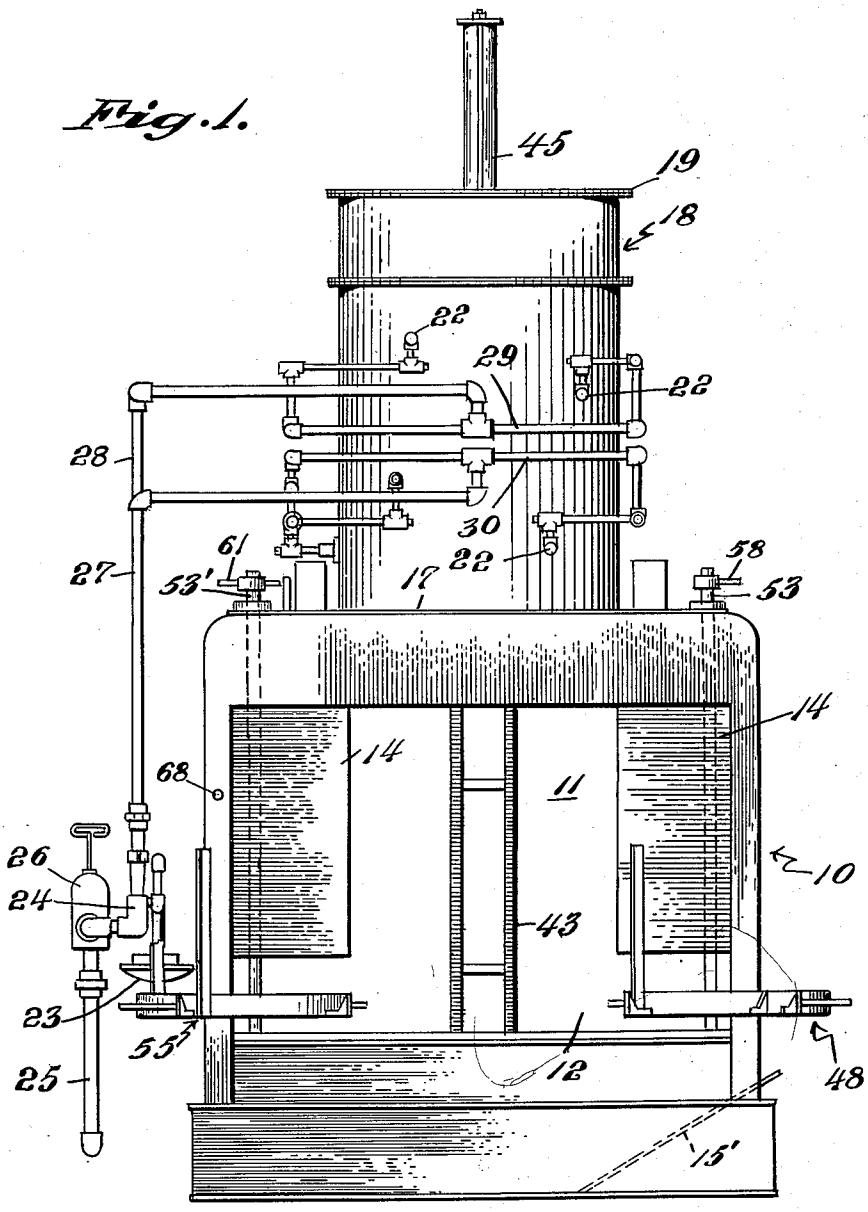
Feb. 4, 1958 B. K. WALPOLE 2,822,160

FURNACE FOR CLEANING CONTAINERS

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Fig. 1.



