March 12, 1940. H. F. GIBBS ET AL 2,193,403

REMOVABLE AIR-COOLED AND INSULATED SLAG POT

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Fig. 3.

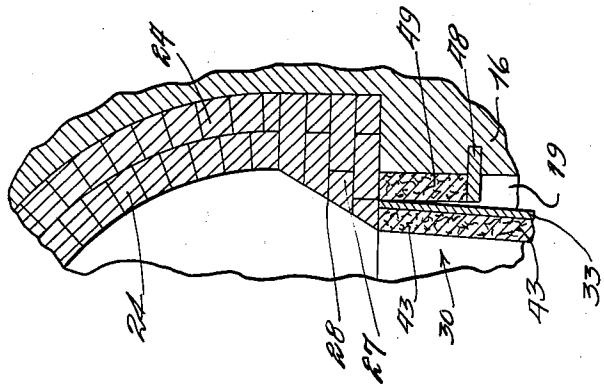
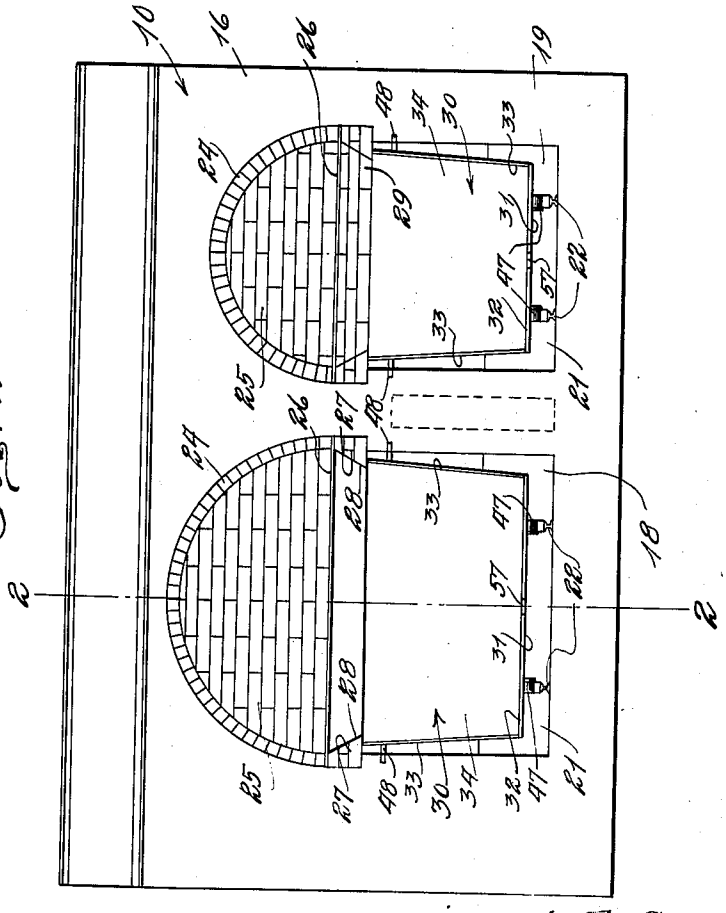


Fig. 1.



