Dec. 3, 1963 M. E. STRATE 3,112,920

OPEN HEARTH FURNACE AND METHOD OF CONSTRUCTING THE SAME

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FIG. 1.

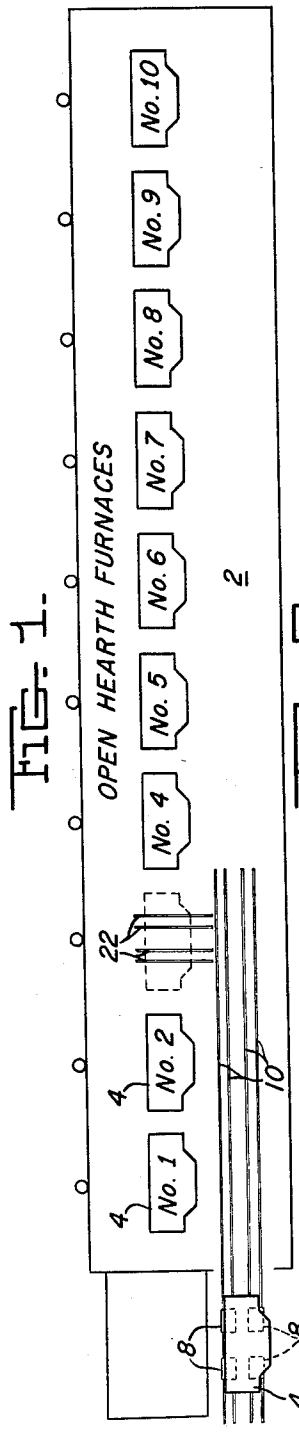
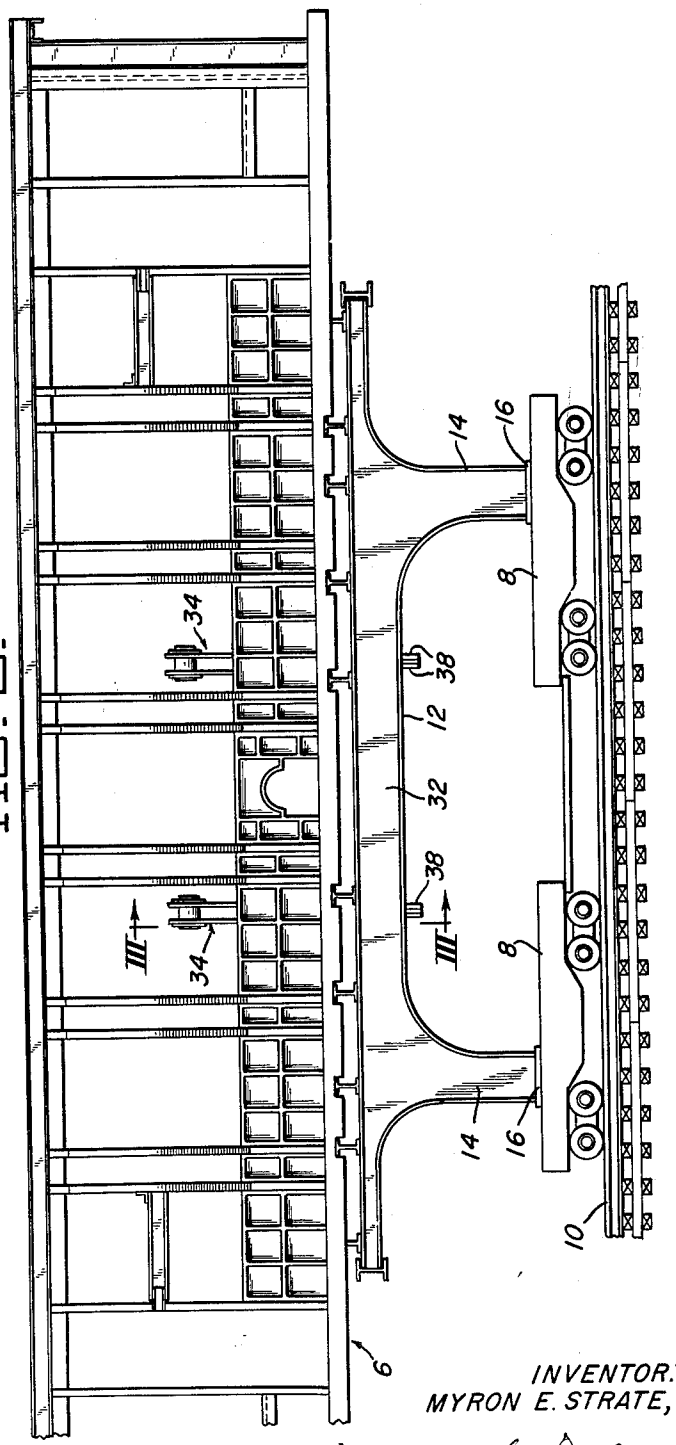


FIG. 2.



