Feb. 12, 1946. C. R. JEFFREYS 2,394,858

APPARATUS FOR SMOOTHING FURNACE WALLS

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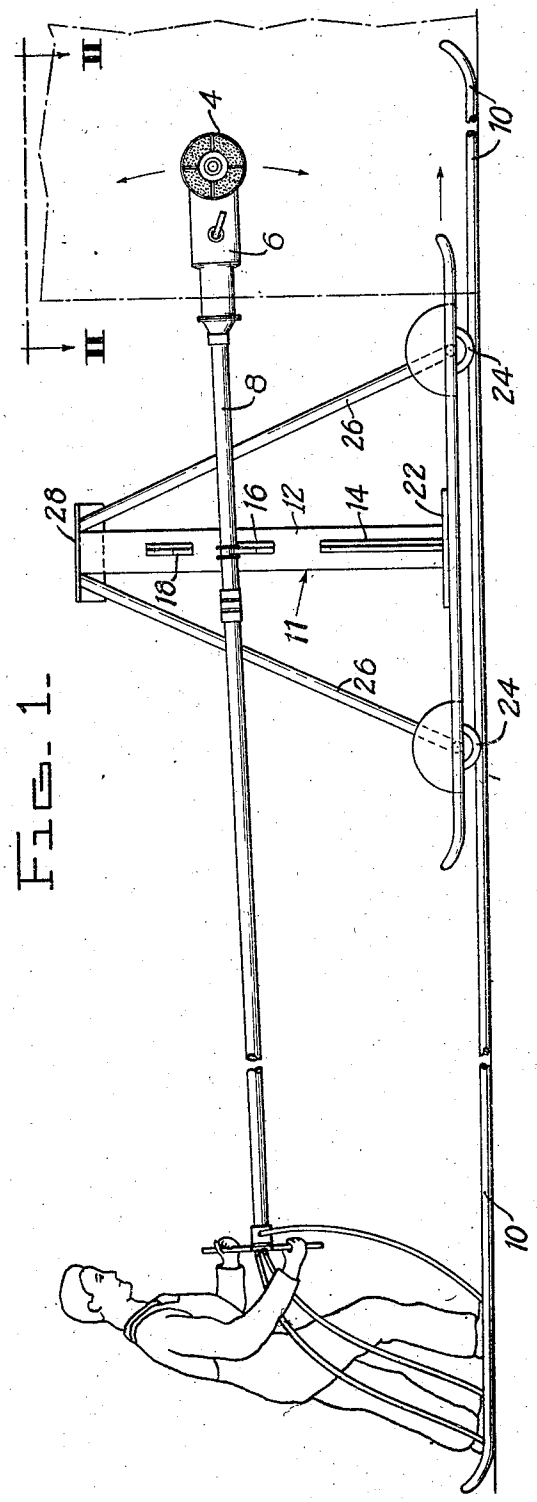


Fig. 1.

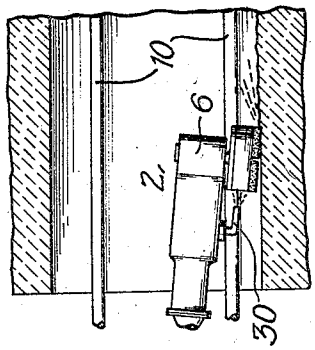


Fig. 2.

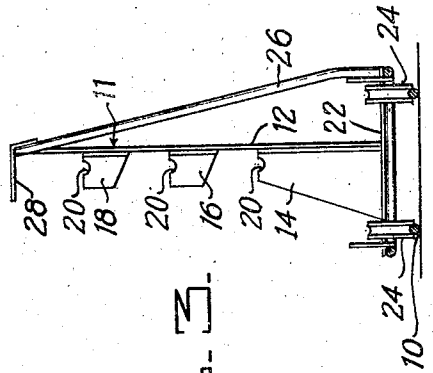


Fig. 3.

