

Feb. 27, 1968

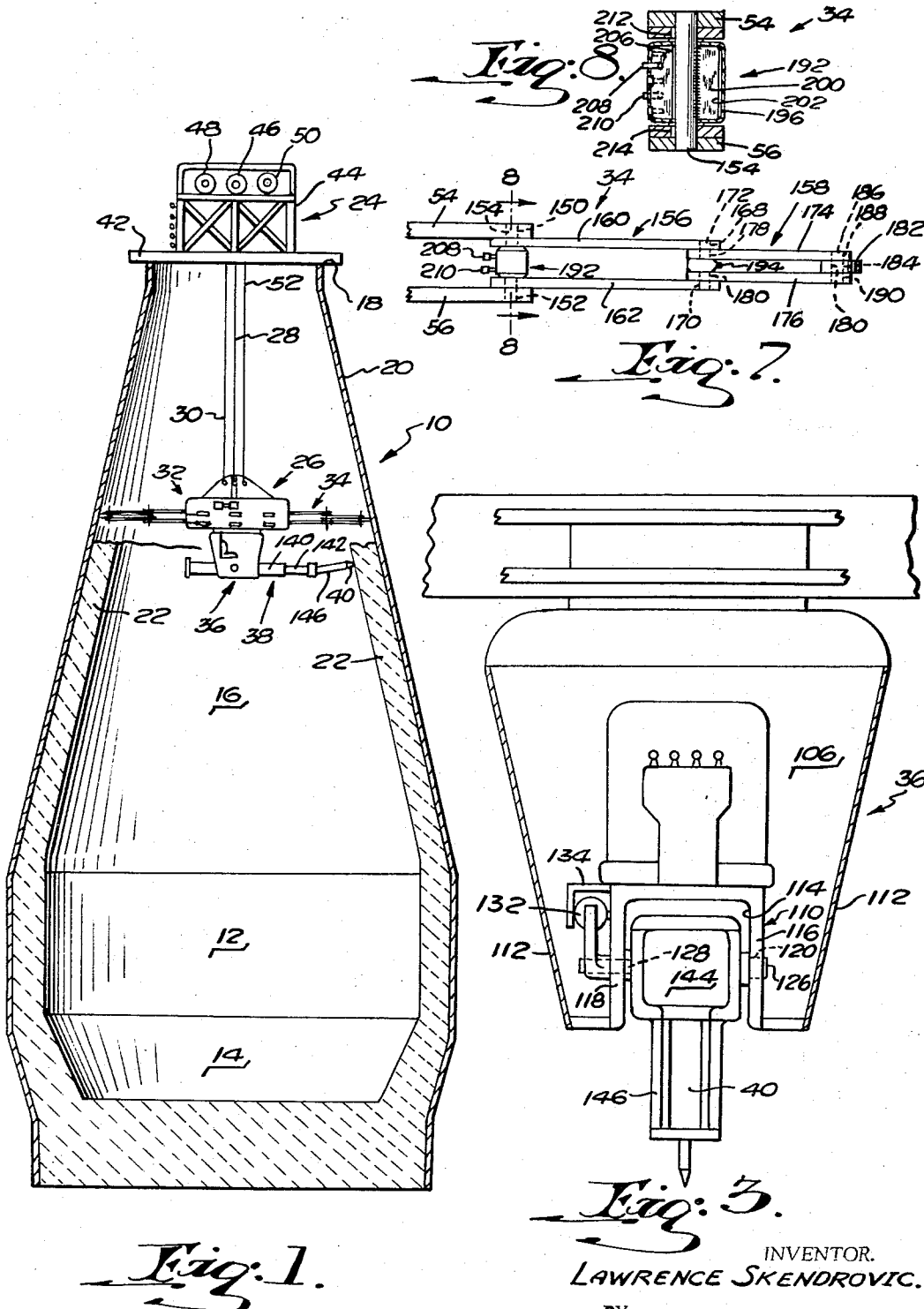
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FURNACE REFRACTORY DELINING APPARATUS

