Oct. 27, 1970 J. A. SCHARBROUGH ET AL 3,536,592

ROTARY COKE QUENCHING APPARATUS

Filed Sept. 24, 1968 4 Sheets-Sheet 1

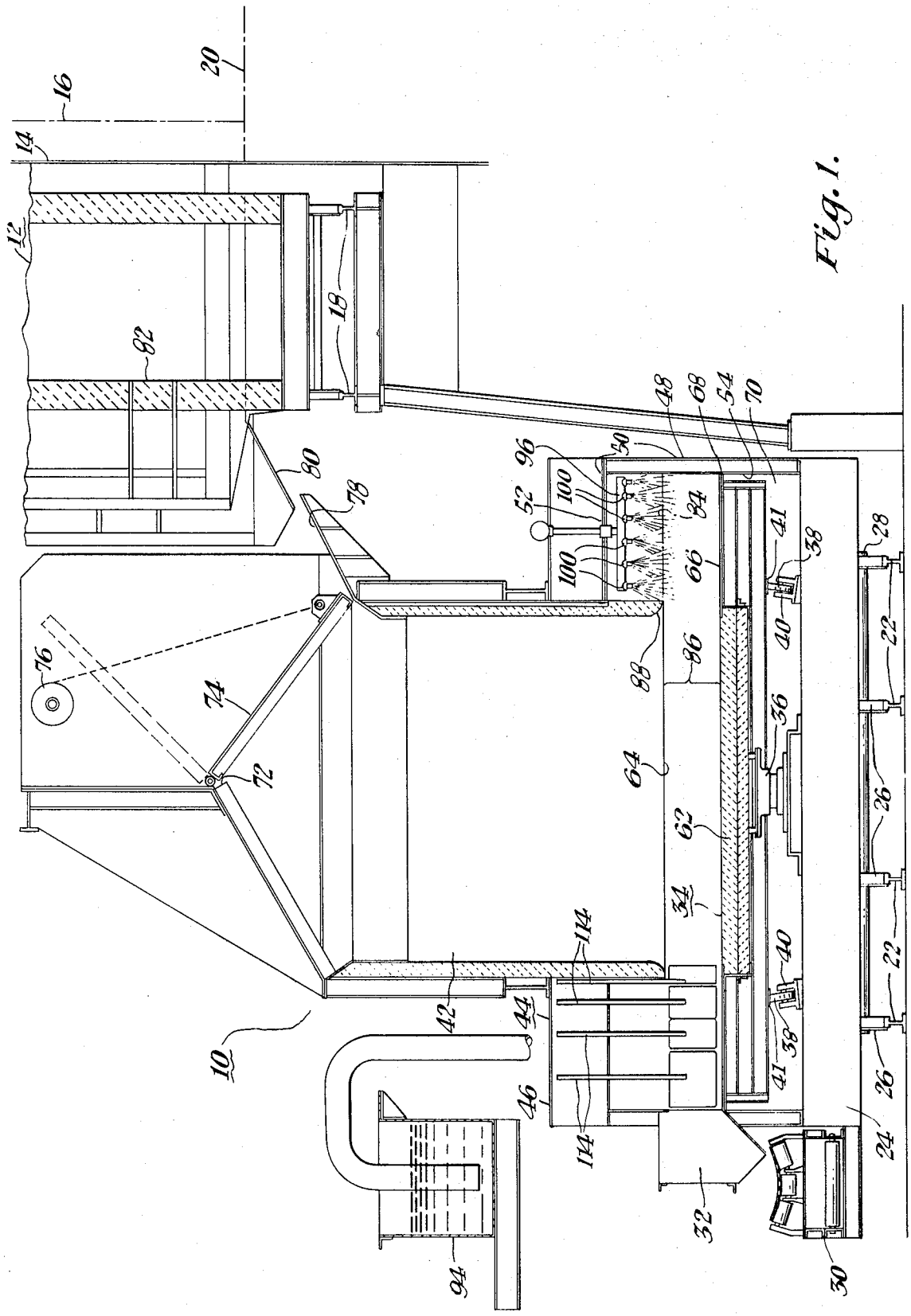

Fig. 1.

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ROTARY COKE QUENCHING APPARATUS

