

[54] **WORK TOWER FOR RELINING
METALLURGICAL VESSELS**

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[51] Int. Cl.² **E04G 21/14**

[58] Field of Search 198/157, 158; 52/749;
214/1 H, 622, 730

[56] **References Cited**

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Primary Examiner—Ernest R. Purser

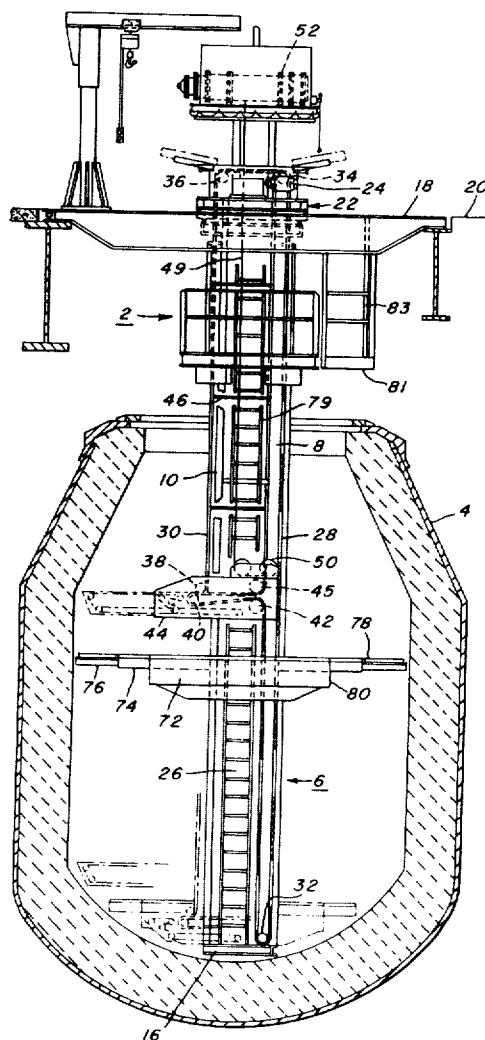
Assistant Examiner—Carl D. Friedman

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[57] **ABSTRACT**

An apparatus for lining the walls of a metallurgical vessel with refractory bricks including support means over the top opening of the vessel, elongated tower means suspended within the vessel from the support means and rotatably movable thereon, and first conveyor means, in the tower and rotatably movable therewith, for conveying bricks vertically within the vessel. The first conveyor means has a charging end, and a discharge point which is vertically variable. A second conveyor means is provided which is vertically movable on the tower means and has a discharge end laterally adjustable with respect to the tower means. The second conveyor means receives bricks from the first conveyor means and transports them to the walls of the vessel at variable heights and distances from the tower means. By reason of the vertically variable discharge point, the first conveyor means delivers bricks to the second conveyor means at any position of the second conveyor means.

16 Claims, 12 Drawing Figures



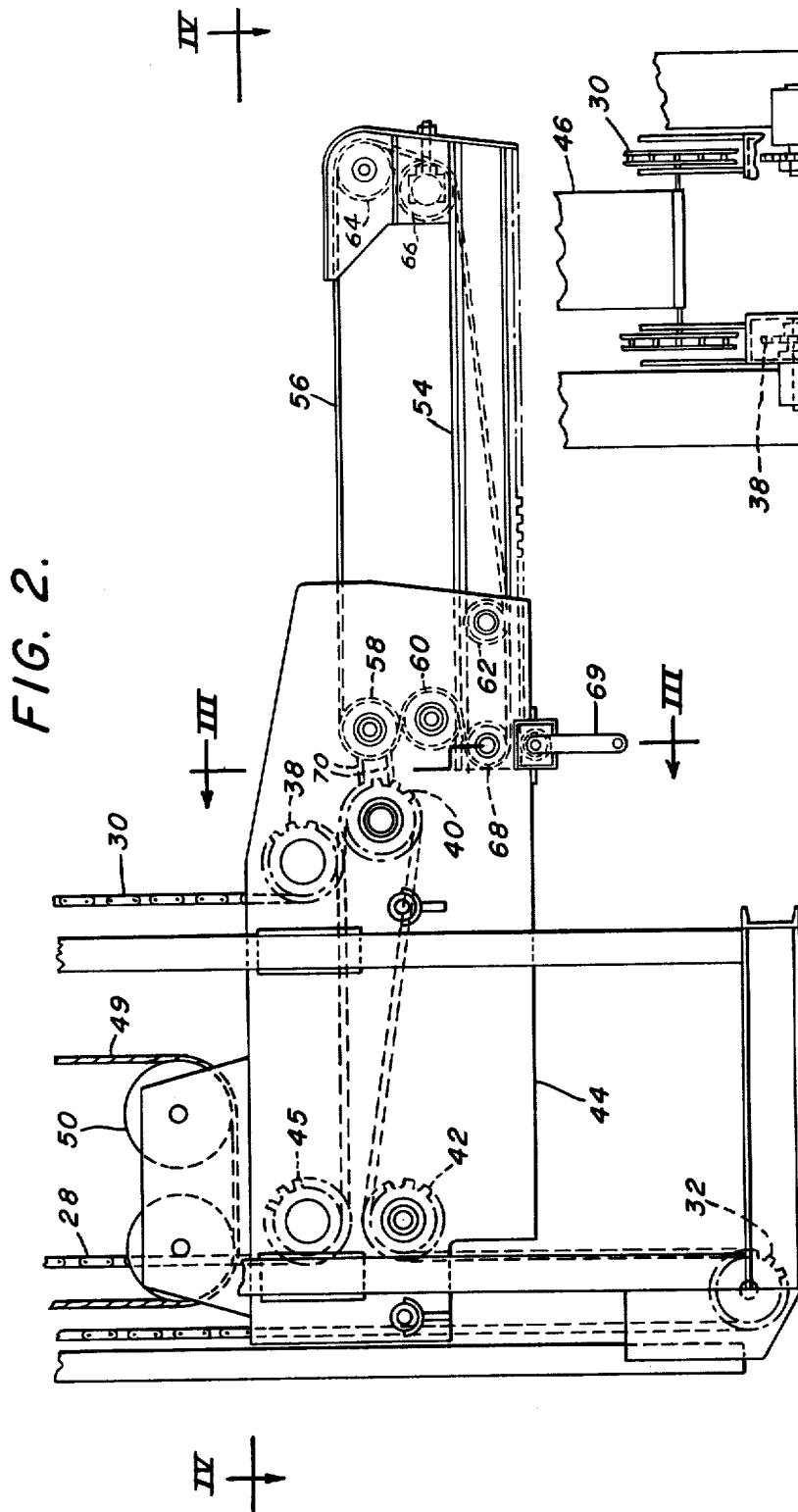
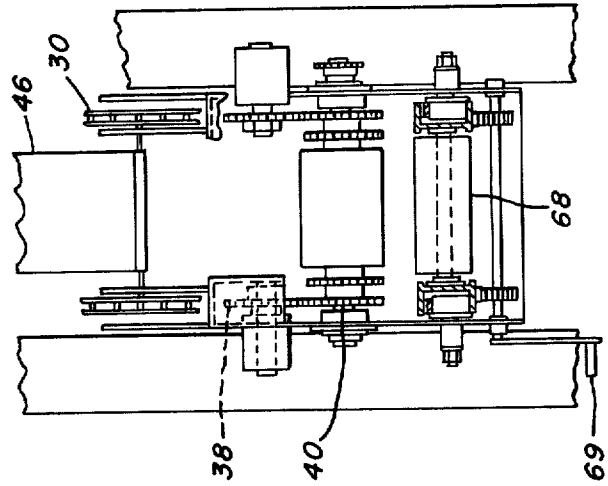


FIG. 4.