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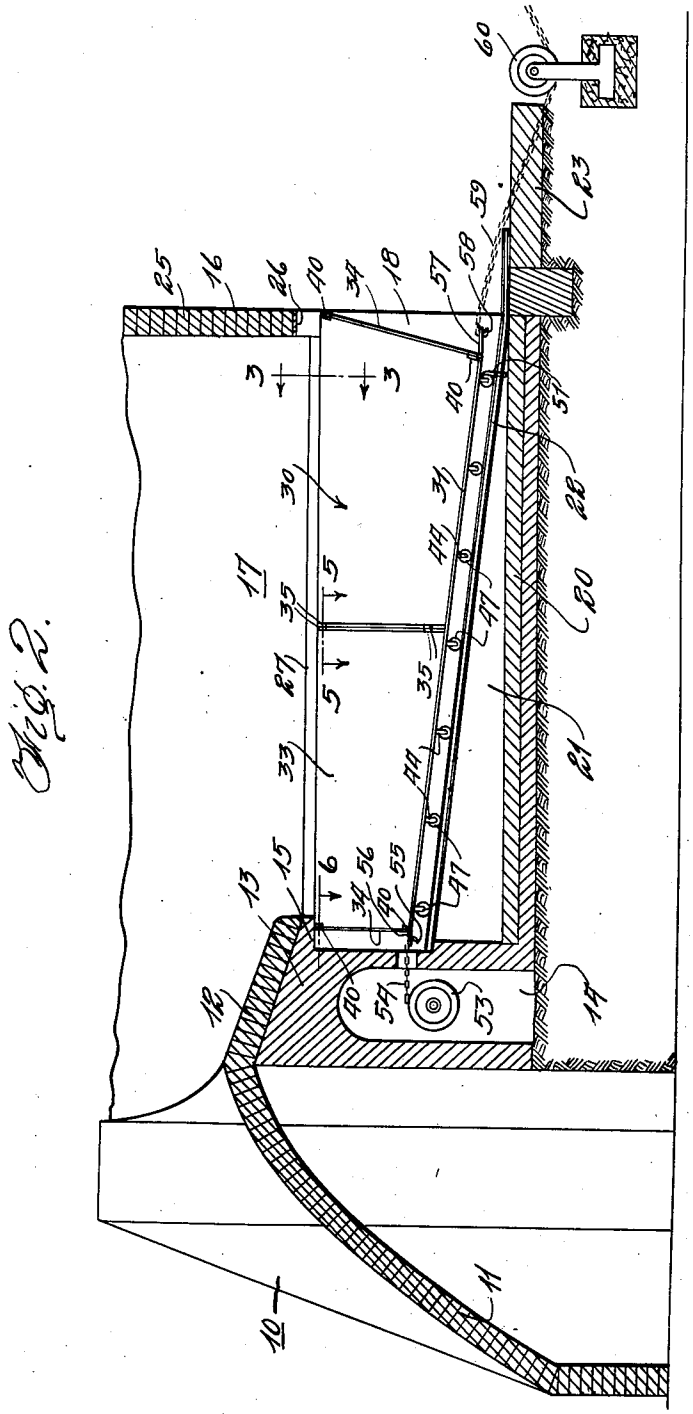
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REMOVABLE AIR-COOLED AND INSULATED SLAG POT

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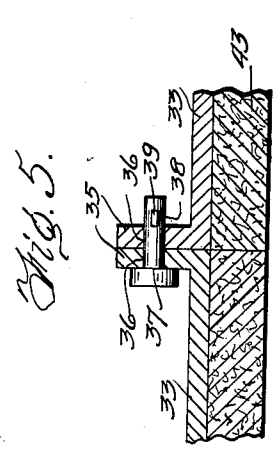


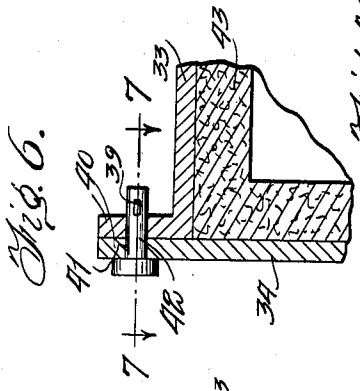
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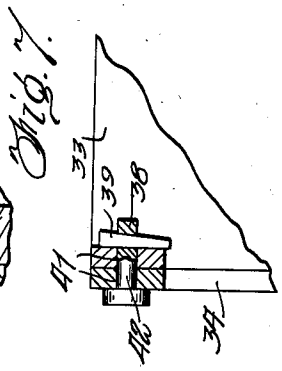
March 12, 1940. H. F. GIBBS ET AL 2,193,403

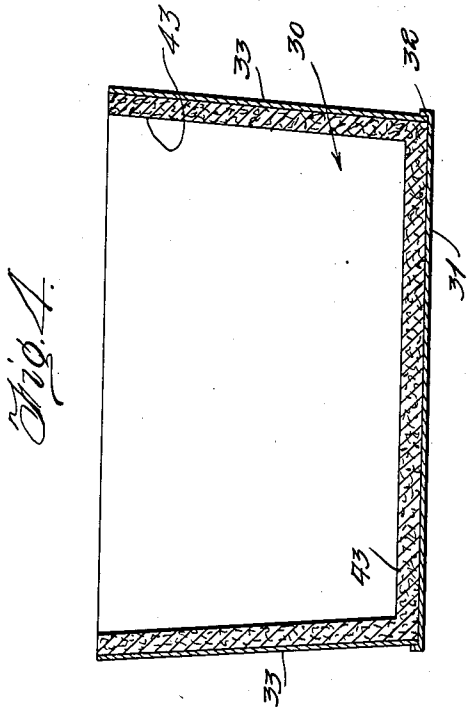
REMOVABLE AIR-COOLED AND INSULATED SLAG POT