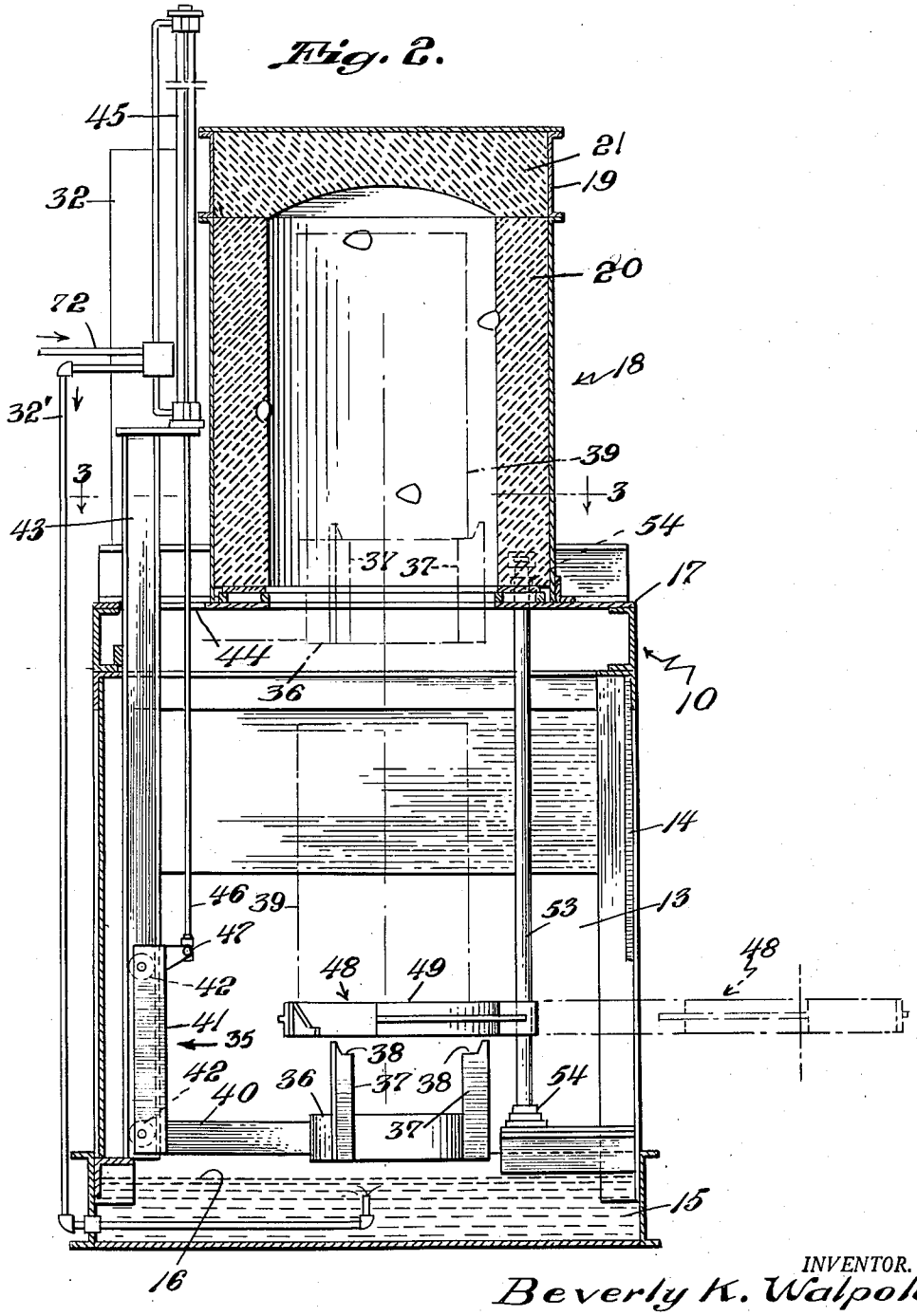
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FURNACE FOR CLEANING CONTAINERS

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Fig. 2.



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Fig. 3.