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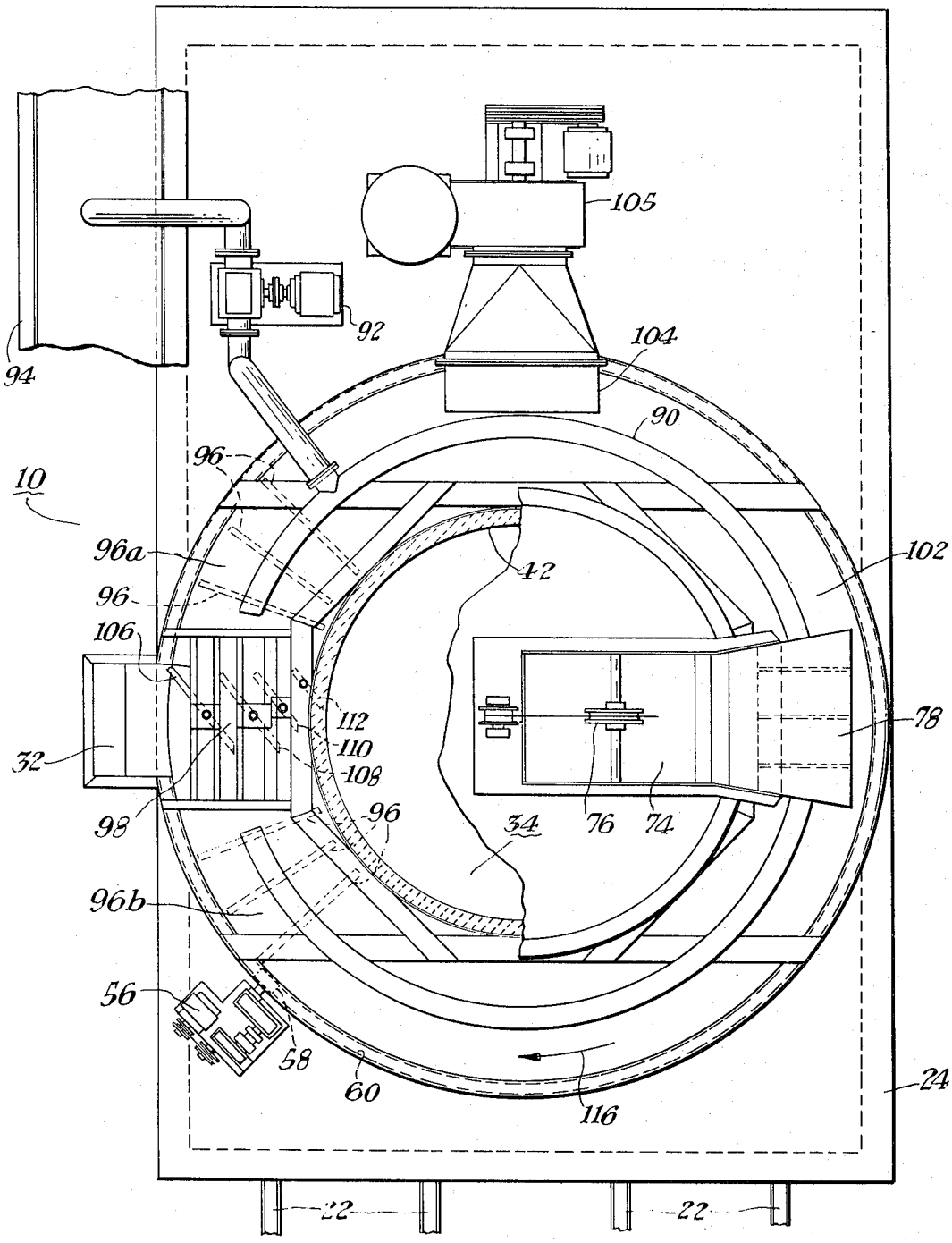

Fig. 2.

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ROTARY COKE QUENCHING APPARATUS

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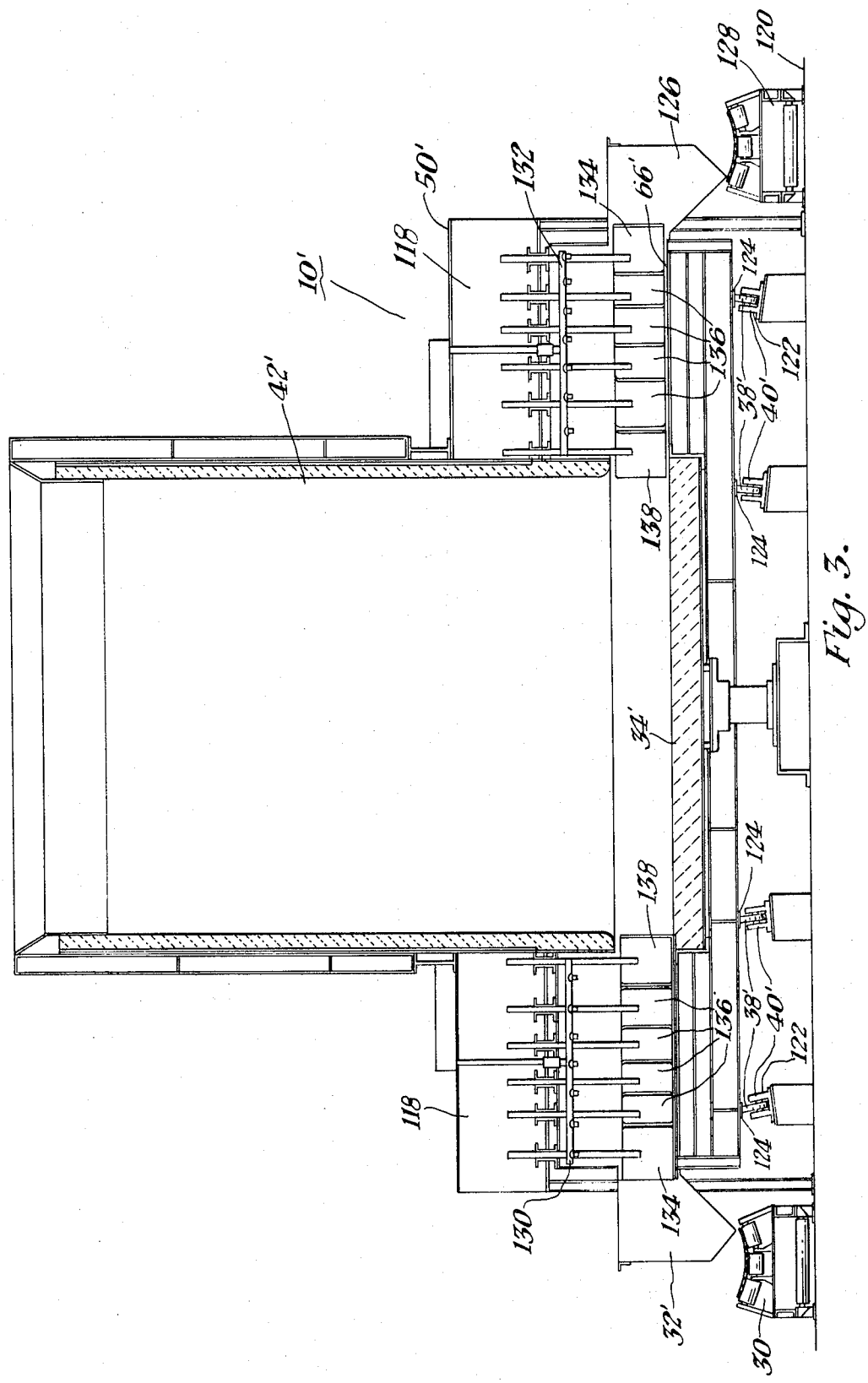