Filed Nov. 8, 1965

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

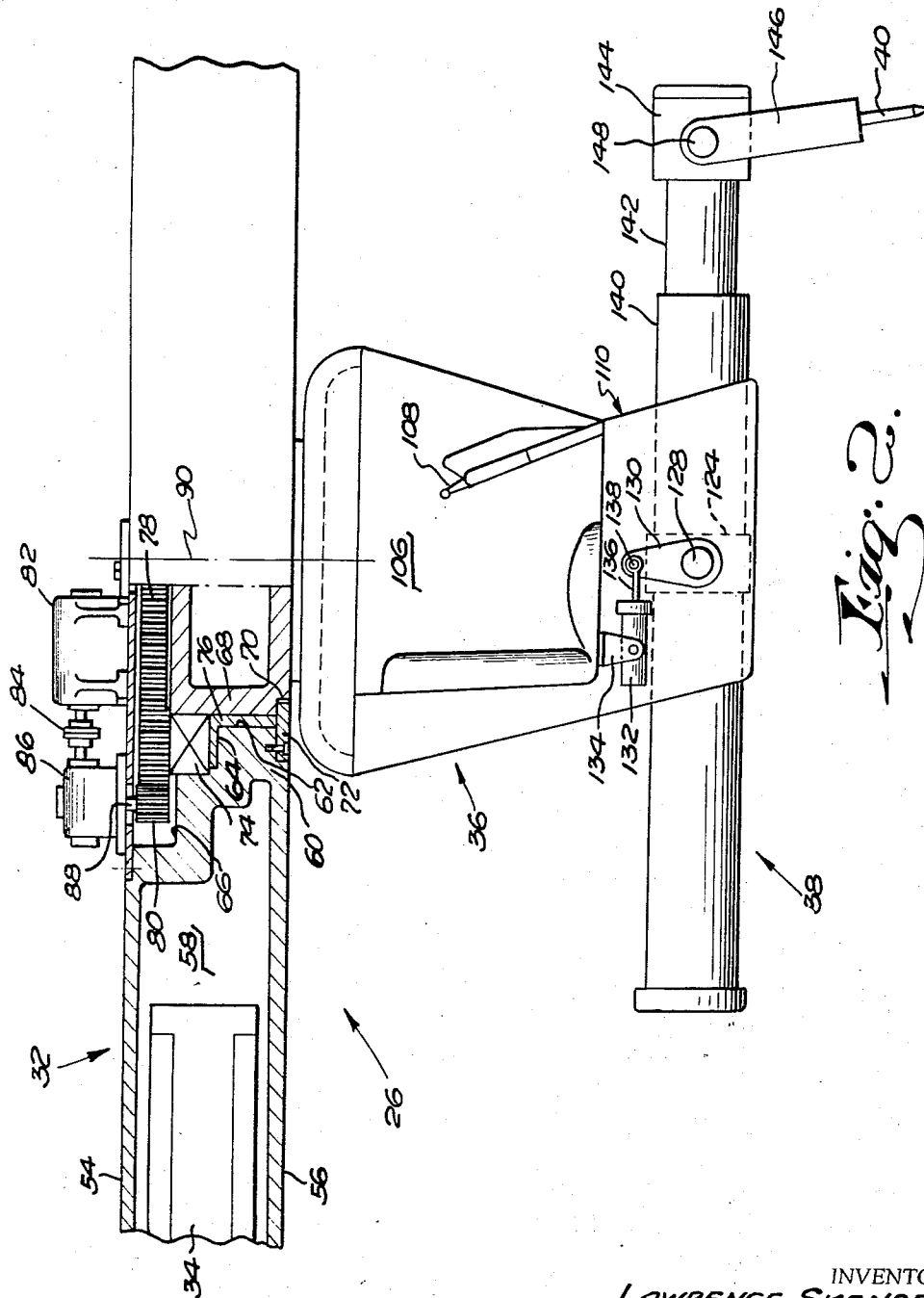


Fig. 2.

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3 Sheets-Sheet 3

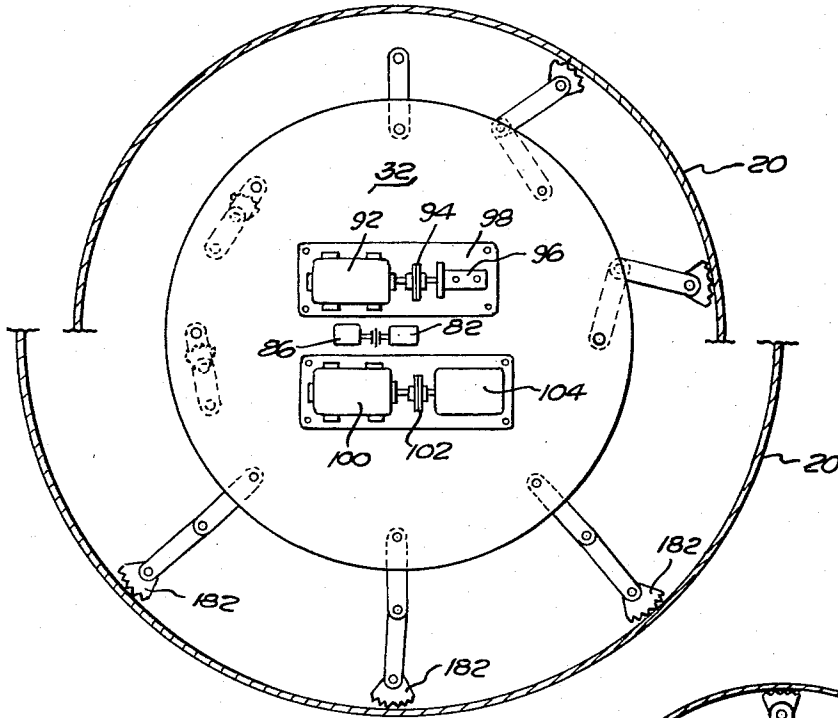


Fig. 4.