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FIG. 3.

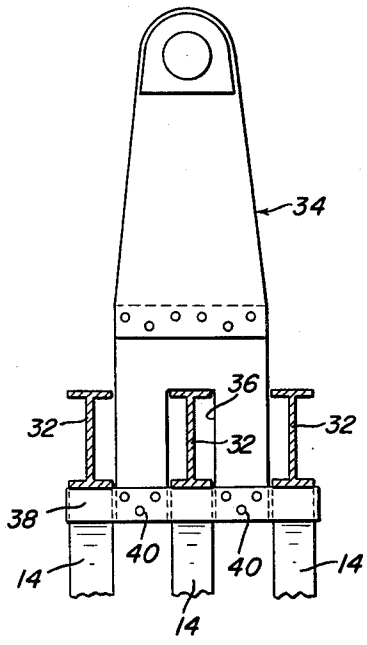


FIG. 4.

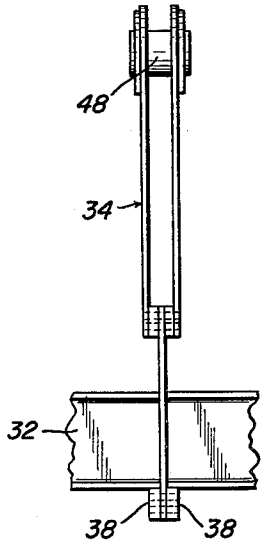
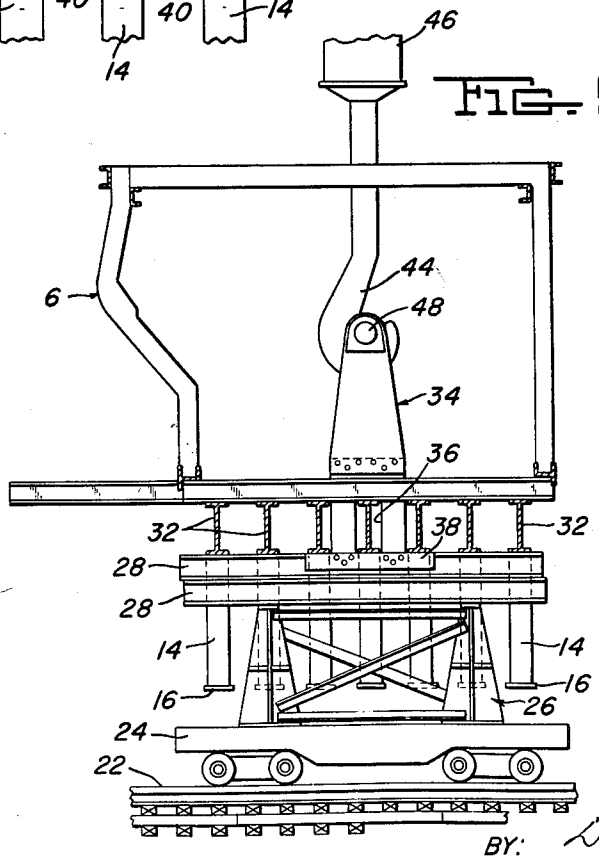


FIG. 5.



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FIG. 6.