Fig. 3.

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ROTARY COKE QUENCHING APPARATUS

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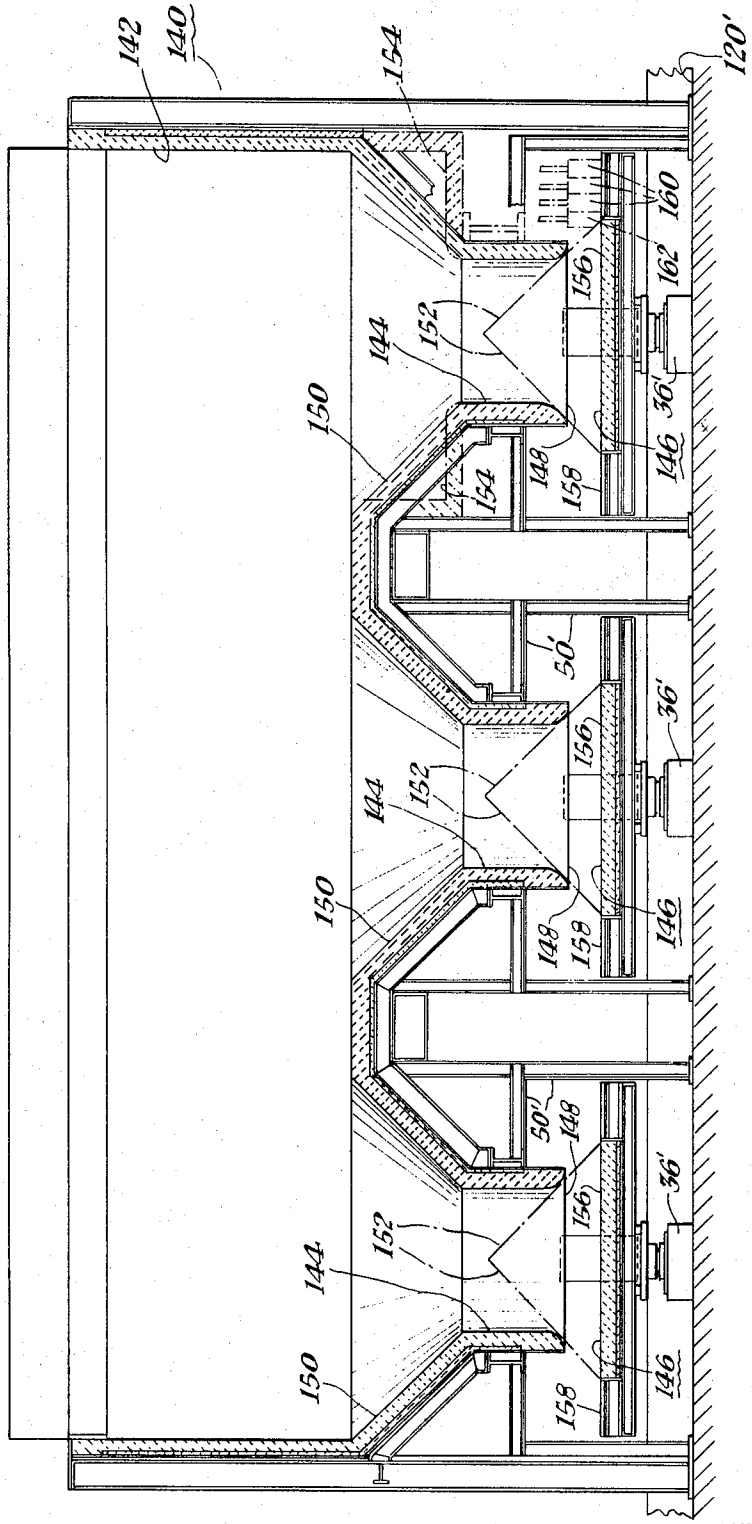

Fig. 4.