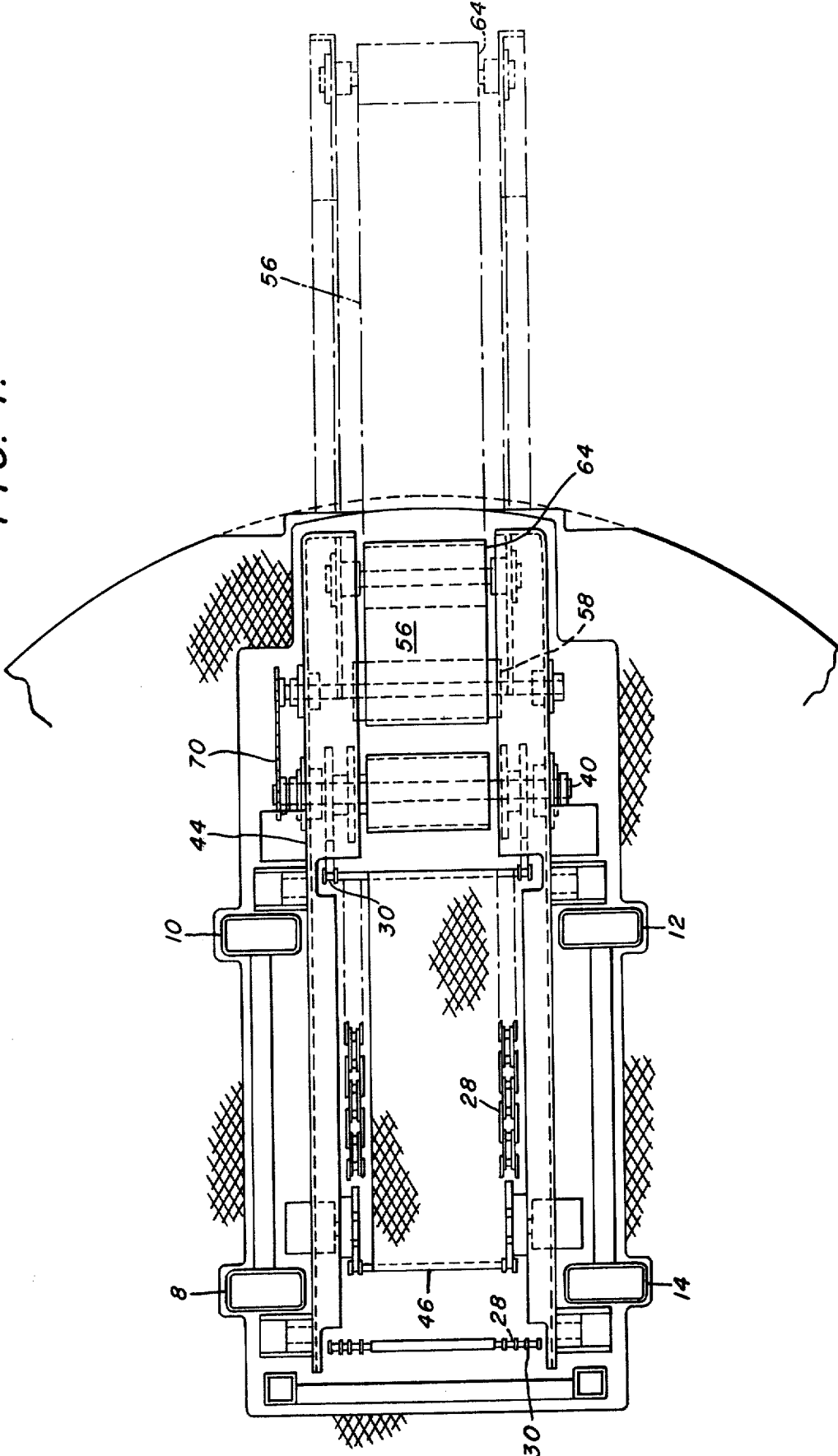


FIG. 5.

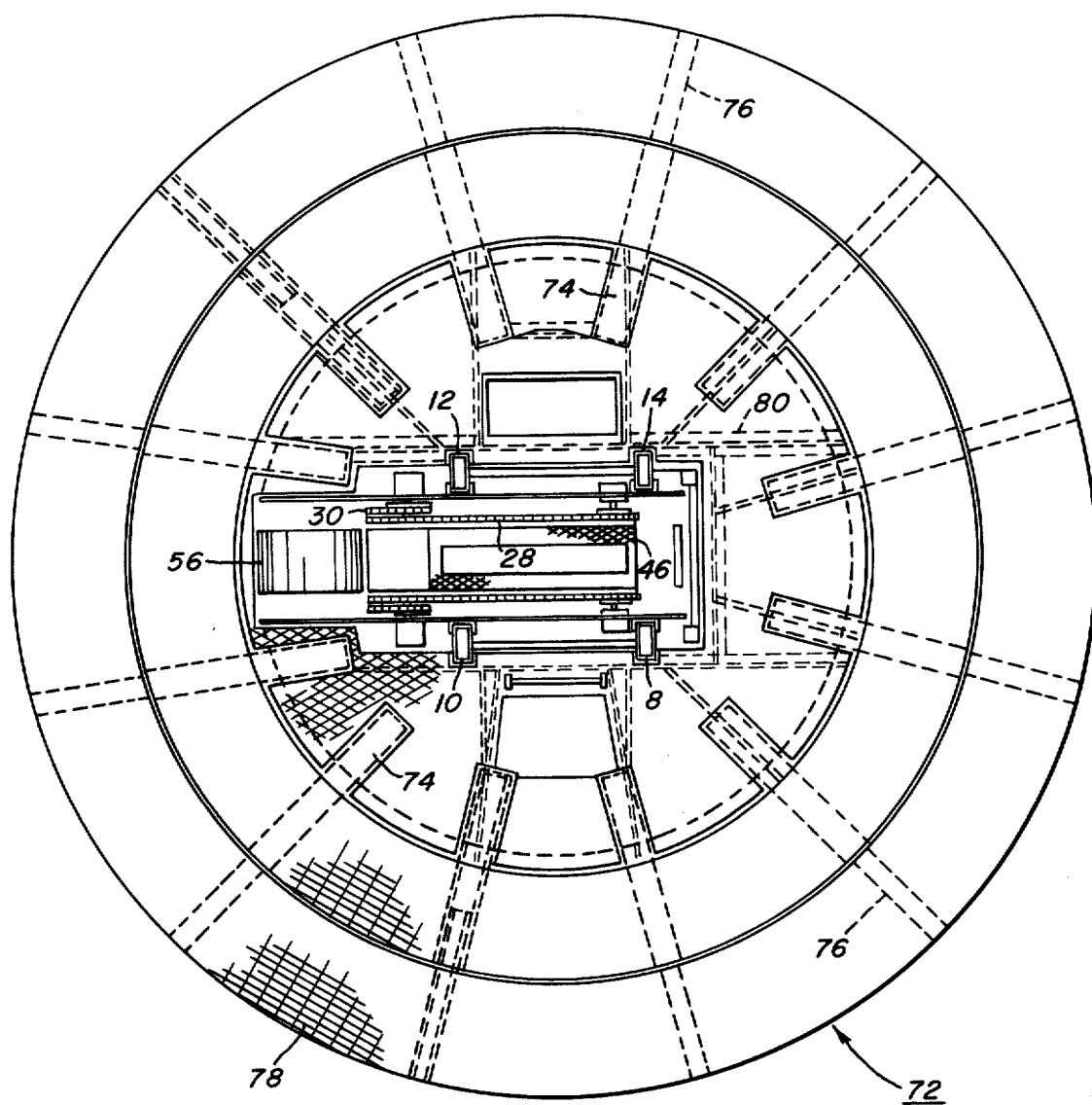


FIG. 6.