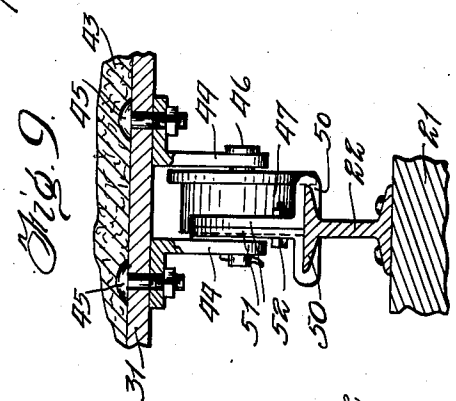
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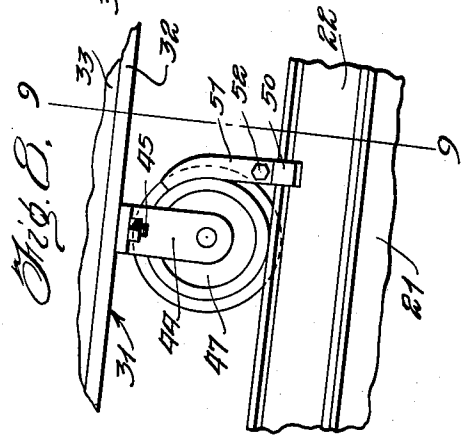












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2,193,403

REMOVABLE AIR-COOLED AND INSULATED SLAG POT

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Application April 17, 1939, Serial No. 268,410

8 Claims. (Cl. 263—45)

This invention relates to open hearth furnaces and has special reference to a furnace slag pot and operating means therefor.

One important object of the invention is to provide a novel arrangement of insulated slag pot to prevent the crystallization of the slag, the warping of the outside steel walls and to prevent the fire brick lining of the pot from sticking to the bottom of the chamber whereby it is made easier to remove the slag from the slag chamber of the furnace.

A second important object of the invention is to provide a novel and improved means whereby the slag pot of the character above mentioned can be readily removed from the slag chamber and replaced therein.

A third important object of the invention is to provide a novel form of slag pot wherein the bottom, sides and ends are held together in such manner that they can be easily disassembled to leave the mass of slag free for removal by a crane or otherwise.

With the above and other objects in view, as will be presently apparent, the invention consists in general of certain novel details of construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and—

Figure 1 is a front elevation disclosing certain slag receiving chambers of an open hearth furnace.

Figure 2 is a section on the line 2—2 of Figure 1 but with the slag pot shown in elevation.

Figure 3 is an enlarged detailed section on the line 3—3 of Figure 2.

Figure 4 is a transverse section through the slag pot showing the arrangement of the sides and bottom and the fire brick lining therefor, other parts of the pot being omitted.

Figure 5 is an enlarged detailed section of the line 5—5 of Figure 2.

Figure 6 is an enlarged detailed section of the line 6—6 of Figure 2.

Figure 7 is a section of the line 7—7 of Figure 6.

Figure 8 is an enlarged detailed section showing a portion of a supporting rail for the pot, a portion of the bottom of the pot, the supporting wheel and the stop member for holding the pot in the chamber.

Figure 9 is a section on the line 9—9 of Figure 8.

In the embodiment of the invention as herein set forth there is provided a furnace, indicated in general at 10, of the open hearth type. For the purposes of this invention the only part of the furnace necessary to be shown is the front wall and the slag opening thereof and as seen best in Figure 2 the furnace wall 10 is provided with a notch wherethrough a slag floor 11 passes to a delivery lip 12. This delivery lip 12 is carried by a supporting structure 13 wherein is formed an air or cooling passage 14. At the upper forward portion of the structure 13 there is provided an overhanging ledge 15 which supports the forward end of the lip 12 and at the same time, as will be presently explained, forms a sealing device for the slag pot.