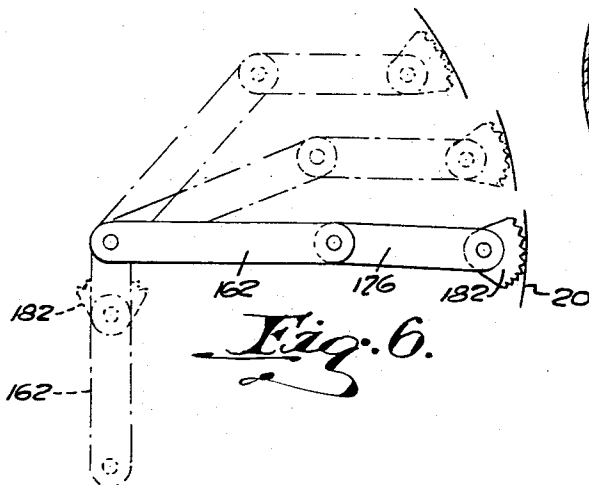


Fig. 6.

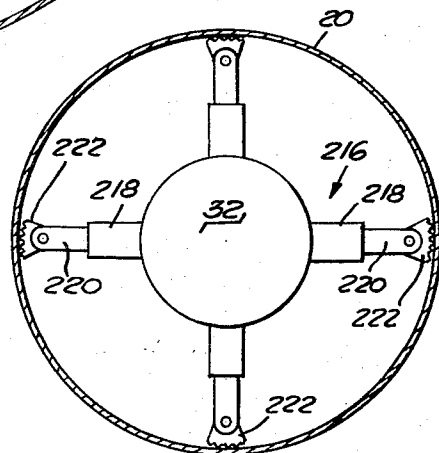


Fig. 5.

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FURNACE REFRACTORY DELINING APPARATUS

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9 Claims. (Cl. 299-70)

ABSTRACT OF THE DISCLOSURE

A furnace delining machine suspended from an overhead support. The delining machine has a stabilizer housing with radially extensible outriggers that engage the side walls of the furnace. A boom support member is rotatably secured to the stabilizer and rotates through 360°. An extensible boom is pivotally connected to the boom support and has a percussive tool pivotally connected thereto. The overhead support has a base portion positioned on the furnace lip and includes reels for cables and conduit connected to the delining machine to support the delining machine and to supply power and air thereto. The boom support has an operators compartment with suitable controls for operation of the delining machine.

This invention relates to furnace refractory delining apparatus and more particularly to refractory delining apparatus that includes a furnace delining machine suspended within a furnace and maintained in operative position by means of a self-contained positioning means.

In large industrial furnaces such as blast furnaces and the like it is necessary to periodically replace the furnace refractory lining. Before a new refractory lining can be installed the existing refractory lining must be removed from the metallic furnace wall. It has been the practice in the past, especially in blast furnaces to erect a support on the top of the blast furnace and to suspend a platform from the support. The platform is lowered into the internal portion of the furnace and either mobile furnace delining machines as described in my copending application No. 504,024 entitled, "Mobile Furnace Delining Machine," filed on Oct. 23, 1965 or men with manually operated percussive tools positioned on the platform remove the old refractory lining from the furnace walls by dislodging pieces of the old refractory lining. The diameter of the platform lowered into the furnace must be continuously increased because of the diverging furnace wall. The erection and positioning of the platform within the furnace requires a substantial labor force and is expensive and time consuming. With the present invention the fabrication of the support member and the platform is eliminated and a single operator is used to both control the position of the delining machine within the blast furnace and to remove the refractory material from the furnace wall.