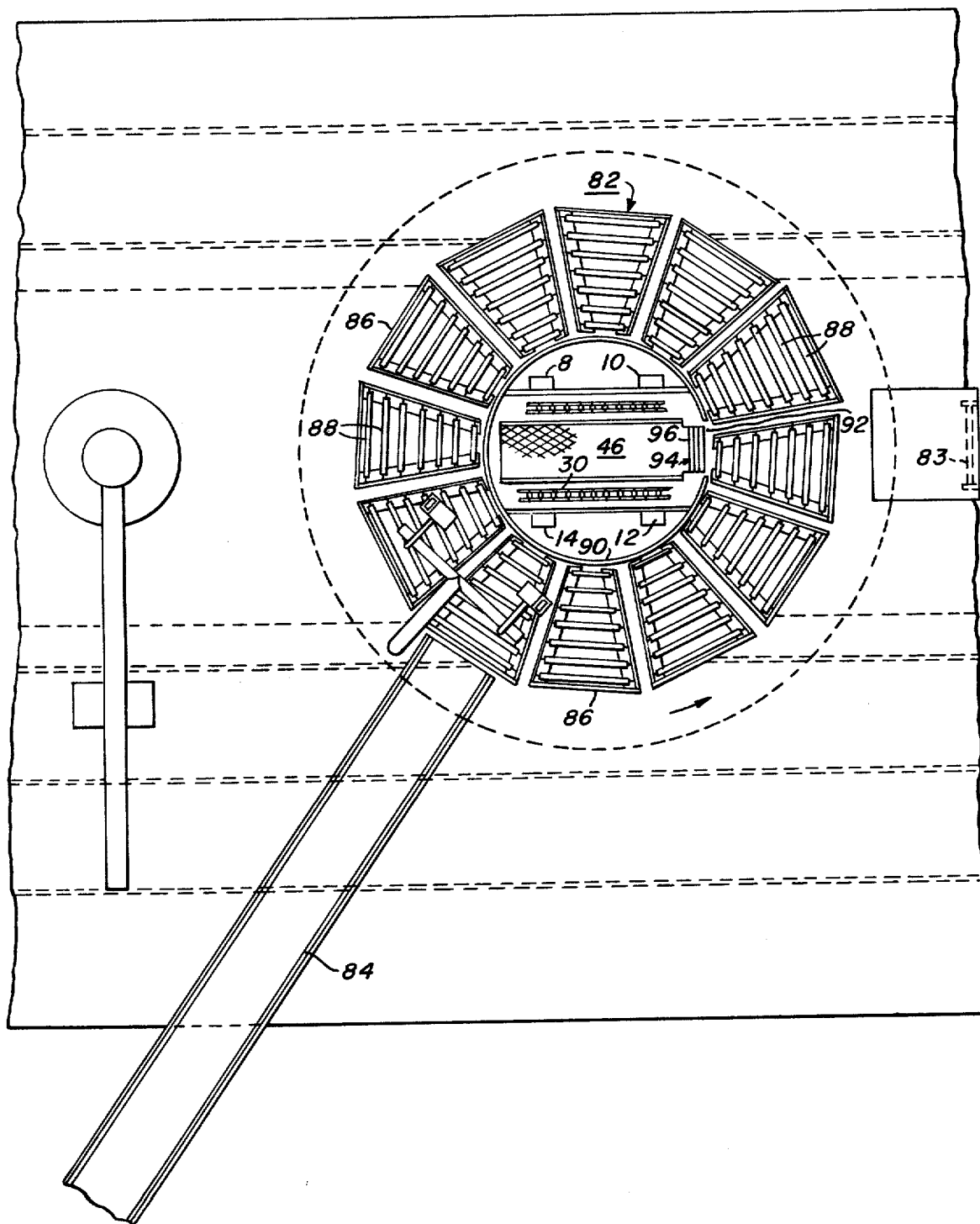
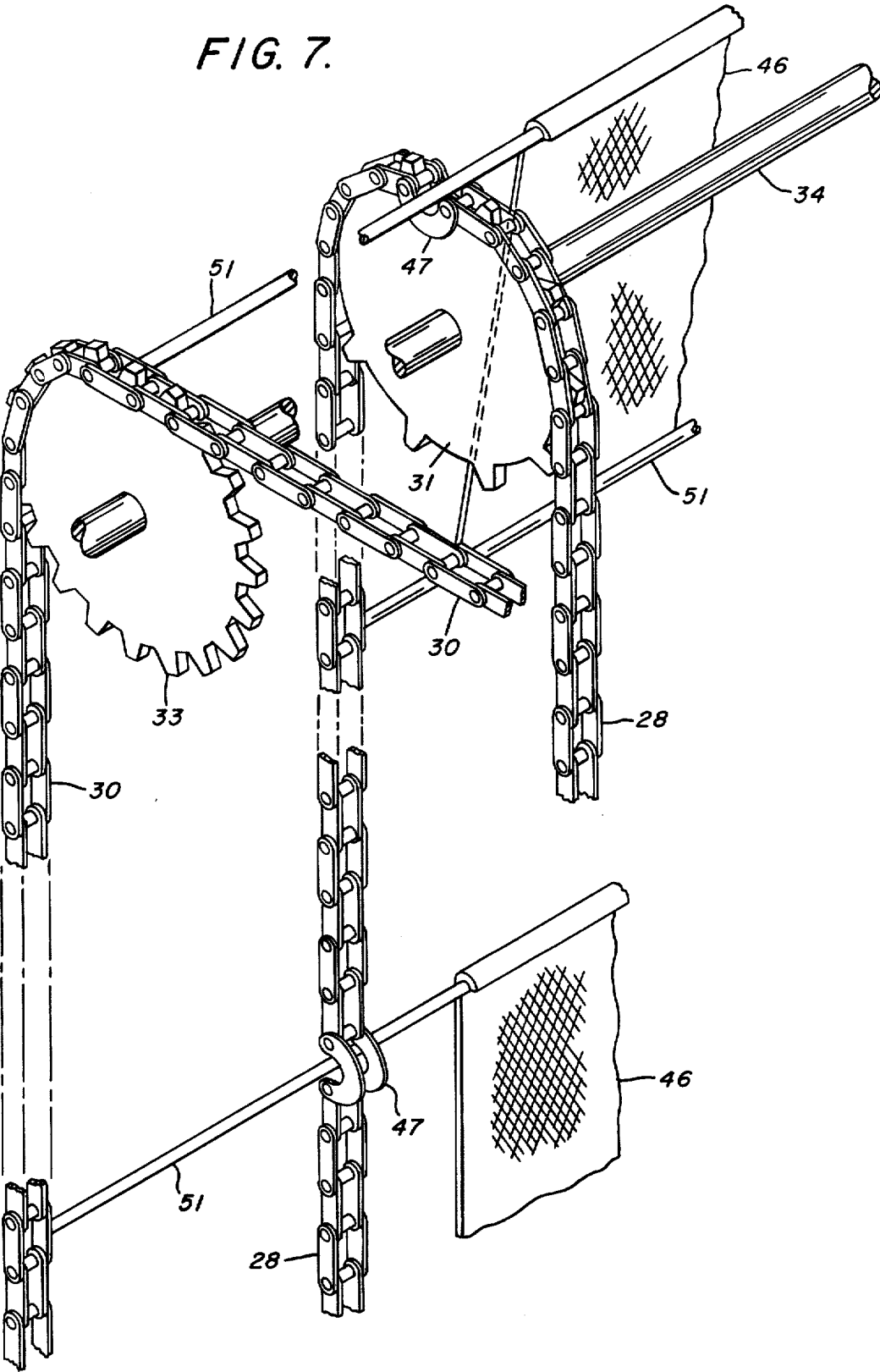