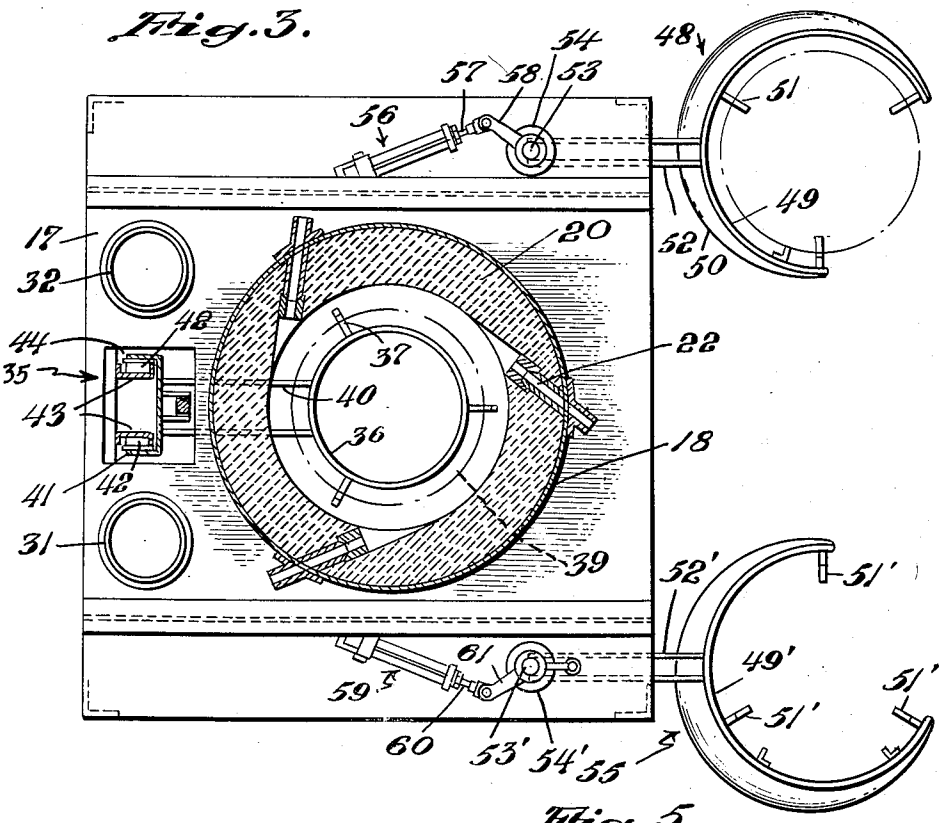


Fig. 5.

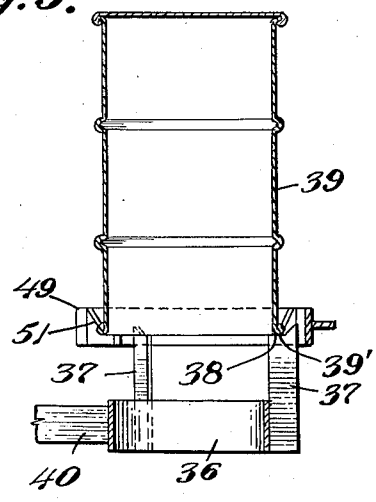
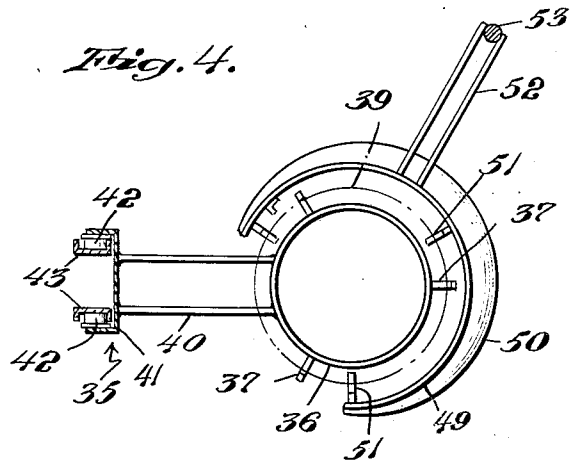


Fig. 4.