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ROTARY COKE QUENCHING APPARATUS

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U.S. Cl. 202—230 19 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed in quenching apparatus, the combination comprising a bin structure having an inlet opening and an outlet opening, a rotary table mounted in spaced relation to said outlet opening so as to receive material to be quenched from said outlet opening upon the central region of said table, means for rotatably mounting and rotating said table, and means for controlling the movement of said material radially outwardly of said central region while subjecting said material to treatment with a quenching fluid.

The present invention relates to apparatus for quenching coke and the like and more particularly to a continuous quenching apparatus. In consequence, the invention discloses several forms of novel quenching apparatus wherein the depth of the coke or other material and the quantity of quenching fluid are controlled to provide uniform quenching and to eliminate hot spots in the quenched material.

Although many quenching arrangements have been previously disclosed, the arrangement in wide spread use at the present time involves charging the coke or other material to be quenched into a railroad car upon discharge from the coke ovens or the like. The car is constructed of steel and sized for handling the entire push or charge from an oven. At the present time a push varies between 12 and 15 tons and is deposited into the car at a depth of approximately three feet. At this time the temperature of the coke is about 1900° F. The railroad car must then be moved by a switch engine to the quenching station where the car is flooded with water. The railway car remains at the quenching station for about 1½ minutes and during this time huge quantities of steam are uncontrollably evolved.

After the quenching operation the car is again moved by switch engine to a brick-lined wharf where the coke is dumped for further cooling. In many cases, a railway car loaded with coke is quenched every five minutes or so, and the switch engine operator frequently has difficulty in locating space on the wharf for discharging the coke. The wharf operator must then visually observe any hot spots in the dumped coke for hand quenching with a water hose. The wharf operator must also, at his discretion, determine when the coke has cooled sufficiently to enter the conveyor belt.

Many disadvantages of this widely used quenching operation are immediately apparent, in addition to the undesirable batch operational feature. Steam is generated irregularly and in large quantities rendering cleaning, control, and subsequent use of the steam virtually impossible. The railway car requires a tremendous amount of maintenance owing to hauling high temperature coke and being alternately subjected to cold water temperatures. Quenching uniformity and the useful life of the wharf conveyor are at the mercy of the wharf operator. The hot coke is not uniformly quenched with the material at the top of the layer receiving far more water than the material at the bottom. The coke therefore is undesirable for certain subsequent uses, for example, blast furnace operation as it is not uniform in moisture content.

As the blast furnace operator does not know the exact moisture content of the coke, he can only guess at the precise carbon content of the blast furnace charge, based on the weight of coke.

We overcome these and other disadvantages of the prior art by providing apparatus for continuously quenching coke or similar hot material. Our apparatus involves a rotary table provided with means for depositing the coke thereon and for turning the deposited charge of coke during the quenching operation to ensure uniform quenching. Controlled quantities of water or other quenching fluid are supplied to the hot material on the rotary table so that the material is uniformly reduced in temperature without release of uncontrolled quantities of steam. Thus, the steam can be reclaimed for subsequent use, as desired.

Various means can be employed for transferring hot coke to the rotary table forming part of my invention. For example, the coke oven can be discharged directly to a hopper or the like which in turn discharges the hot coke centrally of the table. If the aforementioned railroad car be employed for this purpose, it can be refractory lined as it is not subject to subsequent quenching temperatures. Thus, the life of the railroad car is prolonged to a considerable extent along with a great reduction in maintenance.

Our novel quenching apparatus can readily handle the entire push or charge of present day coke ovens. However, the size of our apparatus can be readily changed, as described below in detail, so that the hopper or bin can handle the charges from two or more coke ovens. In the latter case the bin or hopper can be provided, if desired, with two or more outlets and an equivalent number of rotary tables.

Our novel rotary table is arranged for discharging the quenched coke directly to the coke conveyor so that the aforementioned brick lined wharf or the like is eliminated along with the hand quenching operation. As our novel apparatus affords a substantially continuous coke quenching process, considerable time is saved in that the railroad car, if used, is not held up at the conventional quenching station or at the wharf. Further time saving is effected by eliminating subsequent hand quenching and/or cooling upon the wharf.

Most importantly, our novel apparatus provides uniformity of quenched material, a controlled release of salvageable, by-product steam, and a controlled and uniform moisture content in the quenched coke or other material. Blast furnace charging is greatly facilitated as a result.

We are aware of previously proposed quenching apparatus involving rotary structures, for example the U.S. patents to Greyson 2,480,726; Baldwin 1,501,977; and Goodall 928,590.

The Greyson structure includues an annular rotating bin having a grating between an outer shelf portion and an inclined section disposed inwardly thereof. The deposited material is either air cooled or quenched with spray from water pipes. The quenched material is then discharged through the grating to a trough or other receptacle.