The front wall of the slag chamber is indicated generally at 16 and between this front wall and the wall 10 is located the slag receiving chamber indicated at 17. In the wall 16, as here illustrated, there is provided a pair of openings 18 and 19, these openings being substantially alike but of different sizes. Obviously the sizes of the openings are not important in the construction of the invention.

The bottom of each slag chamber 17 includes a floor 20 wherefrom rises ribs 21 forming a species of ramp structure. On this ramp structure are supported I beams 22 forming rails as will be presently understood. In front of the wall 16 is a floor 23 and the rails 22 extend forwardly over this floor. The wall 16 above each of the openings 18 and 19 is supported by an arch 24 which has its upper part filled with brick work 25. Across the bottom of the brick work 25 extends a supporting plate 26. Just below the plate 26 the side walls are corbelled out as at 27 and the projecting portion is provided with an inclined face 28 so that a flat brick work member 29 may extend between the faces 28 and rest thereon to close a portion of the opening below the plate 26.

The slag pot is indicated in general at 30 and consists of a metal shell and fireclay or firebrick lining therefor. The metal shell comprises a bottom portion 31 having a peripheral flange 32. Upon the bottom 31 are seated the side members 33 and the end members 34. The side members 33 may consist of two or more sections each and when made of more than a single piece these sections are each provided, as shown in Figure 5, with out-turned flanges 35 at their abutting ends. The flanges 35 are provided with

registering openings 36 for the reception of a head and pin 37 having a projecting end provided with an opening 38 wherethrough passes a wedge pin 39 forcing the flanges together and holding the parts securely assembled. At the end of each side there is provided an out-turned flange 40 and end 34 and flange 40 are provided with registering openings 41 for the reception of pins 42 of the same character as the pin 37. By this means the entire side and end structure is held firmly together but yet may be taken apart for the removal of any slag in the pot. In order to prevent damage to the metal shell of this slag pot the bottom, side walls and end walls are provided interiorly with an insulating coating of fireclay or brick such as is shown at 43.

On the bottom 31 are secured pairs of L shaped brackets 44 the brackets being fastened to the bottom 31 by means of suitable bolts 45. These brackets are so arranged that each pair supports an axle 46 whereon is mounted a wheel or roller 47 which engages on the upper surface of the I beam or rail 22. Thus the slag pot can be readily moved on these rails.

From an inspection of Figure 2 it will be noted that the bottom part of the slag pot inclines parallel to the rail while the upper edge of the slag pot is horizontal. Due to this construction the forward end of the slag pot is deeper than the rear end thereof. The corbels 27 extend from the wall 16 to the overhang 15 and the lower spaces of these corbels are in the same plane as the underside of the overhang 15 and the bottom of the member 29. Thus when the slag pot is inserted in the slag chamber the front part of the pot engages under the member 29 while the rear part thereof engages under the overhang 15. At the same time the side walls engage beneath the lower surface of the corbels 27 on each side. By reason of the inclined ramp structure this engagement is accompanied by a wedging action which makes the joint between the pot 30 and the upper part of the slag chamber practically air-tight.

In order to assist the sealing of the sides of the slag pot the side walls of each slag chamber are provided with ledge members 48 spaced below the corbels 28 and on these ledge members is formed a fire clay or fire brick seal 49 which runs along the fire side of the chamber. This fire clay 49 presses against the side 33 and thus assists in sealing.

In order to hold the pot 30 in its position within the chamber there is provided for each rail 22 a stop member consisting of a pair of brackets having U shaped portions 50 and upstanding legs 51, the U shaped portions embracing upper flanges of the I beam 22 while the legs 51 engage against the outer face of the wheel 47 running on the particular rail. Legs 51 are pulled together by means of a suitable bolt 52 and thus the stop member is clamped on the rail but at the same time may be readily removed therefrom or slid therealong by loosening the bolt 52.