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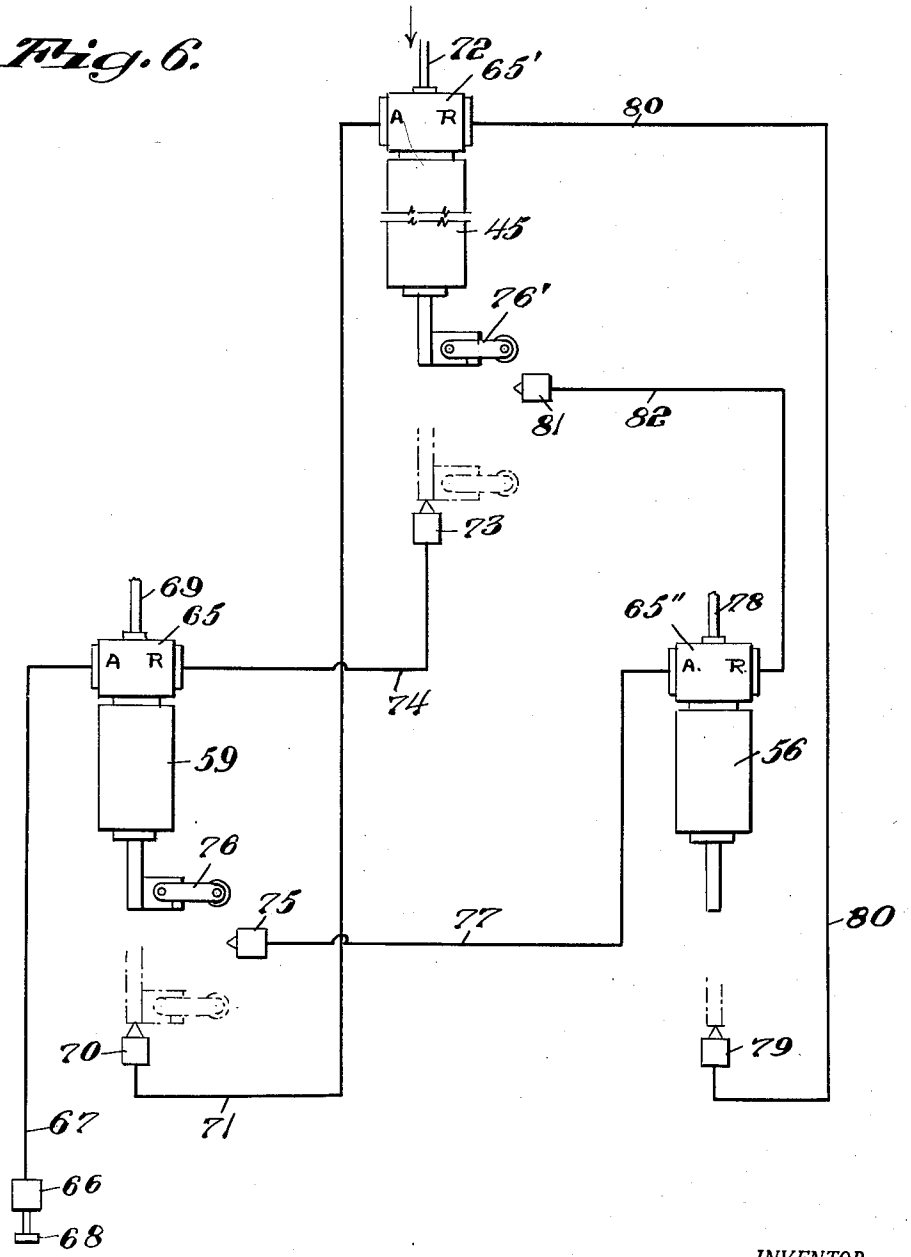
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FURNACE FOR CLEANING CONTAINERS

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Fig. 6.