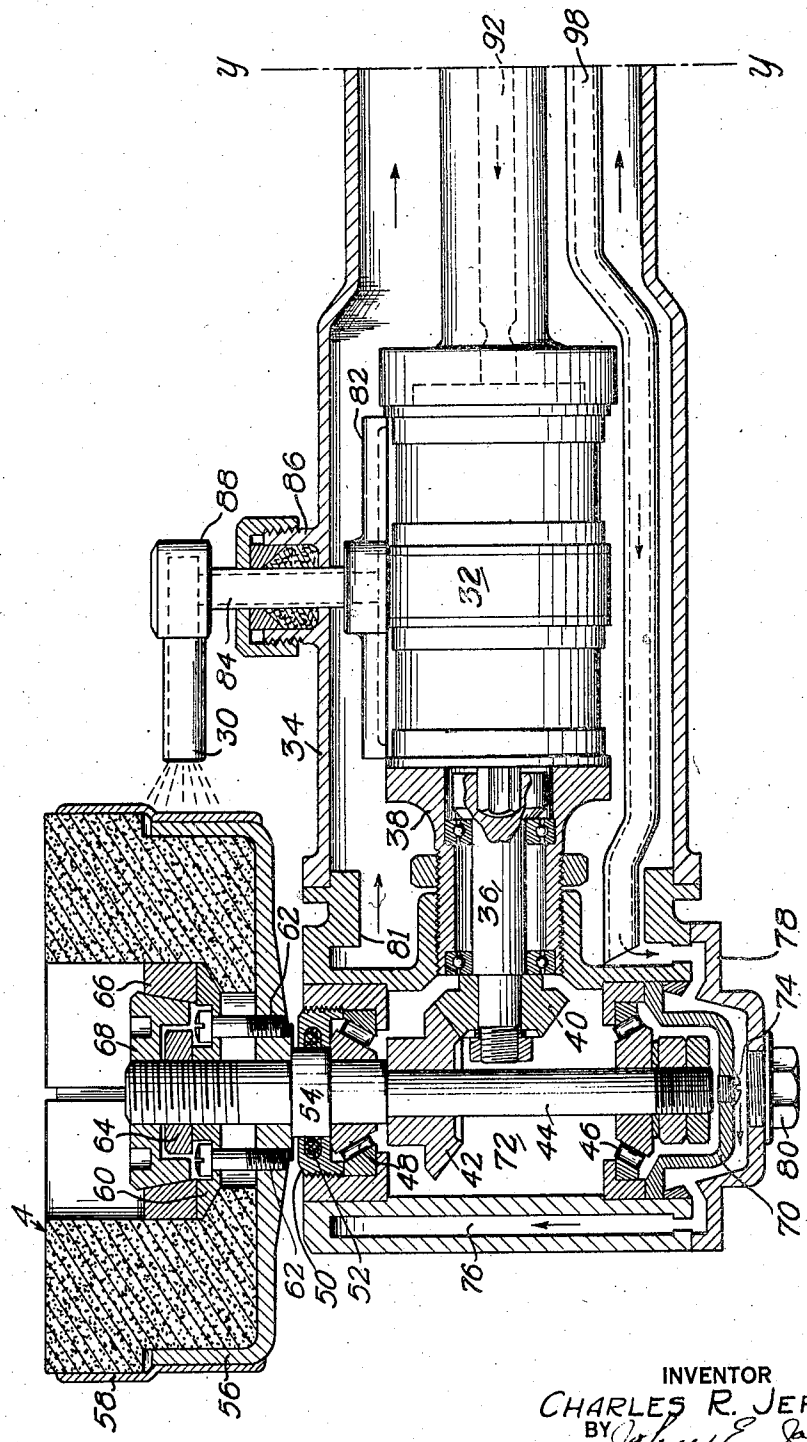
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Fig. 4.



