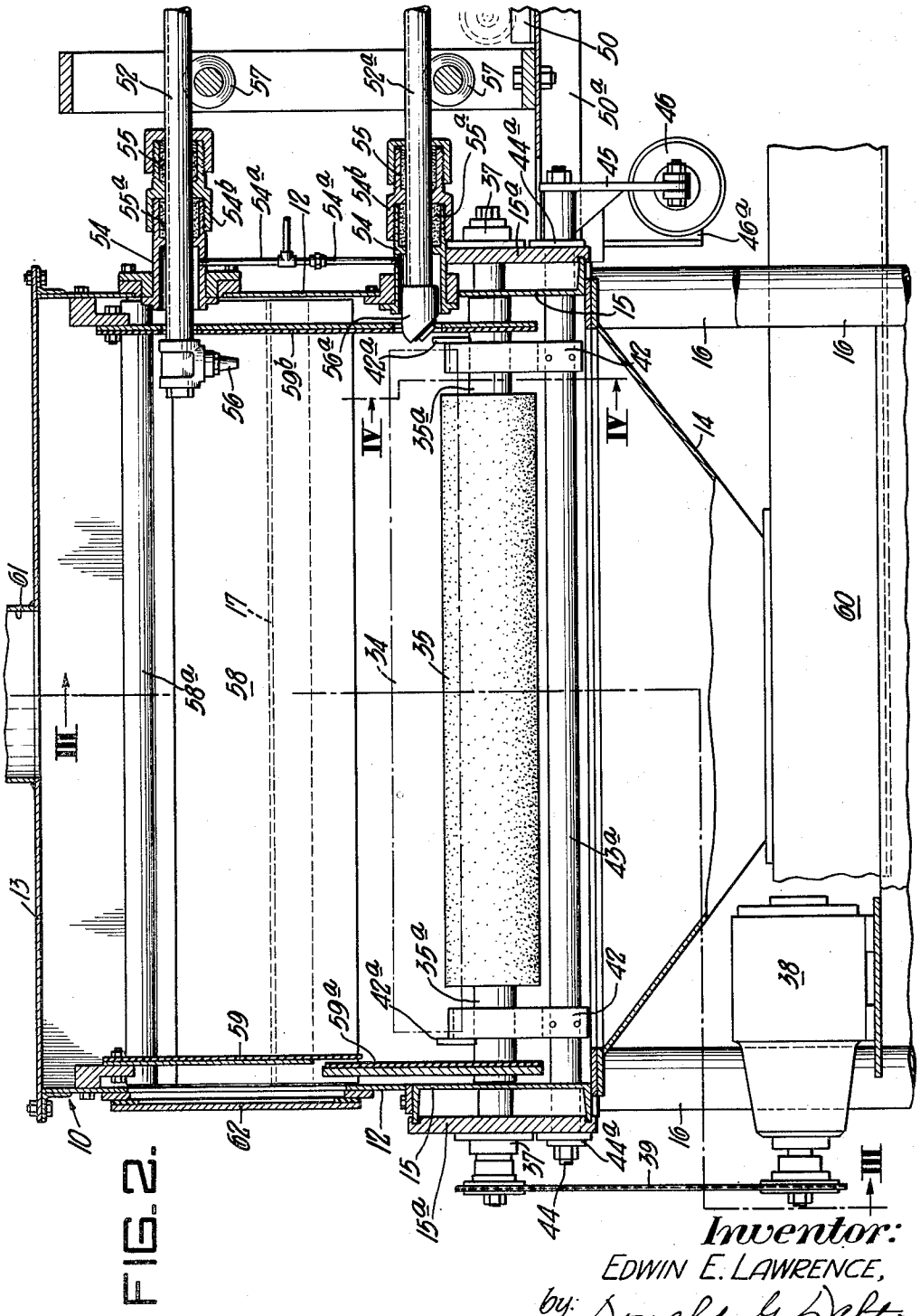

FIG. 2.

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APPARATUS FOR CLEANING AND DESCALING TUBULAR ARTICLES BY ABRASIVE BLASTING

Filed Dec. 12, 1951 3 Sheets-Sheet 3

FIG. 3a.