Briefly, my invention is directed to furnace delining apparatus that includes a self-contained portable rig or support member that is mounted on top of the furnace across the furnace lip. The portable self-contained rig has cable reeling means for support cables that suspend a furnace delining machine within the blast furnace. The furnace delining machine has a plurality of radially adjustable outriggers that are maintained in abutting relation with the furnace wall. The furnace delining machine also has an extensible boom member that is rotatable about a vertical axis to position an end portion of the extensible boom in operative relation to dislodge the refractory material around the inner circumference of the furnace. The boom is pivotally mounted to move in a vertical plane and has a percussive tool holder connected to an end portion thereof. The tool holder has a percussive

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tool mounted therein and is pivotally connected to the end of the extensible boom to move in a vertical plane relative thereto. With this arrangement, a single operator stationed on the furnace delining machine controls the relative position of the delining machine within the blast furnace and also operates the furnace delining machine to remove the refractory material from the furnace walls.

Accordingly, the principal object of this invention is to provide a furnace delining machine that is suspended within a blast furnace and includes means to maintain the furnace delining machine in a preselected position relative to the blast furnace wall.

Another object of this invention is to provide furnace refractory delining apparatus that includes a support member positioned on the upper portion of the furnace and suspending a furnace delining machine within the furnace.

These and other objects and advantages of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

In the drawings:

FIGURE 1 is a sectional view in vertical elevation of a blast furnace with the furnace refractory delining apparatus positioned therein and suspended from an overhead support means.

FIGURE 2 is a fragmentary view in elevation of the stabilizer housing boom support member and extensible boom with the percussive tool secured thereto.

FIGURE 3 is a fragmentary view in front elevation of the apparatus illustrated in FIGURE 2.

FIGURE 4 is a composite view in section of the blast furnace taken at different elevations and illustrating the manner in which the stabilizer housing is maintained in fixed spaced relation to the metal walls of the blast furnace.

FIGURE 5 is a view similar to FIGURE 4 illustrating a stabilizer housing with four outriggers extending radially therefrom and abutting the walls of the blast furnace.

FIGURE 6 is a fragmentary view in plan illustrating the manner in which the extensible outriggers abut the metallic furnace walls at different elevations within the furnace.

FIGURE 7 is a fragmentary view in side elevation of the stabilizer housing and the outrigger extending radially therefrom.

FIGURE 8 is a view in section taken along the line 8-8 of FIGURE 7 illustrating the hydraulic actuator for extending and retracting portions of the outrigger.

Referring to the drawings and particularly FIGURES 1-5 there is illustrated my improved refractory delining apparatus positioned within a conventional blast furnace. The blast furnace is generally designated by the numeral 10 and has a bosh section 12, hearth section 14 and inwardly diverging stack section 16 that terminates in an annular lip portion 18. The conventional blast furnace 10 has a metallic shell 20 with a refractory lining 22. The refractory lining 22 comprises conventional refractory bricks suitably tied to the metallic shell 20. It is the practice to replace the refractory lining 22 after predetermined periods of use. To replace the refractory lining 22 it is necessary to first dislodge the existing lining and thereafter to replace the lining in a conventional manner. As previously stated, in the past it was necessary to erect a platform within the furnace 10 and remove the refractory lining at the level of the platform, permitting the dislodged refractory lining to fall to the hearth section of the furnace where it was removed in a conventional manner. The platform was suspended from the upper portion of the furnace and lowered in increments of about four feet to permit the removal of about four feet of refractory material around the wall or shell of the furnace.

It was necessary to continually increase the diameter of the platform as it was lowered into the furnace because of the diverging configuration of the blast furnace stack portion 16.

In FIGURE 1 there is illustrated my improved refractory delining apparatus that includes a support member generally designated by the numeral 24 that is supported on the annular lip 18 of furnace 10. The support member 24 is a portable unit easily transportable from one blast furnace to another. A delining machine generally designated by the numeral 26 is suspended from the support member 24 by means of a pair of cables 28 and 30. The furnace delining machine 26 includes a stabilizer housing generally designated by the numeral 32 that has extensible outriggers generally designated by the numeral 34 that abut the inner wall of the furnace metallic shell 20. A boom support member designated by the numeral 36 is rotatably secured to the stabilizer housing 32 in a manner that the boom support member 36 may rotate through a 360° arc. An extensible boom generally designated by the numeral 38 has a percussive tool 40 secured thereto which is operable to penetrate and dislodge the refractory lining 22. The extensible boom 38 is pivotally connected to the boom support member 36, as will be later explained. Further, the percussive tool 40 is pivotally connected to the end of the extensible boom 38 so that it may assume various positions relative thereto for dislodging the refractory material 22.