FIG. 7.



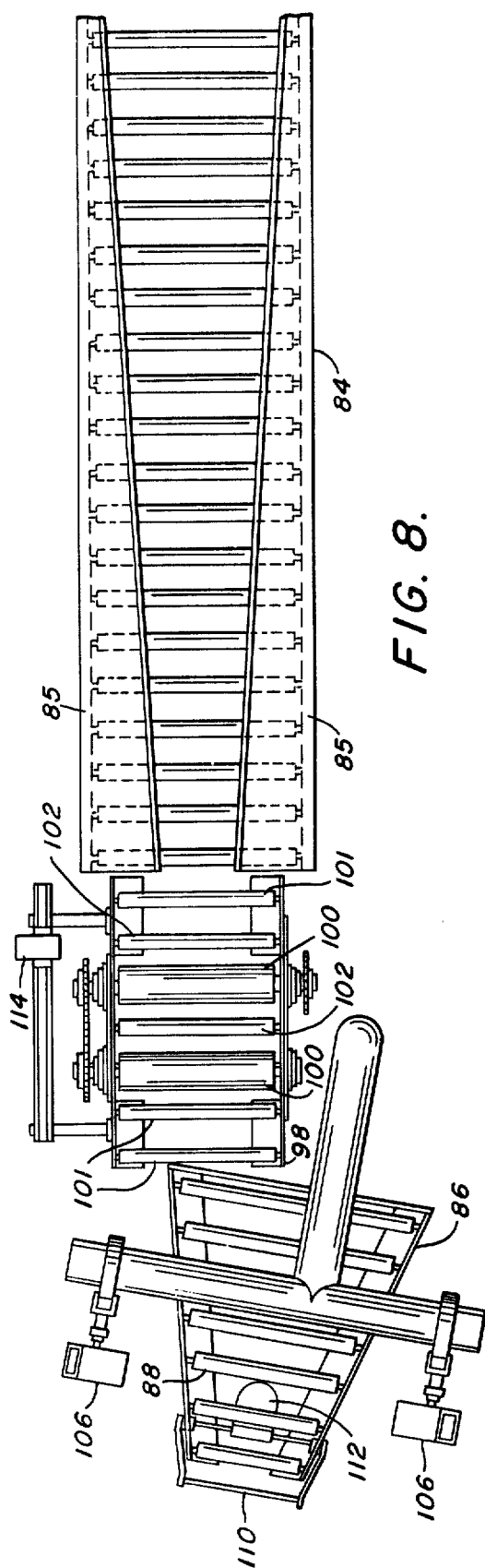
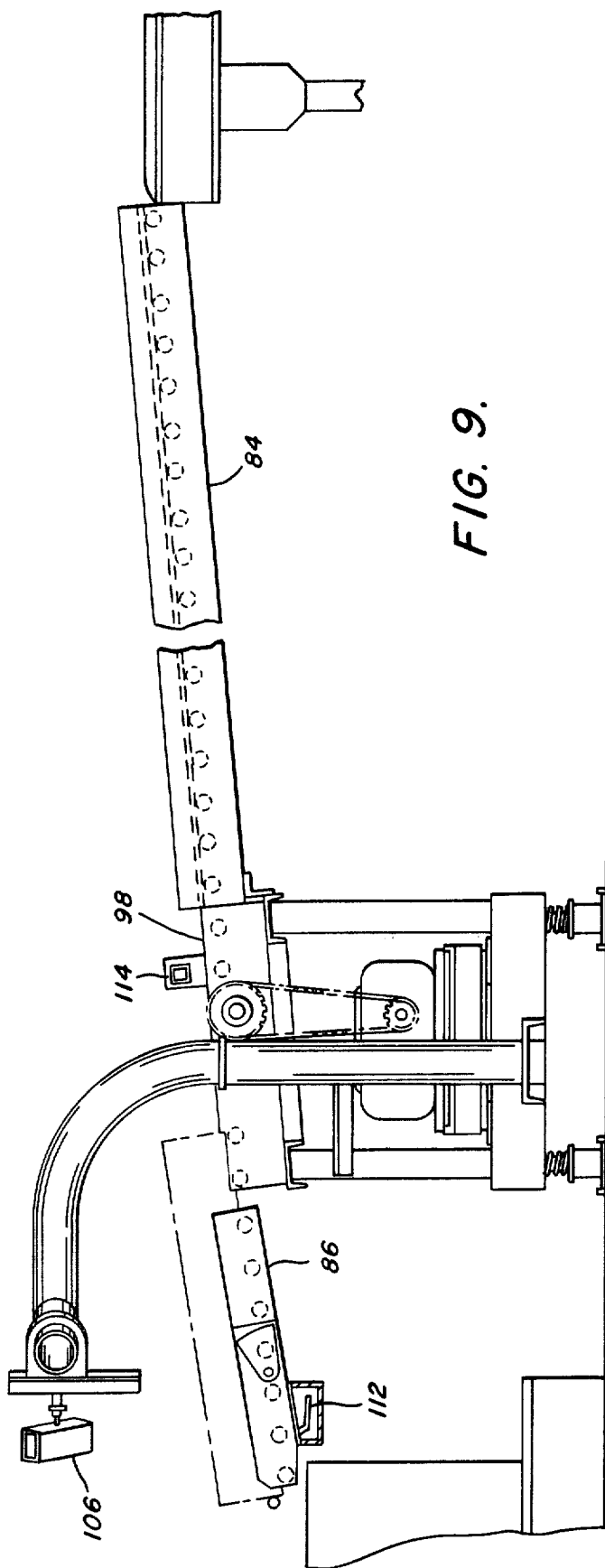


FIG. 11.