Naturally these slag pots are of considerable weight and in order to pull the pot up the rail 22 there is provided in the passage 14 a winding drum 53 driven by suitable means not deemed necessary here to be shown. On this winding drum is wound a pull chain 54 which is provided at each end with a hook 55 engaging in an eye 56 formed on the forward end of the bottom of the pot 30. Furthermore it may happen that due to the wedging action of the pot when inserted in the chamber 17 difficulty is experienced in starting it down the rail 22. In order to assist such starting an eye 57 is provided in the front end of the pot 30 to receive a hook 58 formed on the forward end of the chain 59 which runs under or around a suitable idler sheave 60. By means of the apparatus just described it will be seen that upon the chain 54 being wound on the drum 53 the pot 30 will be pulled into position and firmly wedged. Furthermore it will be seen that when it is desired to remove the pot any pull on the chain 59 will effect such removal.

It will be observed from Figures 1 and 2 that the pot 30 is spaced from the walls of the slag chamber as shown at 18 and 19. Thereby there is provided a dead-air space which extends around the slag pot and cools the pot and also the wall.

It will furthermore be observed that the wall 11, shown best in Figure 2, provides a highly efficient means of outlet for gases, so as to increase the dead-air space which will not only strengthen the furnace and the slag pot, but at the same time, make the entire process of steel production more efficient.

It will now be plain that the slag flowing over the lip 12 will drop directly into the pot 30 and, due to the construction and wedging action of the pot, the latter forms a removable bottom for the chamber 17 which is so sealed against the upper part of the chamber that no gases nor air can escape through the opening in the wall 19 so long as the pot is in position. Obviously, the pot will not be withdrawn from the chamber at times when the blast is on the furnace but only at those times in which the blast is off. Consequently no noxious gases will escape to injuriously affect the workers in front of the furnace. In using the device when the pot is withdrawn it is often possible to lift, with the crane generally provided, the mass of slag from the pot without difficulty, the only repair requirements being to patch up the fireclay lining of the pot if necessary. However, at times the slag may so stick in the pot as to be difficult to remove in which case by knocking out the pins 39 and post 42 the side and ends of the pot may be disassembled thus leaving the slag easy of access for lifting with the crane.

Having thus described the invention, what is claimed as new is:

1. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges.

2. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges, said last means including corbels projecting from the side

walls and engaging the upper edges of the sides of said pot.

3. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges, said ramp means including a pair of inclined rails and the pot having rollers revolvably mounted below its bottom and resting on said rails.

4. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges, said last means including corbels projecting from the side walls and engaging the upper edges of the sides of said pot, said ramp means including a pair of inclined rails and the pot having rollers revolvably mounted below its bottom and resting on said rails.

5. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges, said ramp means including a pair of inclined rails and the pot having rollers revolvably mounted below its bottom and resting on said rails, and stop clamps gripping said rails and engaging the forward wheels of said pot.

6. The combination with a slag chamber having front, rear and side walls and having a floor between said walls, said rear wall having an overhanging flow lip and the front wall having an opening with an edge level with the underside of the overhanging lip; of a slag pot supported to roll in and out of its chamber, the floor of the chamber having inclined ramp means supporting said pot, and means to seal the upper edges of the pot to close the spaces between the side walls of the chamber and said upper edges, said last means including corbels projecting from the side walls and engaging the upper edges of the sides of said pot, said ramp means including a pair of inclined rails and the pot having rollers revolvably mounted below its bottom and resting on said rails, and stop clamps gripping said rails and engaging the forward wheels of said pot.

7. The combination with a slag chamber having a front wall provided with an opening and having a ramp inclined from the rear of the chamber downwardly to the bottom of said opening, with a slag pot supported to roll on said floor, said slag pot being spaced from the side walls and floor of the slag chamber whereby to provide a dead-air space for cooling the slag pot and walls of the chamber, the inner wall of said chamber being provided with a passage and having an opening leading from the chamber to the passage at the upper end of the ramp, and pull means for said slag pot including a winding drum in the passage and a chain wound on said drum, said chain extending through said opening and connected to said slag pot.

8. The combination with a slag chamber having a front wall provided with an opening and having a ramp inclined from the rear of the chamber downwardly to the bottom of said opening, with a slag pot supported to roll on said floor; in combination with a treatment chamber having an inclined wall leading upwardly and forwardly to the slag chamber and providing dead-air space whereby to strengthen the furnace and slag chamber and render the production process more efficient, the inner wall of said chamber being provided with a passage and having an opening leading from the chamber to the passage at the upper end of the ramp, and pull means for said slag pot including a winding drum in the passage and a chain wound on said drum, said chain extending through said opening and connected to said slag pot.

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