The Baldwin apparatus likewise uses a rotary device including a tapered annular bed. Quenching is accomplished by water spray pipes, and the quenched material is removed by a deflecting plate onto a conveyor located between a pair of rails. The rotary device is mounted for movement along these rails for juxtapositioning individually to a battery of coke ovens.

Goodall discloses a quenching water spray from a number of perforated pipes extending across and vertically of a rotatable central structure, which in turn is mounted upon a sliding platform. The material on the rotary structure is discharged by means of a pivoted fence which

guides the material onto a screen and thence into a truck to receive the material.

In the cited patents, the material to be quenched is delivered to the periphery or eccentrically of the rotating structure and there are no means for controlling the depth of the material on the rotary structure. The rotary structure is annular in configuration and is provided with a central fixture for various purposes. A fence or inclined surface of the rotary structure is employed in each case to effect discharge of the quenched materials.

None of these references discloses means for depositing the material to be quenched centrally upon the rotary structure, for uniformly controlling the depth thereof, or for salvaging by-product steam. Moreover, there are no means disclosed for turning the material being quenched. Other differences will be disclosed as this description proceeds.

We accomplish these desirable results by providing in quenching apparatus, the combination comprising a bin structure having an inlet opening and an outlet opening, a rotary table mounted in spaced relation to said outlet opening so as to receive material to be quenched from said outlet opening upon the central region of said table, means for rotatably mounting and rotating said table, and means for controlling the movement of said material radially outwardly of said central region while subjecting said material to treatment with a quenching fluid.

We also desirably provide similar quenching apparatus wherein said quenching fluid is water, said table is substantially enclosed within a hood structure, and duct means are coupled to said hood structure for withdrawing by-product steam therefrom.

We also desirably provide similar quenching apparatus wherein the central area of said table is a high temperature refractory structure, said structure being disposed for initial contact by said material when issuing from said outlet opening.

We also desirably provide similar quenching apparatus wherein said outlet opening is generally planar in contour and said table is mounted in spaced generally parallel relation to said outlet opening such that the space between said table and said outlet opening determines a uniform thickness of said material as the latter is conveyed outwardly to the peripheral portions of said table.

We also desirably provide similar quenching apparatus wherein said motion controlling means includes a plurality of fixed rabbles spaced radially of said table and closely spaced from the material bearing surfaces thereof.

We also desirably provide similar quenching apparatus wherein said bin structure is provided with a plurality of spaced outlet openings, a rotary table is spacedly juxtaposed to each of said outlet openings, and motion controlling means are mounter respectively adjacent said tables.

We also desirably provide similar quenching apparatus wherein said rotary table is mounted upon an apparatus support, means are provided for mounting said support for movement along guideways extending generally along a battery of furnaces capable of producing said high temperature material.

During the foregoing discussion, various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and presently preferred methods of practicing the same.

In the accompanying drawings we have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, wherein:

FIG. 1 is a vertically sectioned view of one form of quenching apparatus arranged in accordance with our invention;

FIG. 2 is a partially sectioned top plan view of the apparatus shown in FIG. 1;

FIG. 3 is a vertically sectioned view of another form of our novel quenching apparatus; and

FIG. 4 is a vertically sectioned view of still another modification of our novel quenching apparatus.

Referring now more particularly to FIGS. 1 and 2 of the drawings the exemplary form of our quenching apparatus **10** in this example is disposed for use with a refractory lined railroad car **12**. In this application the car **12** is individually juxtaposable with a battery of coke ovens in one of which is denoted generally at **14**. Oven **14** is provided with an insulating door **16** and the railroad car **12** is mounted upon a railway structure including rails **18** disposed in this example below the coke oven hearth **20**. It is also contemplated that car **12** be omitted, and the coke or other quenchable material be pushed directly into our novel quenching apparatus.

Depending upon the number of coke ovens in the battery, one or more quenching apparatus **10** can be supplied and mounted upon a railway structure including in this example a number of rails **22**. The quenching apparatus includes a support **24** mounted for movement along the rails **22** by means of railway wheels **26** supported upon a number of axles **28**. Mounted adjacent the apparatus support **24** is a conventional conveyor **30** to which quenched material is supplied from chute **32** forming part of our quenching apparatus **10**.

A rotary table **34** is mounted at its central region upon a pivot structure **36** which in turn is positioned upon the upper surface of apparatus support **24**. The rotary table **34** is stabilized when rotated relative to the apparatus support **24**, by a number of rollers **38** secured to the upper side of support **24** by brackets **40** and engageable with circular track **41** on the lower surface of the rotary table **34**.

In this arrangement of our invention, an open bottom bin **42** is supported directly above the central region of the rotary table **34**. The bin **42** is lined with a suitable refractory material and is supported upon a beam framework **44** or other suitable structure, the details of which are better shown in FIG. 2 of the drawings. Briefly, the beam support **44** includes a number of horizontal beam members **46** supported on vertical posts **48**, which in turn are mounted on apparatus support **24**, as better shown in FIG. 1 of the drawings. A hood **50** including an annular plate **52** and a cylindrical portion **54** substantially encloses the area between the lower end portion or opening **64** of the bin **42** and the upper surfaces of apparatus platform **24**, save for the chute **32**. Within this enclosed area, rotary table **34** is rotated by means of a suitable and conventional drive **56** (FIG. 1), an output pinion **58** of which engages circular rack **60** on the underside of the rotary table **34**.