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FURNACE FOR CLEANING CONTAINERS

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Application August 16, 1954, Serial No. 450,183

2 Claims. (Cl. 263—5)

This invention relates to a furnace for burning out the residual contents in metal containers, such as barrels, drums, and the like.

Heretofore, in the process of reconditioning used metal barrels and the like, it has been common practice to cleanse the barrel of the residue therein by manually removing the greater portion of the residue and thereafter burning within the barrel that residue which remains. The barrels may have contained any of various materials, for for example, semi-solids such as greases, gum-like substances in texture, and the like, and which residue is collectively termed in the trade by the slang expression "gunk." Manually removing said residue is at best a messy and most disagreeable task. The barrels after having the residue partially removed are stacked in a pile and the remaining residue set on fire to burn the same, thus causing much undesirable smoke as well as undesirable odors. Frequently the burning operation is not sufficiently complete, and residue remains in the crevices at the seam of the barrel. The subsequent sand blasting operation forming part of the reconditioning process is ineffective in removing said unburned residue lodged in such crevices.

An object of the invention is to improve generally on the art of removing the residue contents of used metal barrels and the like.

A more specific object is to provide a furnace so constructed as to provide for applying a controlled heat at such temperature to thoroughly loosen from the walls of the barrel all the residual contents of the barrel.

Another object is to provide a furnace of the above character operable to apply heat to the barrel in a manner to dislodge the greater portion of the residue that it may drop by gravity from the barrel and to provide means for quenching the dropped mass to prevent its burning.

Another object is to provide a furnace operable in a manner so that in each cycle of operation a barrel to be cleansed of residue will be automatically moved into the furnace, heated, and then moved out of the furnace.

Another object is to provide a furnace in which the heating chamber will be at an elevated position and the barrel to be cleansed will be adapted to be raised in an inverted position thereof into the chamber.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a front elevational view of a furnace embodying my invention;

Figure 2 is a central side sectional view of the furnace shown in Figure 1;

Figure 3 is a sectional view taken substantially along line 3—3 of Figure 2;

Figure 4 is a sectional view showing in top plan view the barrel loader in position for the barrel elevator to receive the barrel to elevate the same into the burner of the furnace;

Figure 5 is a similar view in elevation of the elevator and loader; and

Figure 6 is a diagrammatic view of the pneumatic operated controls of the furnace.

Referring to Figure 1, the furnace shown according to the present embodiment of the invention comprises a body 10 which is shown as being made of an iron framework covered with sheet iron plate or the like providing a chamber 11 having an open front as at 12 and open at one side as at 13 (see Figure 2). Metal panels 14 may be provided to reduce the size of the open front in order to protect the operator to some extent from the heat emitted from the furnace. The lower portion of body 10 (see Figure 2) is made water tight to form a tank 15 which is open to chamber 11 and in which water may be maintained at substantially the level 16 as shown. On the upper wall 17 of the body 10 there is supported and secured a heating chamber 18 which is of cylindrical formation with its axis extending in a vertical direction. The burner is closed by a dome 19 and is open at its lower end to open into the chamber 11. The side wall and dome of the burner are properly lined as at 20 and 21 with a refactory material of a kind usually employed for a burner lining.

The heating chamber or burner 18 may be fired or heated in any of various manners which may be found desirable depending upon the particular location and type of fuel readily available. In the present instance, as by way of example, a gas fuel is employed for heating the burner. To this end (see Figure 3) there is provided in the side wall of the burner 18 a plurality of gas fuel burners designated 22 and hereinafter to be referred to as jets. There are four rows of these jets 22 which are equally spaced both circumferentially and in a vertical direction. The jets 22 extend through the wall and lining of the burner angularly thereto so as to throw the flame therefrom tangentially to a circle substantially the diameter of the barrel to be operated thereon. The gas fuel is supplied through a suitable supply line (not shown) to a zero pressure governor 23 (see Figure 1), thence to a fuel mixing valve 24 of a known type which operates to mix the gas fuel with air under pressure. Air under pressure is supplied from a suitable air pressure source (not shown) through pipe 25 to a gate type valve 26 and thence to the mixing valve 24. The gas and air mixture is lead through suitable fuel lines 27 and 28 and thence through secondary lines 29 and 30, respectively, to the jets 22. The fuel lines are arranged in a known manner to provide for distribution of the fuel at an equal pressure at each jet 22. It is here pointed out that the mixing valve 24 is of the common type employed in gas burners and has a venturi mechanism arrangement whereby the air flow therethrough will determine the amount of gas drawn into the air stream. Thus, by controlling the flow of air at the gate valve 26, the flow of the gas and air mixture to the jets 22 may be readily controlled.