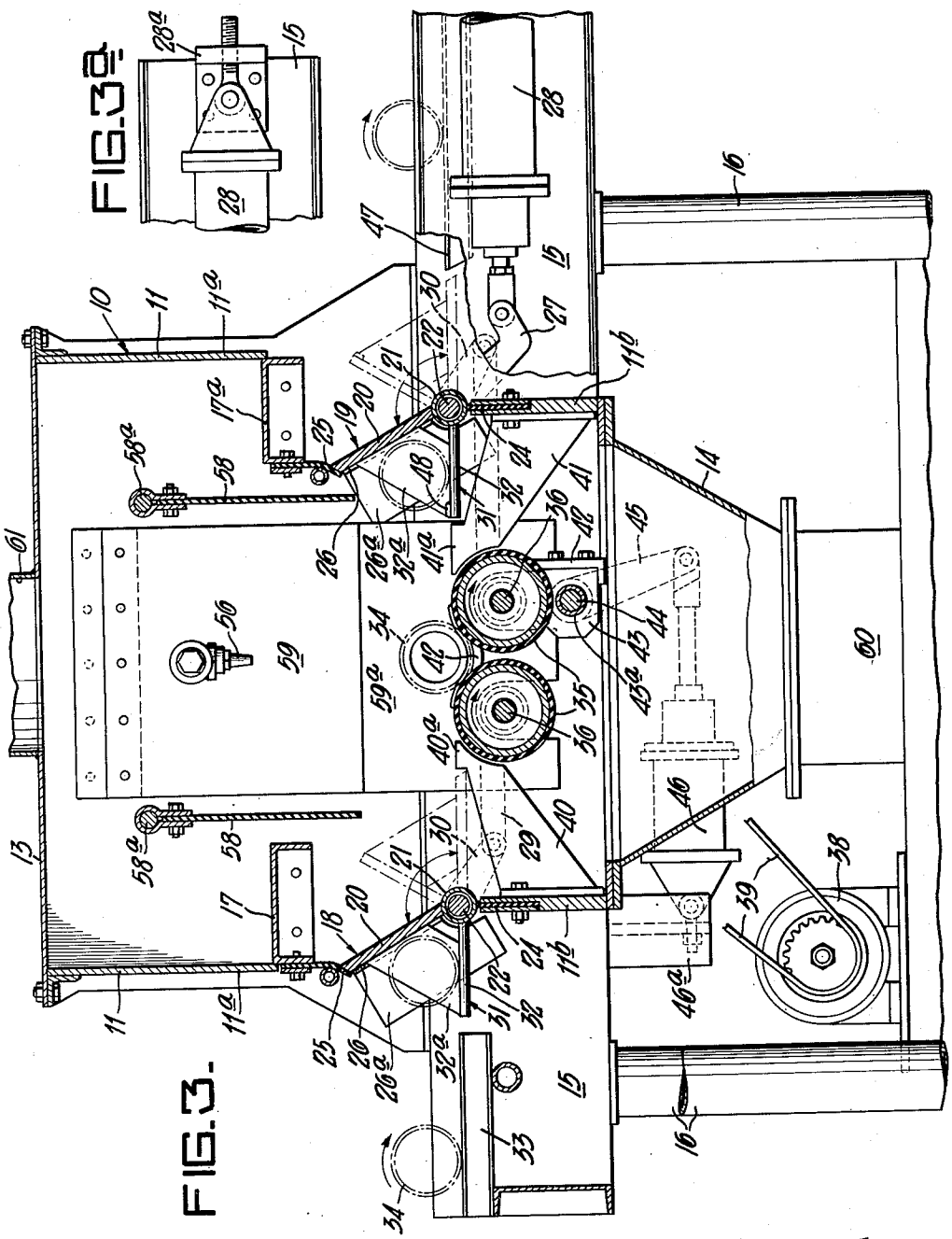

FIG. 3.

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UNITED STATES PATENT OFFICE

2,692,458

APPARATUS FOR CLEANING AND DESCALING TUBULAR ARTICLES BY ABRASIVE BLASTING

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Application December 12, 1951, Serial No. 261,345

25 Claims. (Cl. 51—14)

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This invention relates to apparatus particularly adapted for cleaning and descaling tubular metal articles of medium size, for example, of the order of a few inches in diameter and a few feet in length. The novel principles thereof, however, may be utilized in cleaning similar articles of various sizes.