The rotary table **34**, in this example, is provided with a high temperature or refractory lined central section **62**, which is juxtaposed to the lower opening **64** of the bin **42**. Surrounding the refractory section **62** is an annular steel plate **66** or the like onto which the coke is moved during the quenching operation. As the outer peripheral portion of the rotary table represented by the annular plate **66** is contacted by quenching water, a refractory lining cannot be used in this area. Desirably, the annular plate **66** is removable from the rotary table **34** for replacement or other maintenance. The peripheral edges **68** of the rotary table **34** desirably are closely spaced from the tubular section **54** of the hood **50** to prevent coke or other material to be quenched from dropping into the area **70** generally between the rotary table **34** and the apparatus support **24**.

The bin **42** for quenchable material is provided also with an upper opening **72** and gate **74**, of which the latter can be raised and lowered by suitable mechanism such as a pulley and cable denoted generally at **76**. An inlet chute structure **78** is secured to the bin **42** adjacent

its upper opening **72**. The chute **78** can be juxtaposed to outlet chute **80** of the aforementioned railroad car **12**, as better shown in FIG. 1, or the chute can be juxtapositioned (not shown) for direct unloading of oven **14**. In this example the railroad car is lined with refractory material **82**, as the car is used only for transferring hot coke from the furnace or oven **14** to the quenching apparatus bin **42** and is not subjected to quenching temperatures.

After the hot coke is dumped into the bin **42**, rotation of the rotary table **34** causes the coke to disperse outwardly onto the annular plate **66** of the table **34** at a uniform depth denoted by chain outline **84**. This depth is determined by the distance between the lower outlet **64** of the bin **42** and the juxtaposed refractory section of the table **34** as denoted by dimensional bracket **86**. The dimension **86** can be varied depending upon placement of the table **34** and the desired depth of coke or other material upon the annular plate **66**. To facilitate issue of quenchable material from the bottom opening **64** of bin **42**, the edges of the openings **64** are rounded inwardly as denoted by reference character **88**.

As better shown in FIG. 2 quenching water is supplied by means of ring header **90** which in turn is supplied by motor-pump **92** from water trough **94**. Desirably, the trough **94** co-extends with rails **22** upon which the apparatus platform **24** is mounted. Thus, a supply of water is available irrespective of the position of the quenching apparatus **10** along its track **22**.

A plurality of spray pipes **96** are equally spaced in two groups in this example on either side of exit chute **32** and rabble structure **98** described below. The spray pipes **96** extend radially and transversely of the ring header **90**, and each of the pipes **96**, as in this example, include a plurality of spray nozzles **100** as better shown in FIG. 1. The spray nozzles **100** are spaced along the associated spray pipes **96** and thus provide spray coverage across the radial width of the adjacent portions of the annular plate **66** and the quenchable material thereon.

The remainder of the annular plate **66** is not subjected to a quenching spray so that a period of time is afforded for soaking and the evolution of live steam, while the material to be quenched is revolved upon the rotary table **34**. Thus, the major proportion of the space **102** within the hood **50** and bounded by the groups of spray pipes **96** affords in effect a collector for evolved steam from the quenching operation. In this example, by-products steam is withdrawn from the space **102** by means of duct **104** coupled to a suitable blower **106**.

Turning of the material to be quenched on the annular plate **66** and diverting a portion thereof into the chute **32** are functions of the aforementioned rabble structure **98**. In addition the rabble structure **98** facilitates egress of the material to be quenched from the bin opening **64**. In furtherance of these purposes the rabble structure **98** includes a plurality of rabbles with four such rabbles **106**, **108**, **110** and **112** being employed in this arrangement of the invention. As shown in FIG. 1 the rabbles **106–112** are affixed to a like number of stationary shafts **114**, which desirably are provided with suitable means (not shown) for angular adjustment about their longitudinal axes.

With the quenching apparatus **10** being arranged for rotation of its rotary table **34** in a clockwise direction, as denoted by arrow **116**, the outermost rabble **106** is disposed to deflect a peripheral portion of the material from the annular plate **66** into the chute **32** and thence to transfer conveyor **30**. The remaining rabbles **108–112** provide stepwise turning and displacement of the material radially and outwardly across the annular plate **66**. With the disposition of the rabble structure between the groups of spray pipes **96** the deflection and turning of the material to be quenched by the inward rabbles **108–112** exposes the underportions of the layer of material to the succeeding group of spray pipes **96*a*** (FIG. 2). Additionally the innermost rabble **112** extends into the area directly between the wall structure of the bin **42** adjacent its opening **64** and the outer periphery of the central, refractory region **62** of the rotary table **34**. This extension of the inner rabble **112** assists in the egress of material from the bin **42** to form a continuously and outwardly moving layer of the material upon the annular quenching plate **66** of the rotary table **34**.