Referring now in greater detail to the refractory delining apparatus, the support member 24 has a base portion 42 that may be fabricated of structural steel or the like and has suitable means to secure the base portion 42 to the blast furnace lip 18. The base portion 42 has a reel support portion 44 extending upwardly therefrom which supports a main cable reel 46. The main cable 28 secured to the stabilizer housing 32 is wound on the cable reel 46. Suitable drive and braking means are also provided on the reel support portion 44 to control the main cable 28. A second cable reel 48 is rotatably secured to the reel support portion 44 and is connected to the safety cable 30 which is also connected to the stabilizer housing 32. A third cable reel 50 is positioned on the reel support portion 44 and has an electrical conduit 52 reeled thereon. Conventional drives are provided for the respective reels 46, 48 and 50 to control the length of the cables and conduits wound thereon. It should be understood that additional reels may be provided for other conduits that may be required for operation of the delining machine 26.

Referring now to FIGURES 2 and 3, the furnace delining machine 26 that is suspended from the support 24 is illustrated in detail. The furnace delining machine 26 includes a stabilizer housing 32 that is generally circular in plan, as illustrated in FIGURE 4, and has an upper wall 54 and a lower wall 56 with an annular receiver 58 therebetween. The receiver 58 is arranged to have the outriggers 34 therein when the outriggers are in a retracted position as is illustrated in FIGURE 2. The stabilizer housing 32 has a central portion 60 with a central aperture 62 therethrough and a first shoulder portion 64 and a second shoulder portion 66. The boom support member generally designated by the numeral 36 has an upwardly extending circular member 68 that is positioned in the stabilizer housing aperture 62. The circular member 68 has an in-turned shoulder portion 70 and an annular keeper plate 72 is secured to the wall 56 of stabilizer housing 32 to maintain the boom support circular member 68 within the aperture 62. An annular thrust bearing 74 is positioned in the aperture 62 and abuts the first shoulder portion 64. Other bearings 76 are provided to permit rotation of the circular member 68 within the aperture 62. A gear 78 is secured to the circular member 68 and meshes with a pinion gear 80 that is arranged through the meshing relation to rotate the circular member 68 and thus the boom support member 36.

There is provided on the upper wall 54 an electric motor 82 with a flexible coupling 84 coupling the motor shaft with a right angle reducer 86. The reducer 86 has a shaft 88 connected to the pinion 80. With this arrangement, actuation of motor 82 rotates the pinion 80 and thus, through the gear 78, rotates the boom support member 36 about the vertical axis 90 of support member 36.

There is also provided on the top surface of upper wall 54 an electric motor 92 that is connected through a flexible coupling 94 to a hydraulic pump 96. The pump 96 has a suitable reservoir 98 therebelow so that the hydraulic pump 96 can supply hydraulic fluid at preselected pressures to the various hydraulically actuated components of the delining machine 26, as will be later described. Also positioned on top of the stabilizer housing 32 is another electric motor 100 that is connected through a suitable flexible coupling 102 to an air compressor 104 that supplies compressed air to the compressive tools, as later described.

The boom support member 36 has an operator's compartment 106 secured to the circular member 68. The compartment 106 is preferably enclosed and houses the operator therein and has the various controls 108 that actuate the various hydraulic, electrical and air systems for the delining machine 26. The various hydraulic, electrical and air connections between the controls 108 and the motors and the devices actuated thereby are not shown. It should be understood, however, that conventional means connecting the various components may be utilized.

The operator's compartment 106 is arranged to straddle the boom member 38 and the support member 36 has a U shaped bracket 110 suitably secured to the side walls 112 to form an elongated recess portion 114. The bracket 110 has vertical walls 116 and 118 with aligned apertures 120 and 122 therethrough. The boom member generally designated by the numeral 38 has a trunnion 124 with shafts 126 and 128 extending therefrom through the receiving apertures 120 and 122 in the vertical walls of bracket 110. With this arrangement, the boom 38 is free to pivot about the trunnion shafts in a vertical plane. Connected to trunnion shaft 128 is a lever bracket 130. An actuating cylinder 132 is pivotally connected to the bracket 110 by a bracket 134. A rod 136 extends from the actuating cylinder 132 and is connected to the bracket 130 by means of a pin connection 138. With this arrangement longitudinal movement of the rod 136 pivots the boom 38 about the transverse axis so that the boom is movable in a vertical plane.

The boom 38 is preferably cylindrical in shape and has a tubular cylindrical body portion 140 that is secured to the trunnion 124. An extensible portion 142 is telescopically positioned within the body portion 140. Suitable hydraulic means within the body portion 140 is provided to extend and retract the portion 142. The tubular extensible boom 38 may have a construction similar to that illustrated in my co-pending application Ser. No. 504,024 filed Oct. 23, 1965, and entitled, "Mobile Furnace Delining Machine."