Metal tubes of medium size, both as to length and diameter, are used in large numbers for the manufacture of a variety of products. In many cases, it is required that the tubes be freed from all scale, grease and other surface deposits, inside and out, before fabrication of the finished product is begun. One such instance is the tubular body portion of rocket projectiles. Attempts to effect the necessary cleaning thereof by immersion in a hot solvent solution failed to produce the desired surface condition. Shot-blasting was thus left as the last resort but manufacturers of equipment therefor could not supply the specialized apparatus necessary to handle relatively short lengths of tube and subject the entire interior and exterior surface to abrasive blasting.

It is accordingly the principal object of my invention to provide apparatus for thoroughly cleaning and descaling tubular articles by abrasive blasting at high speed. A further object is to provide apparatus for supporting and rotating the workpieces and for moving them successively into and out of blasting position. A still further object is to provide means mounting blasting heads or nozzles for movement along and into the workpiece. Still another object is to provide a dust-tight enclosure for the apparatus, with sealed entry and exit doors. Further objects and advantages of the invention will become apparent during the course of the following detailed description.

In a preferred embodiment, the apparatus of my invention comprises a blasting chamber having a pair of parallel supporting rollers journaled therein. An entry door and transfer device in one side wall of the chamber receives a tube to be cleaned, by sidewise movement from adjacent skids and introduces it into the chamber. Blast-nozzle tubes slidably fitting in one end wall of the chamber are mounted on a traveling carriage for movement along and into the tube, respectively. Kick-out arms lift the tube from the rollers when the cleaning has been completed and deliver it sidewise to an exit door and transfer device in the other side wall. The latter, when operated, places the cleaned tube on delivery skids.

A complete understanding of the invention

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may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings,

Figure 1 is a plan view of my improved apparatus;

Figures 2 and 2*a* together constitute a longitudinal section taken along the plane of line II—II of Figure 1;

Figures 3 and 3*a* together constitute a transverse section with parts in elevation, taken along the plane of line III—III of Figure 2; and

Figure 4 is a partial transverse section taken on the plane of line IV—IV of Figure 3.

Referring now in detail to the drawings, the apparatus of my invention includes a box-like chamber 10 having side walls 11, end walls 12, a bolted-on top 13 and a hopper bottom 14. The chamber is carried on spaced side rails 15 which rest on posts 16. A bearing plate 15*a* extends along the outer side of each side rail. Side walls 11 include spaced upper and lower portions 11*a* and 11*b*, the lower portions being offset inwardly of the upper portions. Transoms 17 and 17*a* extend between the end walls along the lower edges of the upper portions of the side walls.

An entry door 18 in one side wall 11 and an exit door 19 in the other extend the full length of the side walls. Each door includes a closure plate 20 having one edge welded to a housing tube or sleeve 21. A hinge shaft 22 extending through the tube and keyed thereto is journaled in bearings 23 secured to bearing plates 15*a*. A flexible sealing strip 24 makes wiping contact with the tube 21 of each door. A sealing strip 25 adapted to make wiping contact with the upper edge of the plate of each door, is secured to the adjacent transom. As shown, the sealing strip 25 for the entry door is secured to the outer flange of its transom 17 while that for the exit door is secured to the inner flange of its transom 17*a*. Thus both doors may be opened by angular movement in one direction and closed by movement in the opposite direction. Butt sealing strips 26 of compressible material such as rubber are secured to the end walls 12 by sheathing plates 26*a*, in position to be abutted by the end edges of doors 18 and 19 when they are closed.

A crank arm 27 secured to the shaft 21 of the exit door is pivoted to the piston rod of a fluid-pressure cylinder 28. The cylinder is pivoted to a bracket 28*a* on one of the side rails 15. A link 29 is pivoted to crank arms 30 at the other ends of shafts 22. Both doors may thus be opened or both closed simultaneously by admitting fluid

under pressure to one end of cylinder 28 and then the other.

Each of the doors 18 and 19 has a pick-up trough 31 on one side thereof. The trough is on the outside of door 18 and the inside of door 19. Each trough is made up of fingers 32 spaced along housing tube 21 and welded thereto at about a 60° angle to the closure plate 20. Web plates 32a extend between the closure plate and the fingers nearest the end thereof. Entry skids 33 are spaced along the length of the chamber at the side on which entry door 18 is located. When the door 18 is closed, fingers 32 thereof are horizontal, on the level of the tops of skids 33.