The number of spray pipes **96** in each group **96*a*** or **96*b*** of spray pipes will depend on the incoming temperature of the material to be quenched, the dimension or distance **86** between the bin opening **64** and the rotary table **34**, the width of the annular plate **96**, and the rotational rate of table **34**. These variables, together with the sizes of the spray pipes **96** and their nozzles **100** and the water head developed by pump **92** can be readily measured or calculated by those skilled in the art to obtain the parameters of a given application of the invention.

Likewise the size and number of rabbles, such as the rabbles **106–112** can be varied for a given application, although desirably the height of each rabble **106–112** is determined by the dimension **86** as better shown in FIG. 1 of the drawings. The number of rabbles, which can be varied as aforesaid and as shown in FIG. 3 of the drawings, is determined primarily by the radial width of annular plate **66** of FIGS. 1 and 2 or annular plate **66′** of FIG. 3. Desirably, the lower edges of the rabbles are closely spaced from upper surface of the annular plate **66**.

In the quenching apparatus **10′** of FIG. 3 the bin structure **42′** is sized for a considerably larger capacity of hot coke or other quenchable material. The size of the rotary table **34′** is likewise made proportionately larger. The structure of the quenching apparatus **10′** is basically similar to that shown in FIGS. 1 and 2 save that a pair of modified rabble structures **118** and chutes **32′**, **126** are provided and the apparatus **10′** is mounted for stationary operation upon a floor or other suitable support **120**. Consequently, the water trough **94** of FIGS. 1 and 2 is omitted together with the track mounted apparatus support **24**, although it will be understood that the quenching apparatus **10′** can be mounted for movement along suitable tracks therefor in the manner depicted in FIGS. 1 and 2. To support the increased weight of the rotary table **34′** and for additional stabilization, a second array of rollers **122** are provided for engagement with a second circular track **124** on the underside of the rotary table **34′**.

Each of the rabble structures **118** is juxtaposed to an outlet chute **32′** or **126** for conveying quenched material to transfer conveyor **30′** or **128** respectively. As in the case of the rabble structure **98** of FIG. 1 a group of spray tubes **130** or **132** are mounted on each side of each rabble structure **118** of FIG. 3. It will be understood of course that a different grouping of spray pipes can be provided and that other suitable means for applying quenching fluid can be used depending upon the specific application of our invention.

In the arrangement of FIG. 3 each rabble structure **118** includes six rabbles **134**, **136** and **138**. The outermost rabble **134** of each rabble structure deflects a peripheral portion of the layer of quenched material from the annular plate **66′** and into the associated chute **32′** or **126**. The innermost rabbles **138** on the other hand aid in the egress of high temperature material from bin **42′**, as described in connection with the inward rabble **112** of FIGS. 1 and 2. The remaining or intermediate rabbles **136** of each rabble structure **118** provide turning of the material and its stepwise outward and radial movement across the width of the annular plate **66′**. From the outlet chutes **32′** and **126** the quenched material is conveyed from the quenching apparatus **10′** by means of transfer conveyors **30′** and **128** to the site of subsequent use.

It will be understood of course that these regions within the enclosing hood **50′** and disposed generally to the front and rear of the bin **42′**, as viewed in FIG. 3, can be coupled to a by-product steam duct system (not

shown in FIG. 3) including for example the duct and blower **104**, **106** of FIG. 1.

Another arrangement of our invention is illustrated in FIG. 4 of the drawings. The quenching apparatus **140** includes a common bin structure **142** having multiple outlet nozzles **144**, with three such nozzles being employed in this arrangement, although a different number obviously can be employed. A rotary table **146** is disposed in this example below and substantially concentrically of the outlet opening **148** of each nozzle **144**. Each rotary table **146** is provided with one or more rabble structures, outlet chutes, transfer conveyors and a quenching spray system, all of which have been described previously but are omitted from FIG. 4 for clarity. Each rotary table **146** is supported on pivot structure **36'** mounted on a suitable support **120'**. If desired the rotary table **146** can be stabilized by one or more circular arrays of roller structures as shown in FIG. 2 or 3.

Desirably, each rotary table **146** is enclosed in a hood structure **50'** coupled to a by-product steam outlet (not shown). The hood **50'** can be constructed as described previously in connection with FIGS. 1 and 2.

Each outlet nozzle **144** of the bin **142** desirably is connected thereto through a frusto-conical section **150**. Accordingly, movement of hot coke or other material from the bin **142** is directed downwardly and outwardly onto the rotary table **146** as denoted by chain reference lines **152**. Alternatively, the frusto-conical sections **150** can be omitted and rectangular sections denoted by chain outlines **154** thereof can be substituted. However, the build up of residual material in the rectangular sections **154** will assume a frusto-conical shape conforming substantially to the frusto-conical sections **150**. Owing to the downward and outward movement of the material to be quenched as denoted by the chain lines **152** each rotary table **146** is provided with a correspondingly larger central refractory section or hearth **156** in order to accommodate the initial movement of high temperature material from the nozzles **144**.