Connected to the end portion of the extensible portion 142 is a tool mounting head 144 with a tool holder 146 pivotally connected thereto. Suitable hydraulic actuating means within the tool holder mounting head 144 is arranged to pivot the tool holder 146 in a vertical plane relative to the longitudinal axis of the extensible portion 142. The hydraulic actuator within the mounting head 144 is arranged to pivot the tool holder 146 about the transverse shaft 148 and may have a construction similar to the tool holder mounting head illustrated and described in my co-pending application Ser. No. 504,024 filed Oct. 23, 1965, and entitled, "Mobile Furnace Delining Machine."

A conventional percussion tool 40 is mounted in the tool holder and air under pressure is supplied from compressor 104 thereto through suitable conduit means. The

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tool mounting head 144 may also be constructed to permit the tool holder 146 to rotate about the longitudinal axis of the tubular boom 38 and contain hydraulic actuators similar to the actuators described in my co-pending application Ser. No. 504,024 filed Oct. 23, 1965, and entitled, "Mobile Furnace Delining Machine."

Referring now in greater detail to the outriggers 34 that maintain the delining machine 26 in operative relation with the furnace wall 20, as illustrated in detail in FIGURES 4 through 7, the stabilizer housing upper and lower walls 54 and 56 have a plurality of aligned apertures 150 and 152 therethrough for receiving a shaft 154 that forms a part of the outrigger 34, as is illustrated in detail in FIGURE 8. The outriggers 34 have an inner member 156 and an outer member 158. The inner member 156 has a pair of parallel spaced members 160 and 162 that have apertures 164 and 166 therethrough that are aligned with apertures 152 and 154 in the stabilizer housing walls 54 and 56. The shaft 154 extends through the respective apertures and pivotally connects the members 160 and 162 to the stabilizer housing in spaced parallel relation to each other. The members 160 and 162 have apertures 168 and 170 on the opposite ends thereof to receive another shaft 172. The outrigger outer portion 158 also has upper and lower members 174 and 176 that are arranged in parallel spaced relation to each other. The upper and lower members 174 and 176 have apertures 178 and 180 therethrough adjacent the rear end portion that are aligned with apertures 168 and 170 in the outrigger inner member 156. The shaft 172 extends through the respective aligned apertures to pivotally connect the outrigger outer member 158 with the outrigger inner member 156. A wall gripper 182 has an aperture 184 extending therethrough. The wall gripper 182 is positioned between the outrigger outer member portions 174 and 176. A shaft 186 extends through aperture 184 in the gripper 182 and through apertures 188 and 190 in the outrigger members 174 and 176. The shafts 154 and 172 form a part of hydraulic actuators generally designated by the numerals 192 and 194. The hydraulic actuators 192 and 194 are of similar construction and each includes a body portion 196, as illustrated in FIGURE 8, with a cylindrical chamber 198 therein. The shaft 154 has a vertical vane 200 secured thereto and extending radially therefrom. The vane has a suitable peripheral seal 202 that abuts the inner wall of chamber 198. Similarly, the body portion 196 has a vane member 204 extending radially inwardly in the chamber 198 and has a peripheral seal 206 extending therearound and abutting the shaft 154. There are provided passageways 208 and 210 for pressurized fluid on opposite sides of the vane 204 extending inwardly into the chamber 198. With this arrangement fluid under pressure entering through one of the passageways 208 or 210 will exert a force on the vane 200 to rotate the shaft 154 connected thereto within the body portion 196. The shaft 154 is suitably splined to the members 160 and 162 by means of splines 212 and 214 so that the inner member 156 rotates with shaft 154. The shaft 154 is rotatably supported in the stabilizer housing upper and lower walls 54 and 56 to permit the inner member 156 to rotate relative to the stabilizer housing 32. The hydraulic actuator 194 is similar to hydraulic actuator 192 and the shaft 172 is similarly splined to the members 174 and 176 so that the outer member 158 is rotatable relative to inner member 156.

FIGURES 4 and 6 illustrate the manner in which the outriggers 34 are adjusted radially relative to the stabilizer housing 32. For example, where the delining machine 26 is adjacent the bosh section of the furnace, the outriggers are extended in a manner illustrated in the lower portion of FIGURE 4. Where the machine 26 is adjacent the upper portion of the stack, the outriggers may assume one of the two positions

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illustrated in phantom lines in the upper portion of FIGURE 4. Where it is desired, the outrigger outer portion 158 may rotate and be positioned between the members 160 and 162 of the outrigger inner portion 156, as is illustrated in phantom lines adjacent the top portion of FIGURE 4. Where it is desired, the outriggers 34 may be positioned within the stabilizer housing, as is also illustrated in phantom lines in the upper portion of FIGURE 4. FIGURE 6 is another fragmentary view of the outriggers in different adjusted positions.