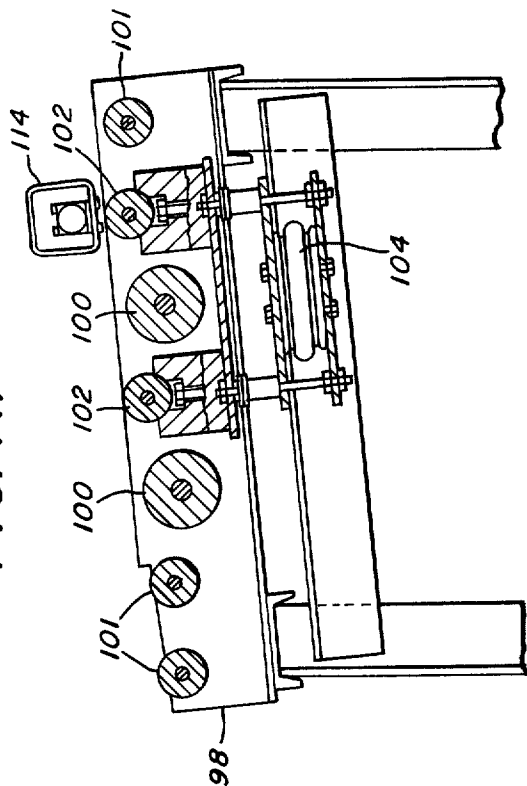


FIG. 12.

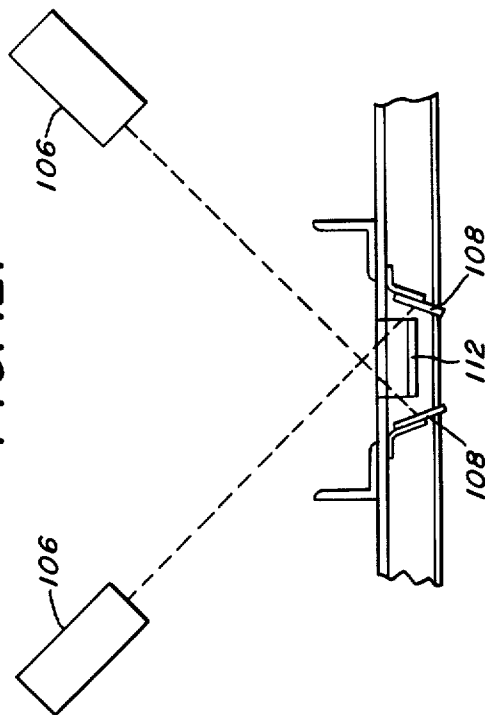
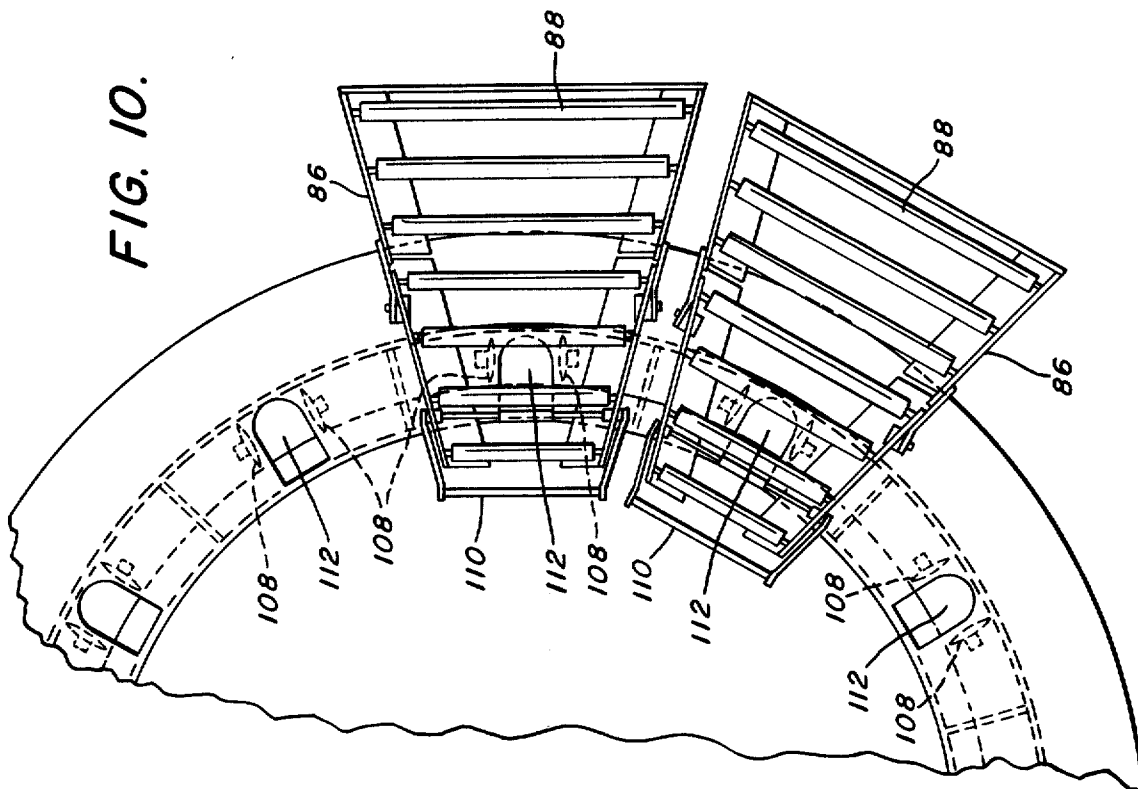


FIG. 10.



WORK TOWER FOR RELINING METALLURGICAL VESSELS

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates generally to work towers for relining the walls of metallurgical vessels, such as L-D furnaces, ladles and the like, and more particularly to work towers for relining such vessels having conveyor means for transporting refractory bricks to selected locations at the vessel walls.

2. Prior Art

In the steelmaking industry the most efficient method of manufacturing steel is the basic oxygen process. In that process, a charge of molten pig iron, scrap and additives such as slagging agents in an open-top converter is subjected to a supersonic stream of high purity oxygen from a lance lowered through the vessel's top opening, and is thereby "blown" to steel. The basic oxygen process is highly corrosive to the steelmaking vessel's refractory lining, and in a typical shop it is usually necessary to reline a vessel's walls after about 2 weeks use. The relining operation is a slow, costly process, generally requiring the use of 10 or more men for several days. It has been necessary in the past to construct a scaffold and lay-up the refractory brick courses by hand. Some more automated versions of work towers have also been proposed which include elevators and the like, but these have not proven practical or gained industry acceptance. The present invention provides an apparatus for relining a metallurgical vessel at a reduced expense of time and labor then has heretofore been known, and reduces to a minimum manhandling of the refractory brick used in lining the vessel's walls.

SUMMARY OF THE INVENTION

An elongated tower is provided which is adapted to be suspended within a metallurgical vessel from a support centered over and above the vessel's top opening. Means are provided for rotating the tower on its support and within the vessel, and a first conveyor means is located in the tower for transporting refractory bricks vertically to any desired depth in the vessel. A second conveyor means is provided which is vertically movable on the tower means and has a discharge end laterally adjustable with respect to the tower means. The second conveyor means receives bricks from the first conveyor means, and transports them to the walls of the vessel at variable heights and distances from the tower means. The first conveyor means has a charging end and a discharge point, and the discharge point is vertically variable so that the conveyor means delivers bricks to the second conveyor means at any position of the second conveyor means.

A rotating feed table may be provided for feeding bricks to the charging end of the first conveyor means. This feed table is adapted to rotate about the tower at a speed of rotation greater than the speed of rotation of the tower. The feed table comprises a series of radial trays disposed at an angle above the horizontal, and interconnected in ring form. These trays have rollers which urge bricks on the trays in a direction generally toward the first conveyor means.