A water spray system (not shown in FIG. 4) or the like can be mounted above the annular plate **158** of each rotary table **146**, after the manner described in the preceding figures. The rabbles structures for each of the rotary tables **146** can be mounted generally behind or both behind and in front of each nozzle **144** together with outlet chutes (not shown in FIG. 4) for communication with a common transfer conveyor extending generally parallel to the array of rotary tables **146**. Each of the rabble structures, with one such structure being displaced from a desired position behind the nozzle **144** and depicted in chain outline **160** in FIG. 4 can be arranged such that the innermost rabble **162** thereof extends over the outer peripheral edge portion of the rotary table hearth **156**, rather than directly under the wall structure of the outlet nozzle **144**. The inmost rabble **162** is disposed thusly owing to the downward and outward movement of the material to be quenched.

From the foregoing it will be apparent that we have disclosed novel and efficient forms of apparatus for quenching coke and the like. While we have shown and described certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be variously embodied and practiced within the scope of the following claims.

We claim:

1. In quenching apparatus, the combination comprising a bin structure having an inlet opening and an outlet opening, a rotary table mounted in spaced relation below said outlet opening so as to receive material to be quenched from said outlet opening upon a central region of said table, means for rotatably mounting and rotating said table substantially concentrically of said outlet opening, and means for controlling the movement of said material radially outwardly from said central region and for subjecting said material to treatment with a quenching fluid.

2. The combination according to claim **1** wherein said quenching fluid is water, said table is substantially enclosed within a hood structure, said hood structure substantially surrounding said bin structure, and duct means are coupled to said hood structure for withdrawing by-product steam therefrom.

3. The combination according to claim **1** wherein a chute is mounted adjacent an outer periphery of said table and said movement controlling means for conducting material from said table to external transfer means.

4. The combination according to claim **1** wherein supply means for said quenching fluid are mounted generally above a peripheral portion of said table, said supply means at least partially surrounding said bin structure.

5. The combination according to claim **4** wherein said supply means are provided with first and second outlet means disposed one on each side of material deflecting means forming part of said motion controlling means.

6. The combination according to claim **2** wherein said hood is stationary and is generally circular in contour, said rotary table is of similar peripheral contour, and the peripheral edges of said table are closely spaced from juxtaposed surfaces of said hood structure to minimize the loss of said material therebetween.

7. The combination according to claim **1** wherein the central area of said table is a high temperature refractory structure, said structure being disposed for initial contact by said material upon issuing from said outlet opening.

8. The combination according to claim **1** wherein a pheriphery of said outlet opening is generally planar in contour and said table is mounted in spaced generally parallel relation to said outlet opening periphery such that the space between a material receiving surface of said table and said outlet opening periphery determines a uniform thickness of said material as the latter is conveyed outwardly to the peripheral portions of said table.

9. The combination according to claim **1** wherein said motion controlling means include a plurality of fixed rabbles spaced radially of said table and closely spaced from the material bearing surfaces thereof, said rabbles being stepped across a peripheral region of said table and outwardly of the central region thereof.

10. The combination according to claim **9** wherein said rabbles are angularly disposed relative to the direction of movement of adjacent surfaces of said table so that said rabbles provide a stepwise outward turning and displacement of said material upon said table so that each portion of said material undergoes such multiple revolutions with said table as determined by the number of said rabbles.

11. The combination according to claim **10** wherein the innermost one of said rabbles extend into the outer peripheral portion of said table central region to aid in the flow of said material through the space between said table and said outlet opening.

12. The combination according to claim **3** wherein said motion controlling means include a plurality of fixed rabbles positioned in an array extending radially of said table and juxtaposed to said chute, said rabbles being disposed to effect stepwise outward displacement of said material, the outermost one of said rabbles deflecting a peripheral portion of said material into said chute, whereby each portion of said material undergoes multiple revolutions with said table.

13. The combination according to claim **1** wherein said bin structure is provided with a plurality of spaced outlet openings, a rotary table is similarly and spacedly juxtaposed to each of said outlet openings, and quenching and movement controlling means are mounted adjacent each of said tables.

14. The combination according to claim 13 wherein a number of outlet chutes are disposed respectively adjacent said tables for communication with common transfer means.

15. The combination according to claim 8 wherein said motion controlling means include a plurality of fixed rabbles disposed stepwise across said table peripheral portions, each of said rabbles substantially co-extending with said material thickness.

16. The combination according to claim 1 wherein said rotary table is mounted upon an apparatus support, means are provided for mounting said support for movement along guideways extending generally along a battery of furnaces capable of producing said high temperature material.

17. The combination according to claim 16 wherein a refractory lined transfer carriage for said material is interposed for movement generally between said guideways and said furnace battery, said carriage having inlet and outlet openings juxtaposable respectively with said bin inlet opening and an outlet opening of each of said furnaces.

18. The combination according to claim 1 wherein a refractory lined transfer carriage for said material is interposed on guideways between said bin structure and a battery of furnaces producing said high temperature material.

19. The combination according to claim 16 wherein said quenching fluid is water, means are provided for supplying said water to a peripheral portion of said table and outwardly of said central region, a water trough is disposed substantially parallel to said guideways, said trough substantially co-extending therewith, and said supply means include a duct extendable into said trough and movable therealong with movement of said apparatus support.

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