The furnace is provided with two vertically disposed smoke stacks 31 and 32 (see Figure 3) which open into chamber 11. These stacks may be connected to a chimney (not shown), and there may be interposed between the chimney and smoke stacks any approved smoke cleansing apparatus (not shown) so as to cleanse and remove solids and noxious gases from the smoke prior to passing to the said chimney.

From the foregoing description it will be apparent that the furnace has a burner 18 closed at its upper end and which opens at its lower end into a chamber 11 in the lower portion of which there is provided a water tank 15 which is directly below the burner 18. It will also be apparent that the burner 18 is fired tangentially to a circle of a size substantially the diameter of the barrel

to be cleansed. Thus, there is provided a plurality of flames directed on the barrel tangentially thereon.

The barrel to be cleansed of residue by the burning thereof is raised into the burner 18 by means of an elevator designated generally 35 (see Figures 2 and 3) which comprises an annular open platform in the form of a ring 36 which is aligned to be centrally of the burner and has secured on the outer side thereof a plurality of vertical arms 37 which are equally distant circumferentially about the ring and extend radially therefrom. The upper end of the arms are notched inwardly of the outer edge thereof as at 38 (Figure 2) to form a rest against which the top edge of an inverted barrel 39 may be engaged, thus providing for well supporting the barrel in inverted position with little obstruction to the open end of the barrel. The platform 36 is attached, as by means of horizontally extending bars 40, to a carriage 41 which has pairs of wheels 42 riding on a pair of vertical tracks 43 attached to the rear wall of chamber 11. The tracks extend above the upper wall 17 (Figure 2) through a suitable opening 44 therethrough.

The carriage 41 is operated by means of an air motor or cylinder 45 (Figure 2) which is mounted at the upper end of the tracks 43 to extend in a vertical direction and the connecting rod 46 of which is connected to the carriage 41 as at 47. The air cylinder 45 is of a type wherein the piston thereof (not shown) is reciprocated by air pressure applied at both ends of the piston. Thus, upon an application of air pressure at the lower end of the cylinder, the piston under air pressure will move upwardly and carry the carriage 41 to position ring 36 as shown in broken lines in Figure 2, which will support the barrel 39 within the chamber of the burner 18 to subject the barrel to the heat and fire of the burner. The barrel 39 will become quickly heated, and the larger portion of the residue contents of the barrel will be dislodged and drop in chunks through the ring 36 and into the water in tank 15 and be quenched thereby. The remaining residue in the barrel will gasify and readily burn itself out with the ash falling out of the barrel into the tank 15. With a view of preventing an accumulation of residue within the tank immediately beneath the barrel, the exhaust air conduit 32' (Figure 2) of air cylinder 45 is led to discharge substantially centrally in the tank 15 whereby to agitate the water in tank 15. The agitation of the water will have a tendency to cause the falling residue to float or be moved away from the area directly beneath the burner, thus preventing a building up of a heated mass of residue in chamber 11. It may be here pointed out that no residue need be removed from the barrel prior to firing the same. Thus, the disagreeable task of manually removing a portion of the residue is entirely eliminated.