A platform means may be provided which mounts on the elongated tower means and is vertically movable thereon. The movement of the platform means may be either independent of or conjoint with a second con-

veyor means. A support for workmen is therefore provided corresponding to the height of the second conveyor means.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional elevation showing one embodiment of the relining apparatus of the present invention in working position in an open top metallurgical vessel with the second conveyor means and work platform shown in various positions in which they may be located.

FIG. 2 is an elevation view of the second conveyor means in full extended position and the discharge point of the first conveyor means.

FIG. 3 is a sectional elevation view taken along the line III—III of FIG. 2.

FIG. 4 is a sectional plan view taken along line IV—IV of FIG. 2 with the second conveyor means shown fully retracted, and also shown in phantom fully extended.

FIG. 5 is a plan view of the platform means and second conveyor means of the present invention.

FIG. 6 is plan view of the rotating feed table and feed conveyor of the present invention.

FIG. 7 is a perspective view of a portion of the chains of the first conveyor of the present invention, showing the U-shaped links and novel sprockets of the inner chain.

FIG. 8 is a plan view of the feed conveyor, control conveyor and sensing means for the present invention, showing one rotary feed table tray in position for sensing for the presence of a brick on that tray.

FIG. 9 is a side elevation view of the apparatus shown in FIG. 8.

FIG. 10 is a plan view of a portion of the rotary feed table of the present invention, showing two traps of the table.

FIG. 11 is a sectional side elevation view of the control conveyor of the present invention.

FIG. 12 is a diagrammatic view of the first sensor of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the figures, in FIG. 1 the preferred embodiment of the relining apparatus of the present invention, designated generally 2, is shown in working position in an open-top metallurgical vessel 4, such as a basic oxygen furnace. The relining apparatus includes an elongated tower portion 6 having frame members 8, 10, 12 and 14 and cross members 16. The elongated tower 6 is suspended within the vessel 4 from supports 18 which rest on service floor 20. In operation, supports 18 are positioned such that the tower, when suspended therefrom, is generally centered within vessel 4.

Frame members 8, 10, 12 and 14 of the elongated tower 6 are rotatably interconnected with supports 18 whereby tower 6 may be rotated on supports 18, and hence rotated within vessel 4. The tower 6 and the supports 18 are interconnected through a large diameter ball bearing ring 22. Ball bearing ring 22 is large and strong enough to support the apparatus without the use of a stabilizer on the vessel bottom. Drive means, such as motor 24, is fixedly or rigidly attached to a frame member of the elongated tower 6. Motor 24 is operably attached to a drive train such that activation of motor 24 causes rotation of elongated tower 6 of apparatus 2.

A first conveyor 26 is provided within the elongated tower 6 for conveying bricks from the surface floor 20 to selected locations within vessel 4. Preferably, the first conveyor 26 comprises two pairs of endless chains 28 and 30 (only one of each pair appears in the elevation view of FIG. 1). Chains 30 follow a path defined by sprockets 31 attached to fixed shafts 32, 34 and 36 and also be sprockets 31 attached to shafts 38, 40 and 42 which are attached to movable frame 44. Chains 28 follow a path defined by sprockets 33 on fixed shafts 32 and 34 and also sprockets 33 on shafts 40, 42 and 45, also on movable frame 44. Pairs of endless chains 28 and 30 travel in substantially the same direction along the path defined by these sprockets. Therefore, in the portion of the path of travel which is above the movable frame 44, pair 28 travels in a plane parallel to and disposed from the plane of travel of the other pair 30, and below the movable frame 44 the pairs of chains 28 and 30 travel in the same plane.

Foldable platforms or pallets 46 are each connected to both pairs of chains 28 and 30 by rods 51 at spaced intervals along the chains. During the portion of the descending path of travel of the chains when they are above the movable frame 44 and are spaced away from each other, foldable pallets 46 are suspended by the rods 51 between the pairs of chains 28 and 30 in a horizontal position, and form rigid pallets which support refractory bricks. During the portion of travel of the chain below the movable frame 44, and also during the ascending path of travel, these foldable pallets 46 are suspended vertically between and in the same plane as the pairs of chains 28 and 30.

Foldable pallets 46 are each attached at one end to inner chain pair 28, and at the other end to outer chain pair 30 (FIG. 7). Since the chains 28 and 30 travel in the same plane over a portion of their path of travel, U-shaped links 47 are provided at the points on inner chains 28 corresponding to the points where the foldable pallets 46 are connected to the outer chains 30. The sprockets 31 on which chains 28 travel are designed such that the teeth of the sprockets 31 only engage alternate links of chains 28. The U-shaped links 47 are so arranged on the chains 28 as to always fall between the teeth on the sprockets 31. Thus the rods 51 connecting the foldable pallets 46 and outer chains 30 do not interfere with the engagement of inner chains 28 by sprockets 31.

As shown in FIG. 2, movable frame 44 is supported by cables 49 which pass through sheaves 50 and are attached to hoists 52. By the winding or unwinding of cables 49 on hoist 52, movable frame 44 may be raised or lowered along tower 6.

A second conveyor 54 is attached to the movable frame 44. Second conveyor 54 includes an endless belt 56 which travels around fixed rollers 58, 60 and 62 and movable rollers 64, 66 and 68. By manual operation of a crank 69, movable rollers 64, 66 and 68 can be horizontally adjusted so as to change their distance from tower 6, and thereby change the length of the upper surface of the belt 56.

From the above description of the structure of first conveyor 26 and second conveyor 54, the operation of these conveyors becomes apparent. Refractory bricks are loaded onto the upper, or charging, end of the first conveyor 26, and are carried downwardly by the foldable pallets 46. Upon reaching the height of movable frame 44, the foldable pallets 46 are moved horizon-

tally by the movement of chain pairs 28 and 30 around sprockets on shaft 40. Therefore a discharge point on the first conveyor 26 is defined by the position of shaft 40. This discharge point is vertically variable along the tower 6 according to the movement of the movable frame 44 and, since second conveyor 54 is attached to movable frame 44, the discharge point of the first conveyor 26 will always be proximate the second conveyor 54.

Shaft 40 and roller 58, both of which are rigidly fixed to movable frame 44, are connected by a second conveyor drive means 70. This second conveyor drive means 70 is preferably an endless chain which connects sprockets on shaft 40 and roller 58 and which causes movement of roller 58 according to the movement of shaft 40. It can be seen that first conveyor 26 and second conveyor 54 will move conjointly at proportionate speeds. Therefore, upon movement of the foldable pallet 46 in a horizontal direction toward the second conveyor 54, the refractory bricks are carried from first conveyor 26 onto second conveyor 54. As previously described, the length of second conveyor 54 can be altered by the movement of movable rollers 64, 66 and 68. Thus, the distance that the bricks will be carried from the tower 6 can be varied according to the distance of the walls of the vessel 4 from the tower 6.