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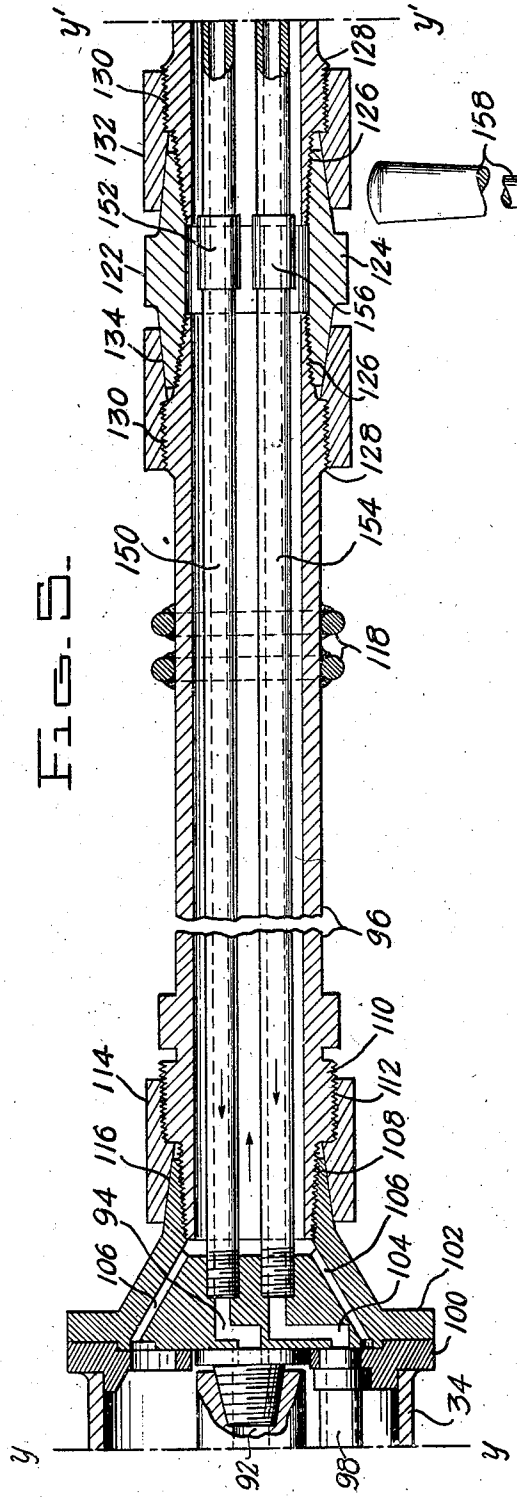


Fig. 5.

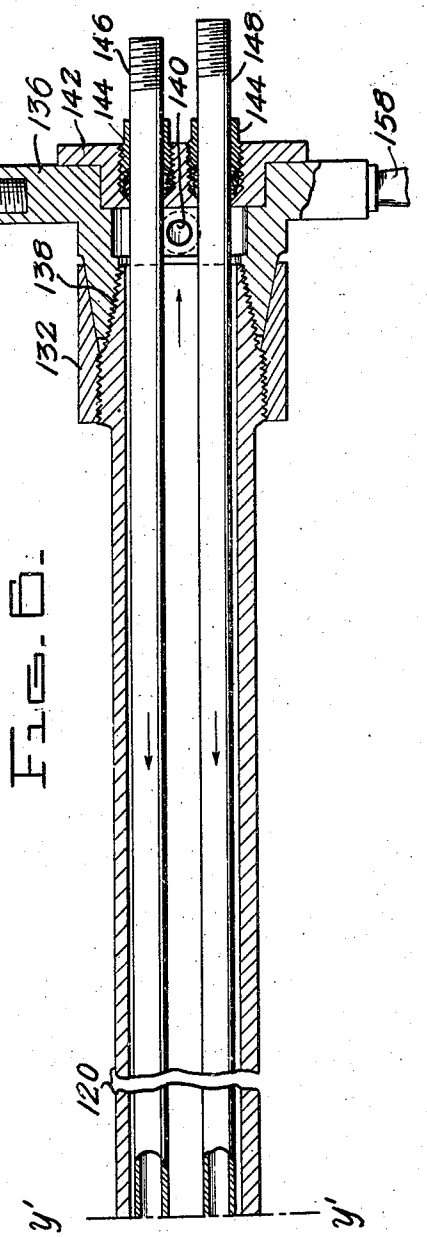


Fig. 6.

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APPARATUS FOR SMOOTHING FURNACE WALLS

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2 Claims. (Cl. 51—170)

This invention relates to apparatus for smoothing hot furnace walls.