A tube 34 delivered to the rails 33 transversely thereof may be rolled therealong by hand until it enters the trough 31 of the entry door and rests on fingers 32 thereof, confined between web plates 32a, as shown in Figure 3. When the doors 18 and 19 are opened, they turn through about 120° bringing the closure plates thereof substantially into horizontal position forming tables adapted to support the tube 34 temporarily. By this movement, the tube in the trough of door 18 is lifted and transferred sidewise into the chamber and rolls across plate 20 by its own momentum.

Two rubber-sheathed rollers 35 are disposed in parallel, closely spaced position lengthwise of chamber 10. The rollers have reduced end portions 35a which are keyed to through shafts 36. These shafts are journaled in bearings 37 mounted on plates 15. The rollers are driven in the same direction by a motor 38 mounted below the chamber, through a chain-and-sprocket drive 39. Brackets 40 spaced along the length of the chamber 10 and secured to the entry side thereof have upper edge portions 40a forming short skids substantially in the plane of rails 33, bridging the space between plate 20 of door 18 when in down-turned position, and the adjacent roller 35. Thus tube 34 rolls from plate 20, over bracket edges 40a and the first roll 35, coming to rest in the valley between the rollers. Brackets 41 similar to brackets 40, extend inwardly from the exit side of the chamber and have upper edge portions 41a forming short skids bridging the space between the other roller and the fingers 32 of door 19 when they are horizontal, i. e., when the door is closed.

Kick-out arms 42 are removably secured to blocks 43 by screws. These blocks are bored to receive a housing tube or sleeve 43a parallel to the rollers, and are disposed thereon adjacent the reduced end portions of the rollers. A shaft 44 extending through the sleeve is keyed thereto and journaled in bearings 44a mounted on plates 15a below the roller 35 on the exit side of the chamber. The blocks are secured to the sleeve by set screws. Arms 42 are shaped so that they normally lie below the tops of the bodies of rollers 35 and the bottom of a tube 34 disposed thereon. Retainer flanges 42a on the arms confine a tube on the rollers against endwise movement during rotation.

A crank 45 on one end of shaft 44 is pivoted to the piston rod of a fluid-pressure cylinder 46. The cylinder is pivoted to a bracket 46a secured to plate 15a. When the piston rod is retracted, arms 42 tilt upwardly and lift tube 34 off of rollers 35 causing it to roll down across bracket edge portions 41a and into the trough on the inner side of door 19. It will be understood, of course, that the length of tubes 34 exceeds the spacing between arms 42. On opening of this door, the tube will be dumped out onto delivery skids 47 similar to entry skids 33. Upstanding lugs 48 on the ends of the fingers of door 19 prevent the tube from rolling back toward the rollers when the door is tilted. The tube will, of course, easily roll over these lugs when descending the kick-out arms.

The means I provide for progressively cleaning the tubes 34 interiorly as well as exteriorly by abrasive blasting, while disposed on rollers 35, includes a wheeled carriage 49 traveling on rails 50. These rails extend outwardly from one end wall of chamber 10, normal thereto, and are supported by a table 50a at approximately the level of the bottoms of rollers 35. The carriage is composed of spaced end plates 51 connected by upper and lower tubes 51a normal thereto. Nozzle pipes 52 and 52a extend through tubes 51a and are secured by set screws to bushings set in the ends of the tubes. The outer ends of the nozzle pipes are connected by flexible hose to a source of abrasive blast (not shown). A fluid-pressure cylinder 53 mounted at the outer end of table 50a has its piston rod connected to the carriage for actuating it toward and from chamber 10.

Nozzle-pipe guide sleeves 54 are set in vertically spaced holes in the end wall 12 from which table 50a extends. Pipe connections 54a extend from the sleeves to a source of compressed air to prevent dust from entering the sleeves. The nozzle pipes slide through bushings 54b, the sleeves and the clearance therebetween is sealed by glands 55. Felt wiping rings 55a ahead of the glands clean abrasive dust from the pipes as they are withdrawn. As shown in Figure 2, pipe 52a will enter a tube 34 on rollers 35 as carriage 49 moves to the left and pipe 52 will travel along the tube at a level thereabove. Nozzles 56 and 56a mounted on the inner ends of the pipes 52 and 52a are adapted to discharge abrasive blasts onto the exterior and interior, respectively, of a tube 34 on rollers 35, covering the entire length thereof twice as carriage 49 reciprocates toward and from the chamber while rollers 35 are being driven to rotate the tube. Nozzle 56a discharges a jet at a forty-five degree angle to the tube axis. A stand of supporting rolls 57 adjacent the chamber takes the weight of the nozzle pipes off of the glands 55 and the bushings 54b.