A work platform designated generally 72 may be provided upon which workmen may stand during the relining operation. In a preferred embodiment, work platform 72 includes pivotally mounted support members 74 (pivot means not shown) at the inner end thereof, which are foldable to a vertical position for passing through the top opening of vessel 4. Platform 72 also includes horizontal radially extending members 76 for supporting a circular array of grating 78 or the like, to provide a surface upon which workmen may stand during the relining operation. Radially extending members 76 have a telescoping function, and thereby provide support for a circular grating surface of variable diameter. The platform 72 is movable vertically within vessel 4 over frame members 8, 10, 12, and 14 of the elongated tower 6. Platform 72 may be either rigidly affixed to the movable frame 44, whereby second conveyor 54 and work platform 72 will move conjointly, or work platform 72 may be raised or lowered independently of second conveyor 54 by hoist 52. Preferably platform 72 includes horizontally extending frame members 80 surrounding the respective frame members of the elongated tower 6 in a sleeve-like or collar-like fashion for slidably mounting and moving platform 72 to selective locations within vessel 4 on the elongated tower 6. Platform 72 may be fixedly attached to selected locations on the tower 6, for example by means of removable pins in openings provided in platform frame members 80 and tower frame members 8, 10, 12 and 14. When platform 72 is moved vertically within the vessel, the pins are removed to be replaced in the openings at the next selected location for the platform 72 on the tower 6. Access to platform 72 is provided by a ladder 79, which is attached to the tower 6, and which provides access from a scaffold 81, suspended from support 18, to any part of the tower 6. Workmen entering the vessel 4 to install the bricks first climb down through the service floor 20 on a second ladder 83 to the scaffold 81 and down the ladder 79 to the work platform 72.

Referring now to FIG. 6, refractory bricks are fed to a rotating feed table, designated generally 82, from a

position remote from the relining apparatus 2, by conventional means such as feed conveyor 84. Preferably the bricks are fed to rotating feed table 82 in exactly the order in which they are to be laid along the vessel wall during the relining process, i.e., bricks are "programmed" to the relining apparatus. Rotating feed table 82 comprises a series of radial trays 86 interconnected in ring form. Trays 86 are disposed at an angle above the horizontal, and are preferably provided with gravity rollers 88, such that a brick, when placed upon tray 86, is urged in a direction generally towards the first conveyor 26. Feed table 82 generally surrounds the elongated tower 6 and is adapted to rotate thereabout at a speed of rotation greater than that of the tower. Rotation of feed table 82 causes refractory bricks in the table to be carried in the direction indicated by the arrow in FIG. 6.

A raised circular shoulder means 90 is provided along the inside diameter or edge of radial trays 86 of rotating feed table 82. The shoulder means 90 extends vertically about the edge of the tray 86 and is adapted to rotate along with elongated tower 6, for example, as by being rigidly affixed thereto. Raised shoulder 90 includes a guide portion 92 for directing the refractory bricks onto a pallet 46 of the first conveyor 26 for vertical transportation into vessel 4. As shown in FIG. 6, guide portion 92 of raised shoulder 90 comprises a guide way or door formed therein through which refractory bricks may pass. An inclined plane 94 having bearings or rollers 96 therein is provided for receiving bricks passing from feed table 82 and transporting them to the first conveyor 26. Thus, it can be seen that, as feed table 82 rotates, bricks are carried to the guide portion and passed therethrough to the first conveyor 26 for vertical descent to selected levels in vessel 4. Upon reaching the first conveyor discharge point, bricks are conveyed toward the vessel wall by the second conveyor 54 to be placed in position.

Preferably, sensing means are employed in conjunction with feed conveyor 84 and the rotating feed table 82 to control the transfer of bricks from the feed conveyor 84 to rotating feed table 82. Such sensing means is shown in FIGS. 8-12. In the embodiment shown in these figures, the feed conveyor 84 comprises a tilted roller conveyor having centering guides 85, on which conveyor the bricks are moved by gravity onto a control conveyor 98. The control conveyor 98 in turn sequentially transfers the bricks to each tray 86 of the rotating feed table 82. Control conveyor 98 includes powered rollers 100 which continuously rotate by motor means in such a direction as to urge bricks toward the rotating feed table 82. Control conveyor 98 also includes free rollers 101 and liftable rollers 102, the latter of which are jointly operated by a pneumatic cylinder 104. When liftable rollers 102 are moved to their lower position by pneumatic cylinder 104, a brick situate on the control conveyor 98 contacts powered rollers 100 and is urged onto the rotating feed table 82. When liftable rollers 102 are moved to their upper position by pneumatic cylinder 104, a brick situate on the control conveyor 98 is supported by the liftable rollers 102 and does not engage powered rollers 100. The brick resting on liftable rollers 102 will thus remain in this position until liftable rollers 102 are moved to their lower position by pneumatic cylinder 104 so that the brick engages powered rollers 100 to be urged onto the rotating feed table 82.

The operation of pneumatic cylinder 104 is controlled by a first sensor 106, such as one or more photoelectric cells. As the rotating feed table 82 rotated, each tray 86 assumes a position under first sensor 106 immediately prior to being aligned with control conveyor 98, as shown in FIG. 8. Mirrors 108 are located on each tray 86 so as to reflect the beam of first sensor 106 when there is no brick on that tray (FIG. 12), in which case the first sensor 106 signals the pneumatic cylinder 104 to move liftable rollers 102 to their lower position so that powered rollers 100 will urge a brick on to that tray 86. If a brick is present on tray 86, the first sensor 106 does not received light from the mirror 108, and pneumatic cylinder 104 maintains liftable rollers 102 in their upper position so that no brick will pass onto that tray. Thus, no brick will pass onto the rotating feed table 82 if there is already a brick on the tray 86 which is at a position proximate the control conveyor 98.

As shown in FIG. 10, each tray 86 has an associated gate 110. This gate 110 is adapted to ride upon a cam means (not shown) associated with shoulder 90 on tower 6. The gate 110 remains in an upper position blocking the path of bricks whenever the guide portion 92 (FIG. 6) is not aligned with that tray 86. When the tray 86 is aligned with the guide portion 92 of the raised shoulder 90, the gate 110 will drop, due to spring biasing of the gate and the weight of the brick, thereby allowing the brick to pass through the guide portion 92 and onto the first conveyor 26. A shutter 112 is attached to the gate 110 to block the mirrors 108 when the gate 110 is opened. Therefore, if the tray 86, the guide portion 92, and the control conveyor 98 are all aligned, and no brick is situate on the tray 86, and with gate 110 in downward position, the shutter will block the mirrors 108 so that the pneumatic cylinder 104 will not allow a brick to pass onto that tray 86 in order to prevent the direct charging of a brick from control conveyor 98, through guide portion 92, and onto first conveyor 26, which could result in misalignment thereof and possible jamming or breakage of a brick so fed.

A second sensor 114, such as a photoelectric cell is positioned adjacent the control conveyor 98 and controls pneumatic cylinder 104 to the extent that, when a brick is discharged from control conveyor 98, with pneumatic cylinder 104 having lowered the liftable rollers 102, the sensor 114 will signal to actuate the pneumatic cylinder 104 so as to again lift the rollers 102 to a position above power roller 100 whereby a further brick is gravity fed from feed conveyor 84 onto the control conveyor 98, so as to rest upon liftable rollers 102 and be positioned for feeding onto a subsequent tray 86.

There has been described a novel apparatus for lining the walls of a metallurgical vessel with refractory bricks. Bricks are fed to the vessel on a feed conveyor, and are intermittently transferred by a control conveyor from the feed conveyor to sequential trays of a rotating feed table. The bricks are transferred from the rotating feed table to a first conveyor traveling at proportionate speed. This first conveyor carries the bricks to a discharge point where they are transferred to a second conveyor which deposits them at predetermined locations on the walls of the vessel.