The barrel is moved to the elevator in position to be engaged thereby by means of a conveyor indicated generally 48 which is normally held at the front of the furnace preferably at the right thereof. The conveyor 48 comprises a horizontally extending band or partial ring 49 which extends on a curvature of a radius sufficiently large to permit passage therethrough of the platform 36 of the elevator. The band 49 is reinforced with a flange 50 and the ends thereof are spaced from each other for a purpose which will hereinafter appear. There is secured to the inner side of the band a plurality of equally spaced arms or supports 51 which extend radially on edge and form a rest to engage the top edge or rim of an inverted barrel. The band is mounted as by means of spaced bars 52 which extend horizontally from a vertical shaft 53 which is properly journaled for rotation in suitable bearings 54 carried by the body 10. The axis of shaft 53 is located at an equal distance from the centers of the ring 36 and band 49 and upon turning of the shaft 53 in a clockwise direction, as seen in Figure 3, the band 49 will be swung to a position directly above the ring 36 (see Figures 4 and 5) to be substantially coaxial therewith and in the path of travel of the elevator with the ends of the band 49 spaced from each other a distance to permit the passage of the bars 40 upwardly past the band 49.

When the barrel is moved by the carrier inwardly to the limit of its travel, the elevator is at its lower limit of travel, and the arms 37 thereof are directly beneath the rim 39' of the barrel. Upon setting the elevator 35 in motion, the arms 37 will be moved upwardly to engage the rims 39' (see Figure 5) and lift and transfer the barrel to the elevator to be carried thereby into the burner 18 as previously described. Upon the barrel being properly fired and the residue removed, the elevator is lowered and the barrel is removed therefrom by a second or unloading conveyor designated generally 55 which is positioned at the front of the furnace at the left side thereof. The conveyor 55 is substantially identical in structure to the conveyor 48 and similarly mounted for swinging motion to and from the path of travel of the elevator 35, and like parts thereof will be indicated with similar but primed numerals. The shaft 53' of conveyor 55 is swung in a counter-clockwise direction so as to position the band 49' and the supports 51' thereon in the path of the barrel to be lowered from the burner. As the elevator is lowered, the arms 37 pass the supports 51' and the rim 39' of the barrel will come to rest on the said support 51', thus transferring the barrel 39 to the conveyor 55 to be thereafter swung outwardly of the surface for the removal of the barrel therefrom.

The shaft 53 is turned or oscillated (see Figure 3) by means of an air cylinder 56, the piston rod 57 of which is pivotally connected to a crank 58 secured to the shaft 53. The shaft 53' is similarly oscillated by an air cylinder 59, the piston rod 60 of which is connected to a crank 60 fixed to the shaft 53'. The air cylinders 45, 56, and 59 are operated in a time relation in a manner shown in Figure 6, which is diagrammatic in character and is not to be construed as representing actual structure but rather as representing so much of the general characteristic of the structure as will enable the operation to be understood. Each air cylinder 45, 56, and 59 is provided with a similar valve mechanism 65, which controls the admission of air pressure at one end or the other to the piston of the air cylinders. These valve mechanisms 65 are pneumatically operated and initially set into action through the action of a manually operated poppet valve 66 connected through a conduit 67 to valve mechanism 65 of air cylinder 59 and having a manually operated push button 68. The valve mechanism 65 of each other air cylinder is indicated by a similar but primed numeral. The time required for removing by heat the residue contents of a barrel is dependent upon the amount and particular residue contents of a barrel. Accordingly, the cycle of operation of the furnace is started with the barrel in the burner 18. The operator of the furnace determines the time required for burning out the residue contents of the barrel and then presses button 68 to initiate the cycle of operation of the furnace. The pressing of button 68 will momentarily open poppet valve 66 which will exhaust air pressure from conduit 67 to actuate the valve control mechanism 65 of air cylinder 59 to open air pressure supply conduit 69 to the advance side of the air cylinder 59. The air cylinder 59 now under air pressure on the advance side thereof will move to rotate shaft 53' to position the unloading conveyor 55 in the path of the platform 36 of the elevator 35 as previously described. At near the end of the advance stroke of air cylinder 59, the same will, as indicated in broken lines, engage and open a poppet valve 70 to exhaust air pressure in conduit 71 which connects the poppet valve 70 with the valve mechanism 65' of the elevator air cylinder 45. The exhaust of air pressure will cause mechanism 65' to open air pressure supply conduit 72 to the advance side of cylinder 45. The air cylinder 45 will now advance to