Flexible curtains or baffles 58 of sheet rubber or the like depending from the hanger bars 58a on opposite sides of the rollers, protect the chamber side walls from abrasion by rebounding abrasive shot. These curtains terminate above the path of the top of a tube 34 as it rolls into and out of the chamber. Protective plates 59 and 59a sheathed with rubber or the like, are disposed inwardly of one of the end walls 12. Plate 59a extends downwardly to the bottoms of rollers 35, being notched to clear the reduced ends thereof. Plate 59b adjacent the other end wall has holes therein to admit the nozzle pipes.

A conveyor 60 receives spent abrasive collected by hopper bottom 14 and delivers it to an elevator (not shown) for return to the apparatus which produces the abrasive blast. An exhaust outlet 61 in the top 13 permits floating abrasive dust to be withdrawn from the chamber and separated from the air. An access door 62 is hinged to the end wall 12 opposite that through which the nozzle pipes reciprocate.

The operation of the apparatus will doubtless be apparent from the foregoing but will now be recapitulated. Tubes 34 to be cleaned are rolled sidewise along a skid table leading to skids 33.

The first tube is rolled by hand into the trough on door 16. Doors 18 and 19 are then opened by operating cylinder 28. The tilting of door 18 through about 120° picks up the tube and deposits it in the chamber with momentum sufficient to cause it to roll over skids 40a and the first roller 35. The tube comes to rest in central position between the two rollers. Doors 18 and 19 are then closed and motor 38 is started to drive rollers 35 thus turning tube 34 about its own axis.

Cylinder 53 is then actuated to advance nozzle pipes 52 and 52a, after the abrasive blast has been turned on. The speed of travel of the carriage is limited, as by a throttle valve in the exhaust line from cylinder 53, to insure thorough coverage of both interior and exterior surfaces of the tube by the blasts from nozzles 56 and 56a. The blast is left on for both the forward and reverse strokes of the carriage. This gives the tube a two-stage treatment which cleans it very effectively. While one tube is being cleaned, the next one is rolled forward into the trough of door 18.

When the cleaning of the first tube has been completed and the nozzles retracted to the illustrated positions, the blast is shut off and motor 38 is stopped. Cylinder 46 is then actuated to operate the kick-out arms 42. As they tilt upwardly, the tube on the rollers 35 is lifted and it rolls down the arms across skids 41a and into the trough on door 19. The kick-out arms are then restored to normal position. Cylinder 28 is then again actuated to open the doors. As a result, the cleaned tube is delivered onto skids 47 and the next tube is introduced sidewise into the chamber in the manner already described. Motor 38 is again started and cylinder 53 is actuated to advance the blasting nozzles. Finished tubes may be rolled along delivery skids 47 to a point convenient for further processing or shipment.

It will be apparent that the device of my invention has numerous advantages. It is quick and effective in operation, cleaning over 150 tubes per hour as against an expected production of from 50 to 60 tubes. The tubes as delivered are clean and free from scale and other surface deposits. The sealing of all four edges of the doors prevents the escape of dust and the bearings are enclosed to prevent entry of dust. The chamber and tube supporting rollers are protected from the effect of flying dust and quick return of spent abrasive is assured. The handling of the tubes through the apparatus is very simple, requiring only the manipulation of the appropriate controls. The introduction of the tubes into the chamber and their removal therefrom are accomplished automatically by opening the entry and exit doors. Both inside and outside of the tube are cleaned simultaneously and each point on both surfaces is traversed twice by one of the abrasive blasts. Finally, the structure of the apparatus is simple and easy to maintain in good working order. Renewal of the kick-out arms when worn by flying abrasive, for example, can be readily accomplished by unscrewing them from their supporting blocks working through doors 19 and 62. Other interior parts may be reached through the door 62 or by removing the top.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

I claim:

1. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers.

2. The apparatus defined by claim 1 characterized by sealing strips of compressible material adapted to be engaged by the edges of said doors when closed.

3. The apparatus defined by claim 2 characterized by said strips including flexible and compressible strips having wiping engagement with the top and bottom of each door when closed.