FIGURE 5 illustrates another embodiment of the invention wherein the stabilizer housing 32 has a different outrigger arrangement thereon. The outriggers illustrated in FIGURE 5 are designated generally by the numeral 216 and have a first tubular section 218 and an extensible section 220 positioned therein. A gripper 222 is secured to the end of the telescopic section 220 and suitable hydraulic actuating means are provided to telescopically extend and retract the portions 220 relative to the tubular section 218 to thereby maintain the wall grippers 222 in abutting relation with the furnace wall 20. Where desired, provisions may also be made to retract the tubular section 218 relative to the stabilizer housing 32 so that the delining machine 26 may be easily removed from the furnace 10 through the upper portion defined by the upper lip 18.

The hydraulic actuators 192 and 194 on each outrigger may have a positive pressure exerted by means of the hydraulic fluid through one of the passages 208 or 210 to maintain a radial outward force on the outrigger against the furnace wall 20 to thereby rigidly secure the stabilizer housing against the furnace wall. Suitable locking or safety means may also be provided to positively lock the outriggers in an extended position against the furnace wall 20 so that the delining machine 26 will be supported by the outriggers in the event of power failure or loss of suspension by means of the cables 28 and 30.

The refractory furnace delining apparatus described now makes it possible to rapidly erect the necessary superstructure to support a furnace delining machine within a blast furnace. The support member 24 is preferably constructed of structural members making a self-contained portable power package containing the drive systems, reels, cables and electrical system. The base portion of support member 24 is positioned on the blast furnace lip 18 and secured thereto. The delining machine 26 with the outriggers 34 retracted is secured by means of cables 28 and 30 to the reel support portion 44. The reel support portion 44 is preferably so constructed that the cables 28 and 30 may be wound on the reels 46 and 48 so that the boom support member 36 is adjacent to the support member base portion 42. The operator may easily enter the operator's compartment 106 from the support member base portion 42. The operator within compartment 106 has control of the apparatus for reels 46 and 48 and controls the lowering and elevating of the delining machine 26 within the furnace. The operator within the compartment 106 also controls the relative position of the outriggers 34 and moves the outriggers into abutting relation with the furnace wall 20. Preferably, the hydraulic system for the outriggers is so arranged that the outriggers extend or retract radially from the stabilizer housing 32 and maintain substantially the same peripheral dimension therefrom. The operator within the compartment 106 also controls the relative position of the boom support member 36 and may rotate the boom support member about a vertical axis therethrough to position the percussive tool around the internal periphery of the furnace 10. The operator within compartment 106 also controls the relative telescopic position of the boom extensible portion 142 and the position of the tool holder 146. The operator actuates the percussive tool 40 to penetrate the refractory lining and dislodge the same. For example, the percussive tool 40 is actuated and the tool holder 146 is maintained in the position illustrated

in FIGURE 1. The boom extensible portion 142 is moved outwardly to permit the percussive tool 40 to penetrate the refractory material. The tool mounting head 144 is then actuated to pivot the tool holder 146 about the shaft 148, preferably in a counterclockwise or upward direction to dislodge a piece of the refractory material from the refractory lining. The dislodged piece of refractory lining will fall by gravity to the hearth section of the furnace 10. The operator then rotates the boom support member about its vertical axis to again reposition the boom 38 and again dislodge an adjacent piece of the refractory lining. This procedure is continued until a peripheral segment of the lining is removed from the furnace wall 20. The outriggers are then retracted slightly and the delining machine 26 is lowered to a new position adjacent the remaining refractory lining. The outriggers are then extended by the operator in compartment 106 to again abut the walls of the furnace 10 and the same procedure is followed with the delining machine to again deline a peripheral segment of the refractory lining. The stepwise procedure is continued until the refractory lining has been removed from the furnace wall 20. The delining machine 26 may then be removed from the blast furnace by means of elevating the machine to the support member 42 and the support member 42 is detached from the furnace lip 18 and lowered to the ground level by suitable crane mechanisms. At this location the support member 24 may be dismantled for transportation to another job site.

It will be apparent with the above described furnace refractory delining apparatus that the refractory lining of large industrial furnaces such as blast furnaces may now be rapidly removed with a minimum amount of labor.