We claim:

1. In an apparatus for lining the walls of a metallurgical vessel with refractory bricks which apparatus in-

cludes support means over the top opening of the vessel, elongated tower means suspended within the vessel from the support means and rotatably movable thereon, and first conveyor means, in the tower and rotatably movable therewith, for conveying bricks vertically within the vessel, the improvement comprising:

a second conveyor means having a laterally extending brick conveying upper surface of adjustable length vertically movable on the tower means for transporting bricks between the tower means and the walls of the vessel at variable heights and distances from the tower means; and wherein

said first conveyor means comprises:

a plurality of sprockets;

two pairs of endless chains traveling in the same direction on a path defined by the sprockets, which path has two vertical runs between upper and lower sprockets rotatably mounted at fixed positions on the tower, one said vertical run having a first portion in which one pair of chains travels in a plane parallel to, and laterally disposed from, the plane of travel of the other pair, and a second vertical portion in which the pairs of chains travel in the same plane, the other vertical run having the pairs of chains travel in the same plane throughout the run;

a plurality of foldable pallets each of which is connected to both pairs of chains at spaced intervals along the chains, which pallets are horizontally suspended between the chains during the first portion of said one vertical run, and are disposed in the same plane as the pairs of chains during the second portion of said one vertical run and throughout the second vertical run; and

a frame having a plurality of sprockets rotatably mounted and arranged thereon to guide one of said pairs of chains along a substantially horizontal path between the two laterally displaced planes of the first portion and the common plane of the second portion of said one vertical run which imparts substantial horizontal movement to the foldable pallets as they pass from said first to second portion of said one vertical run, said frame being vertically movable on the tower to vary the respective lengths of said first and second portions of said one run and to align the horizontally moving foldable pallets between said first and second portions in brick transferring relationship with the second conveyor whereby bricks are conveyed between the exterior of the metallurgical vessel and the interior walls thereof through vertical movement by said first conveyor and lateral movement by said second conveyor.

2. The apparatus defined by claim 1 wherein said second conveyor extends from and is carried by said frame whereby the first and second conveyors remain in brick transferring relationship.

3. The apparatus as defined in claim 1 wherein the sprockets mounted on said movable frame include first and second pairs of sprockets for guiding the first and second pairs of chains respectively from the spaced vertical planes of said one portion of the first vertical run to a common horizontal plane, additional pairs of sprockets around which the respective chains pass all rotatable about a common horizontal axis laterally spaced from said spaced vertical planes to define the lateral extent of the horizontal travel of said pairs of

chains in said common horizontal plane, and further sprockets rotatable about a common axis for guiding said endless chains laterally from said additional sprockets to a common vertical plane in the other portion of said first vertical run whereby the foldable pallets are carried in a horizontal plane between said first and second portions of said one vertical run and discharge bricks onto the second conveyor as they pass around said additional pairs of sprockets.

4. The apparatus defined in claim 1 including platform means extending horizontally from and selectively vertically movable on the elongated tower means independently of and conjointly with the second conveyor means.

5. The apparatus defined in claim 4 wherein the platform means comprises a series of horizontal, radially extending support members having a circular array of gratings thereon, the radially extending members having a telescoping function for forming a circular grating surface of variable diameter.

6. The apparatus defined in claim 4 wherein said second conveyor means is vertically movable on said elongated tower means below said platform means for relining the bottom of the vessel.

7. The apparatus defined in claim 1 wherein the second conveyor comprises:

an endless belt of fixed length;

fixed roller means which define a loading point on the belt; and

movable roller means which are movable laterally to adjust the length of an upper brick conveying surface of the belt and to prevent slack in the belt.

8. The apparatus defined in claim 1, including a rotating feed table for feeding bricks to the charging end of the first conveyor means, adapted to rotate about the tower at a speed of rotation greater than the speed of rotation of the tower.

9. The apparatus defined in claim 9 including:

speed-adjustable motor means for operating the first conveyor, second conveyor and rotating feed table; and

means for transmitting motion from the motor means to the first conveyor, second conveyor and rotating feed table so as to cause the first conveyor, second conveyor and rotating feed table to move cooperatively at speeds proportionate to any selected speed of the motor means.

10. The apparatus defined in claim 8 wherein the rotating feed table comprises a series of radial trays disposed at an angle above the horizontal, interconnected in ring form, and having rollers therein whereby bricks on the trays are urged in a direction generally toward the first conveyor means.

11. The apparatus defined in claim 10 including:

a feed conveyor positioned so as to feed bricks toward the rotating feed table;

a control conveyor for controlling the transfer of bricks from the feed conveyor to the rotating feed table; and

sensing means associated with the rotating feed table, which sensing means detect the presence of a brick on each radial tray when the tray is proximate the control conveyor, and prevent the transfer of a brick from the feed conveyor to the tray if a brick is present on the tray.

12. In an apparatus for lining the walls of a metallurgical vessel with refractory bricks, which apparatus in-

cludes support means over the top opening of the vessel, elongated tower means suspended within the vessel from the support means and rotatably movable thereon, conveyor means supported by the tower and rotatably movable therewith for conveying bricks vertically into the vessel and then horizontally toward the walls of the vessel at variable heights and angular positions, a feed table rotatable about the charging end of the conveyor means in the same direction and at a proportionally faster rate than the rate of rotation of the tower and comprising a ring of trays each having a downwardly and radially inwardly inclined roller surface which urges bricks placed thereon toward the conveyor means, and a feed conveyor for charging bricks on said rotating feed table, the improvement comprising:

control conveyor means between said feed conveyor and said rotating feed table for controlling the transfer of bricks from the feed conveyor to the rotating table, said control conveyor means including:

control means for selectively retaining a brick on the control conveyor and for urging a brick from the control conveyor onto one of the feed table trays; and

sensing means responsive to the alignment of an empty feed table tray with said control conveyor for operating the control conveyor to urge a brick onto the empty tray.

13. The apparatus defined in claim 12 wherein said control means includes drive roller means, a pair of undriven rollers and actuating means for raising and lowering the undriven rollers between a lowered position in which a brick on the control conveyor is engaged by the drive roller means and urged onto a feed table tray

and a raised position in which a brick is supported above and out of engagement with the drive roller means, said actuating means being responsive to the first sensing means to move said undriven rollers to said lowered positions when an empty tray is aligned with the control conveyor.

14. The apparatus defined in claim 13 wherein a brick is gravity fed from the feed conveyor onto the control conveyor when said undriven rollers are moved to their lowered position and including second sensing means responsive to the transfer of a brick from the feed conveyor to the control conveyor for operating the actuating means to move the undriven rollers to their raised position.

15. The apparatus defined in claim 12 wherein each feed table tray includes gate means at the radially inward edge thereof to retain a brick thereon and means for displacing said gate when the associated tray is aligned with the tower supported conveyor means such that the brick is urged onto the tower supported conveyor means by the downwardly and radially inwardly inclined roller surface of the tray.

16. The apparatus defined in claim 15 wherein said gate means includes means operative to render the sensing means inoperative to sense the absence of a brick on the associated feed table tray when the gate has been displaced to allow a brick to pass from the tray to the tower supported conveyor means thereby preventing the control conveyor from transferring a brick to the tray at the same time that a brick is being transferred from the tray to the tower supported conveyor means.

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