It is often desirable to repair or smooth hot furnace walls, such as those of the coking chambers of by-product coke ovens. A plurality of these chambers are arranged side by side with heating chambers between them. Each coking chamber is approximately twenty inches on the discharge end and a few inches narrower on the pusher end. As the coke is pushed from the oven it tends to dig into the walls and pockets are gradually formed therein. Since the ovens are very close together, it is impossible to cool an oven down to a temperature at which a man could work while operating the adjacent oven. It has also been discovered that a patch applied while the oven is hot will give better service than one applied while cold. For these reasons it is considered desirable to patch an oven while hot. After the patch is applied it must be smoothed in order to enable the coke to be pushed out of the oven without snagging on the walls.

It is an object of this invention to provide apparatus for smoothing hot furnace walls.

This and other objects will be more apparent after referring to the following description and attached drawings in which:

Fig. 1 is a view showing the appartus in position for smoothing the walls of a coke oven.

Fig. 2 is a plan view taken on line II—II in Fig. 1.

Fig. 3 is an end view of the support for the grinding wheel of the invention.

Figs. 4, 5 and 6, combined, show the grinder and extension therefor used in practicing the invention.

The invention will be described as applied to the repairing of the walls of the coking chamber of a coke oven, but it will be understood that it may be used in repairing or smoothing the hot walls of other types of furnaces.

Referring more particularly to the drawings, reference numeral 2 indicates the discharge end of a coking chamber. The walls of this end of the chamber are often dug out by the coke as it is pushed out of the oven. The temperature of the chamber with the adjacent ovens in operation is about 1600° or 1700° F. To repair the hot walls a refractory is sprayed into the pockets in the wall. Several layers of the refractory are applied until the wall has been built up to slightly more than the desired thickness. The sprayed walls are rough and it is necessary to smooth them in order to enable the coke to be removed from the oven. This is done by grinding the walls as shown in Figs. 1 and 2. The grinding wheel 4 is driven by an air motor 6 having an extension 8 connected thereto. This extension may be lengthened or shortened as required to enable the operator to manipulate the grinding wheel at various distances from the end of the oven. A portable rail 10 supports a movable carriage 11 which may be constructed as desired. As disclosed it is formed from a plate 12 having brackets 14, 16 and 18 fastened thereto. Each of the brackets has a groove 20 for supporting the extension at various heights. The bottom of the plate 12 is fastened to a plate 22 which supports wheels 24 for movement on the rail 10. Reinforcing members 26 extend between the ends of plate 22 and a bent plate 28 fastened to the top of plate 12.

The operation is as follows: After the patch has been applied the rail 10 is put in the desired position and the carriage 11 placed thereon. Preferably the outer end of the chamber is smoothed first. The grinder is placed with the extension 8 resting in the desired groove 20 and the operator swings the wheel in an arc about the groove to grind the projections from the wall. The air from the motor exhausts through the pipe 30 against the wheel to cool it and blow the dust away from the vicinity of the wheel in order to enable the operator to see the work clearly. When the limit of movement of the wheel from one position is reached the extension 8 is moved to another bracket and a higher or lower section of the wall is ground. To work on a different longitudinal section of the wall, the grinder along with the carriage 11 is shoved longitudinally along the track 10. When the carriage 11 reaches the end of the track 10, the track is moved further into the furnace.

The above procedure is followed until the entire wall is smooth. To smooth the walls of the other end of the chamber the apparatus is taken to the pusher end of the furnace and the same operation is performed.

The details of the grinder used in smoothing the walls is illustrated in Fig. 4. An air motor 32 is enclosed in a water jacket 34. The motor shaft 36 is mounted in a bearing housing 38 attached to the motor. The motor drives the grinding wheel 4 through the shaft 36, bevel gears 40—42, and grinding wheel shaft 44 mounted in bearings 46 and 48. Bearing 48 is held down by means of a left hand threaded nut 50 which has an oil seal 52 and fits over the enlarged section 54 of the shaft 44. The wheel chuck 56 is fabricated steel construction and is machined after

welding to fit the sectional grinding wheel. The safety guard 58 is a machine steel slip ring which can be adjusted up or down by means of screws in the chuck wheel. Plate 60 is a retaining and clamping device for keeping the stone sections in place in the chuck and is held in place by screws 62. A nut 64 is screwed on the shaft 44 to clamp the grinding wheel in place. A taper ring 66 is cut into four segments after machining. When the tapered nut 68 is screwed on the shaft 44 it causes the ring 66 to expand the sectional stones out toward the chuck and at the same time hold down the whole assembled grinding unit against the shoulder on shaft 44.