lower the elevator 35 and transfer the barrel thereon onto the unloading conveyor 55 in the manner previously described. At near the end of the advance stroke of air cylinder 45, the same will engage and open a poppet valve 73 which is connected through conduit 74 to valve mechanism 65 of air cylinder 59. Thus, air pressure will be exhausted in conduit 74 to actuate mechanism 65 to connect air pressure supply line 69 to the return side of the air cylinder 59 so as to return the air cylinder to initial position and swing conveyor 55 and the barrel thereon out of chamber 11. During the return stroke of air cylinder 59, the same will engage and open a poppet valve 75. The air cylinder 59 carries a tripping mechanism 76 which will swing past poppet valve 75 on the advance stroke of air cylinder 59 but will engage on the return stroke of the cylinder the said poppet valve 75 to open the same. It may be here pointed out that the poppet valves will return automatically to the closed positions thereof upon being disengaged by the air cylinders. Poppet valve 75 is connected through conduit 77 to the valve mechanism 65'' of air cylinder 56. Upon the exhaust of air pressure in conduit 77, the mechanism 65' will operate to connect air pressure conduit 78 to the advance side of air cylinder 56 and cause the same to advance and turn shaft 53 in a direction to swing conveyor 48 and the barrel previously loaded thereon to a position in the path of travel of the elevator 35. At near the end of the advance stroke of air cylinder 56, the same will engage and open a poppet valve 79 connected by conduit 80 leading to the valve mechanism 65' of elevator air cylinder 45. The exhaust of air pressure will actuate mechanism 65' to connect air conduit 72 to the return side of the air cylinder 45 so as to actuate the same to raise the elevator 35 which upon passing conveyor 48 will receive the barrel and carry the same into the burner 18 as previously described. Cylinder 45 is also provided with a tripping mechanism 76' which on the return stroke of the cylinder 45 will engage and open a poppet valve 81 connected by air pressure conduit 82 to the valve mechanism 65''. The exhaust of air in conduit 82 will actuate mechanism 65'' to connect the air conduit 78 on the return side of the air cylinder 56 to swing the now empty conveyor 48 out of chamber 11, thus completing the automatic cycle of operation of the furnace whereby a treated barrel is lowered from the burner 18, the barrel transferred and removed from the

chamber, and another barrel placed in position to be received by the elevator and carried into the burner.

The accumulation of residue in tank 15 may be, after draining the tank, shoveled out through opening 13. The wall of tank 15 adjacent to said opening 13 is positioned on a slant as at 15' to facilitate the said removal of residue.

I claim:

1. A furnace for burning out the residue contents of a metal barrel and the like container having an open end and a closed end comprising an elevated vertically disposed chamber adapted to receive therein a barrel in the inverted position with its closed end up and its open end down, a means for projecting heat against the outside of said barrel and located radially outwardly of the barrel, an elevator for raising and lowering said barrel in the inverted position into and out of said burner, a first conveyor for moving a barrel over said elevator, a second conveyor for removing a barrel from said elevator, means for automatically operating said elevator, and conveyors in sequence, whereby the barrel will be lowered from said burner onto the second conveyor and removed and the first said conveyor will move to position a barrel at a location to be transferred to said elevator and raised thereby into said burner.

2. A furnace as set forth in claim 1 wherein said elevator has an annular platform provided with arms for engaging the rim about the open end of the barrel to support the same in the inverted position over the opening in said platform.

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