According to the provisions of the patent statutes, I have explained the principle, preferred construction, and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiments. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Furnace refractory delining apparatus comprising, a furnace delining machine having a stabilizer housing, a boom support member connected to said stabilizer housing and rotatable relative thereto about a vertical axis of said boom support member, an extensible boom member having a cylindrical body portion and an extensible portion, said cylindrical body portion pivotally and non-rotatably connected intermediate its end portions to said boom support member for pivoting about a pivot axis beneath said boom support member, said extensible boom member arranged to pivot in a vertical plane relative to said boom support member, a tool holder mounting head pivotally secured to an end portion of said extensible boom member, a tool holder connected to said mounting head, means to pivot said tool holder in a vertical plane relative to said extensible boom member, a percussive tool mounted in said tool holder and extending forwardly therefrom, extensible means connected to said stabilizer housing and arranged to abut the inner wall of a furnace and maintain said furnace delining machine in a fixed position relative to the inner wall of said furnace while said percussive tool dislodges refractory lining therefrom.

2. A furnace refractory delining apparatus as set forth in claim 1 which includes a support member arranged to be positioned on and secured to the upper lip of a furnace,

said support member having cables secured thereto and depending downwardly therefrom,

said cables secured to said furnace delining machine and arranged to suspend said furnace delining ma-

chine within said furnace from said overhead support member secured to the upper lip of a furnace and supply power to said furnace delining machine to actuate said percussive tool and said extensible means.

3. Furnace refractory delining apparatus as set forth in claim 2 in which said extensible means includes, a plurality of outriggers pivotally connected at one end to said stabilizer housing and spaced about the periphery of said stabilizer housing, and

means to pivot said outriggers relative to said stabilizer housing to move said outrigger other end portions radially outwardly in a substantially horizontal plane into abutting relation with the inner wall of a furnace and maintain said furnace delining machine in a fixed position relative to the inner wall of said furnace while said percussive tool dislodges refractory lining therefrom.

4. Furnace refractory delining apparatus as set forth in claim 2 in which said extensible means includes, a plurality of outriggers pivotally secured to said stabilizer housing in spaced relation to each other and adjacent the periphery of said stabilizer housing, said outriggers each comprising a first member pivotally secured at one end to said stabilizer housing, a second member pivotally secured at one end to the other end of said first member, and means to pivot said first member relative to said stabilizer housing and said second member relative to said first member to move said second member other end portion radially outwardly into abutting relation with the inner wall of a furnace and maintain said furnace delining machine in a fixed position relative to the inner wall of said furnace while said percussive tool dislodges refractory lining therefrom.

5. Furnace refractory delining apparatus as set forth in claim 2 in which said stabilizer housing includes a peripheral slotted portion,

said extensible means includes a plurality of outriggers each comprising, a first member having one end portion positioned in said stabilizer housing peripheral slotted portion and pivotally secured to said stabilizer housing,

said first member having a longitudinally slotted portion therein,

a second member pivotally secured at one end to said first member other end portion,

first fluid pressure operated means to pivot said second member relative to said first member and operable to position said second member within the longitudinally slotted portion of said first member,

second fluid pressure operated means to pivot said first member relative to said stabilizer housing and operable to position said second member within said stabilizer housing peripheral slotted portion,

said first and second fluid pressure operated means operable to radially extend said first member and second member outwardly beyond the periphery of said stabilizer housing and into abutting relation with the inner wall of a furnace to thereby maintain said furnace delining machine in a fixed position relative to the inner wall of said furnace while said percussive tool dislodges refractory lining therefrom.

6. Furnace refractory delining apparatus as set forth in claim 2 which includes,

an operators compartment associated with said boom support member, and

control means within said operators compartment to extend and retract said extensible boom member, pivot said boom member, pivot said tool holder mounting head, rotate said boom support member, and actuate said percussive tool, so that an operator within said compartment controls the relative position of the furnace delining machine components to dislodge the refractory lining from an inner wall of a

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furnace while said furnace delining machine is suspended from an overhead support member.

7. Furnace refractory delining apparatus as set forth in claim 1 in which said boom support member has an upwardly extending portion with a circular spur gear secured thereto,

5 said stabilizer housing having a central vertical aperture therethrough, said boom support member upwardly extending portion positioned in said aperture and rotatably secured to said stabilizer housing,

10 a pinion gear meshing with said spur gear and rotatably secured to said housing, and

means to rotate said pinion gear to thereby drive said spur gear and rotate said boom support member about a vertical axis thereof.

15 8. Furnace refractory delining apparatus as set forth in claim 2 in which said support member includes a base member arranged to be secured to the upper lip of a furnace,

20 said base member having upstanding members forming a reel support portion spaced above said base portion, and

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a plurality of reels rotatably mounted on said reel support portion,

said cables secured to said reels arranged to move said furnace delining machine to a position adjacent to said support member base portion to permit access to the furnace delining machine from said support member base member.

9. Furnace refractory delining apparatus as set forth in claim 2 which includes,

fluid pressurizing means positioned on said stabilizer housing and operable to provide fluid under pressure to the fluid actuated component positioning means.

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