A plate 70 separates the cooling water from the lubricating grease in the gear box 72. A grease plug 74 is removed to apply grease to the gear box 72. The gear box 72 has a cooling water chamber 76. The bottom of this chamber is covered by a plate 78 which is provided with a removable plug 80 for draining the water from the chamber 76 and providing access to the plug 74. The water jacket 34 is connected to the flange 81 of gear box 72. On the side of the motor toward the grinding wheel is an exhaust manifold 82 to which is connected the pipe 84 which passes through a conventional stuffing box 86. The swivel joint 88 is fastened to the outer end of the pipe 84 and a pipe 30 extends from the swivel joint toward the grinding wheel. The exhaust air is directed from the pipe 30 against the grinding wheel to cool it and blow dust away from the grinding wheel to clear the vision of the operator.

An air passage 92 extends to the end of the jacket 34 and matches with an air passage 94 in an extension 96. An inlet water pipe 98 extends from the outer end of the jacket 34 to the water passage in the gear box. The water fills the remaining portions of the jacket 34. A flange 100 on the jacket 34 is connected to a flange 102 on the extension 96. The flange 102 has an opening 104 which leads to the water inlet 98. Passages 106 drain the heated water from the jacket 34. The flange 102 is screwed to the extension 96 by means of pipe threads 108. The extension has a raised portion 110 having straight threads 112 for receiving a reinforcing nut 114 having a tapered portion 116 for engaging with a corresponding taper on the flange 102. Spaced rings 118 are welded to the extension 96 to prevent the grinder from slipping on the support 11. The other end of the extension 96 is formed with two threads in the same manner as the end next to the water jacket. The rear section of pipe 120 is formed in the same manner as the extension 96. The two sections are fastened together by means of a coupling shown in Fig. 5. A sleeve 122 having a hexhead 124 has pipe threads 126 on each end thereof for receiving the corresponding threads of sections 96 and 120. Adjacent the pipe threads the sections of pipe have raised portions 128 with straight threads 130 for receiving reinforcing nuts 132. These nuts have tapered portions 134 cooperating with corresponding tapered portions on the sleeve 122. While other types of coupling could be used to unite the two sections, this particular coupling is shown and described because it is extra strong and rigid.

A handle head 136 is screwed on the outer end of section 120 and the connection is reinforced by nut 132. The handle head has a warm water drain 140 therein. To the outer side of the handle head, there is fastened a gland plate 142 having two packing boxes 144 for receiving the compressed air pipe 146 and the cooling water pipe 148. A section of pipe 150 is threaded into the flange 102 and is connected to the compressed air pipe 146 by means of coupling 152. A cooling water pipe 154 is threaded into the flange 102 and is connected to the cooling pipe 148 by means of coupling 156. Handles 158 are screwed into the handle head 136. It will be understood that additional sections of pipe may be inserted between the sections 96 and 120 in order to give the required length of extension.

The operation of the grinder is as follows: After the motor has been assembled with the extensions thereon, the cooling water pipe 148 is connected to a source of water. The water passes through the pipes 148 and 154, through the passage 104 and the pipe 98 to the cooling water chamber 76 and the space within the jacket 34. The warm water passes out through the passage ways 106, the extensions 96 and 120 and is discharged from the outlet 140. Compressed air is supplied to the motor through the pipes 146 and 150, and passages 94 and 92. The exhaust air passes through the manifold 82, pipe 84, swivel joint 88 and pipe 30 and is discharged against the grinding wheel.

While one embodiment of the invention has been shown and described, it will be apparent that other adaptations and embodiments may be made without departing from the scope of the attached claims.

I claim:

1. A hot furnace grinder comprising a grinding wheel, an air motor for rotating said grinding wheel, means for directing the exhaust air against the grinding wheel and means for supplying a coolant to said motor.

2. A hot furnace grinder comprising a grinding wheel, an air motor for rotating said grinding wheel, means for directing the exhaust air against the grinding wheel, a housing for said motor, an extension connected to said housing, means on the free end of said extension for operating said grinder from outside the furnace, and means for supplying a coolant to said motor through said casing.

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