4. The apparatus defined by claim 2 characterized by said strips including compressible strips adapted to make abutting engagement with the side edges of each door when closed.

5. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, one of said end walls having a hole therein, a carriage reciprocable toward and from said one of said end walls, a nozzle pipe mounted on the carriage and slidable through said hole for movement along an article on said rollers, and means sealing the space between said pipe and said one of said end walls.

6. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, said entry door having tube pick-up means extending therefrom so as to lie substantially in a horizontal plane when the door is closed.

7. The apparatus defined by claim 6 characterized by said means being spaced fingers.

8. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and

adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, said exit door having tube pick-up means extending therefrom so as to lie substantially in a horizontal plane when the door is closed.

9. The apparatus defined by claim 8 characterized by said means being spaced fingers.

10. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, and skids spaced along the rollers, extending inwardly from a side wall and bridging the gap between the entry door when open, and the adjacent roller.

11. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, and skids spaced along the rollers, extending inwardly from a side wall and bridging the gap between the pick-up means on the exit door when the latter is closed, and the adjacent roller.

12. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, and means for opening said doors simultaneously.

13. The apparatus defined by claim 12 characterized by said means including a crank arm on one door and a link connecting the two doors.

14. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, kick-out arms shaped to extend under an article on said rollers and means mounting said arms for pivotal movement whereby the arms on tilting, lift the article from said rollers and cause it to roll toward said exit door.

15. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, one of said end walls having a hole therein, a carriage reciprocable toward and from said one of said end walls, a nozzle pipe mounted on the carriage and slidable through said hole for movement along an article on said rollers, and means sealing the space between said pipe and said one of said end walls, a nozzle-pipe guide seated in said hole and a bushing therein through which the nozzle pipe slides.

16. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, one of said end walls having a hole therein, a carriage reciprocable toward and from said one of said end walls, a nozzle pipe mounted on the carriage and slidable through said hole for movement along an article on said rollers, and means sealing the space between said pipe and said one of said end walls, a nozzle-pipe guide seated in said hole and a connection from said guide to a source of compressed air.

17. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, one of said end walls having a hole therein, a carriage reciprocable toward and from said one of said end walls, a nozzle pipe mounted on the carriage and slidable through said hole for movement along an article on said rollers, and means sealing the space between said pipe and said one of said end walls, said nozzle pipe being positioned to enter the article on the rollers.

18. Abrasive-blast apparatus for cleaning cy-

lindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, one of said end walls having a hole therein, a carriage reciprocable toward and from said one of said end walls, a nozzle pipe mounted on the carriage and slidable through said hole for movement along an article on said rollers, means sealing the space between said pipe and said one of said end walls, and a bearing roller mounted adjacent said sealing means, effective to support said pipe.

19. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, and flexible curtains suspended in said chamber parallel to the axes of said rollers and between the latter and said side walls, said curtains terminating above the path of movement of an article through the apparatus.

20. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, and buffer plates adjacent said end walls extending downwardly below said rollers.

21. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, said side walls each including an upper portion and a lower portion offset inwardly therefrom, the axes of said doors being adjacent the upper edges of said lower side-wall portions, respectively.

22. The apparatus defined by claim 21 characterized by sealing strips on said lower side-wall portions having wiping engagement with said doors.

23. The apparatus defined by claim 21 characterized by a transom extending along the lower edge of the upper portion of said other side wall, and a sealing strip carried by the transom for wiping engagement with the upper edge of said exit door.

24. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, each of said doors including a closure plate and means forming a pick-up trough on one side thereof.

25. Abrasive-blast apparatus for cleaning cylindrical workpieces comprising a box-like chamber having side and end walls, a pair of parallel rollers journaled side-by-side in said end walls, adapted jointly to support a workpiece and rotate it about its own axis, an entry door in one side wall and an exit door in the other, each of said doors being hinged on a horizontal axis and adapted to tilt down substantially into the horizontal plane tangent to the tops of the rollers, thereby forming a table over which a workpiece may roll in passing through the apparatus, a pipe slidable longitudinally through one of said end walls parallel to said rollers, and a nozzle on said pipe adapted to discharge an abrasive blast onto a workpiece resting on said rollers, each of said doors including a closure plate, a plurality of pick-up fingers spaced therealong, said fingers extending from the hinge side of the plate at an acute angle thereto, and web plates extending from the closure plate to the fingers adjacent the ends of the door.

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