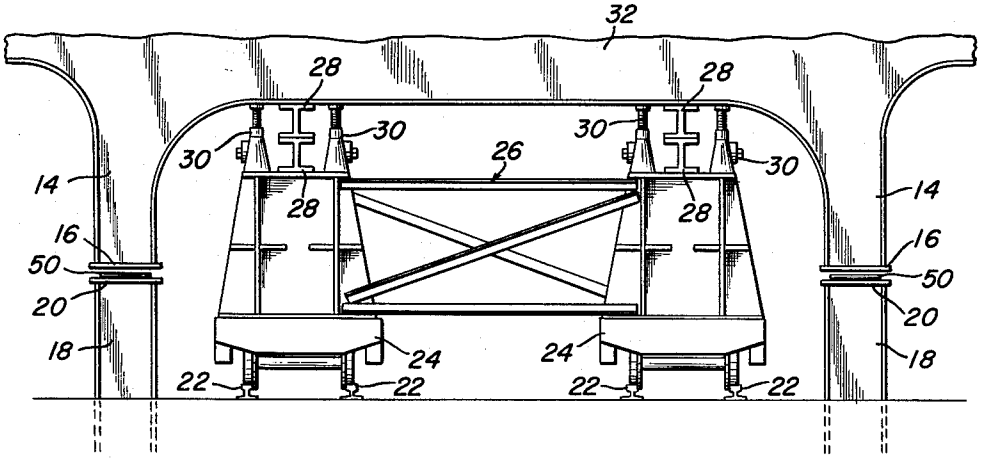
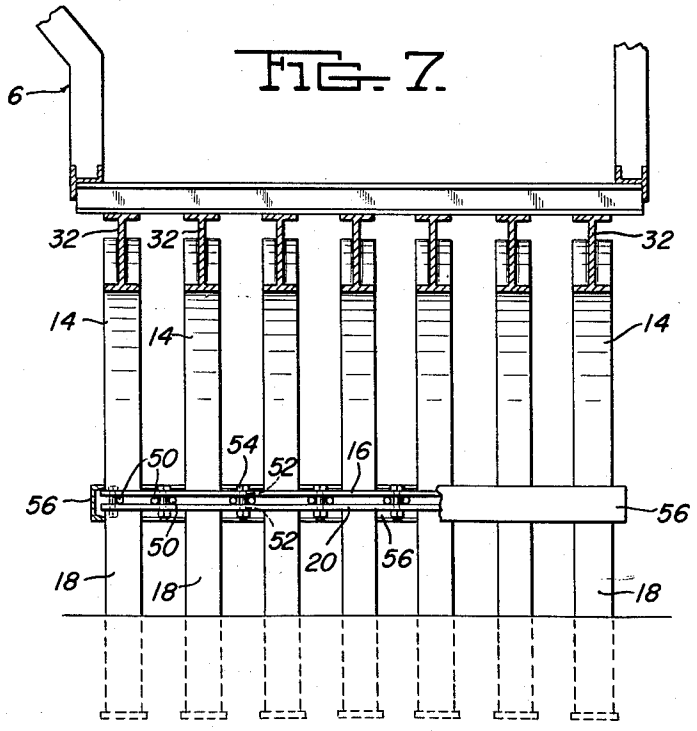


FIG. 7.



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OPEN HEARTH FURNACE AND METHOD OF CONSTRUCTING THE SAME

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Filed June 7, 1956, Ser. No. 590,000
6 Claims. (Cl. 263—46)

This invention relates to an open hearth furnace for producing steel and to a method of constructing the same. Open hearth furnaces are normally constructed on the site where they are to be operated. When a furnace is to be reconstructed, it is necessary to demolish the old furnace and then erect the new furnace in place. This is a costly and time-consuming operation. In most cases it is desirable to have the furnace back in operation as promptly as possible, and as a result construction is carried on for twenty-four hours a day every day in the week. This further increases the cost of construction due to over-time pay. Another disadvantage is that the open hearth crane must handle the charging and tapping operations for the other furnaces in the shop so that it is not always available to handle the materials used in the construction of the new furnace.

It is therefore an object of my invention to provide an open hearth furnace which may be constructed at a point remote from the open hearth shop and then moved into position.

Another object is to provide a method of constructing such an open hearth furnace.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is a schematic view showing the open hearth shop, the furnace construction site and an arrangement for moving the prefabricated furnace into position;

FIGURE 2 is a schematic view showing the framework of a furnace mounted on a vehicle;

FIGURE 3 is a view taken on the line III—III of FIGURE 2;

FIGURE 4 is a side view of FIGURE 3;

FIGURE 5 is a view of the steel framework mounted on a second vehicle;

FIGURE 6 is a view of the framework mounted on the second vehicle and in position to be mounted on the stub columns and;

FIGURE 7 is a schematic elevation showing the framework of the furnace in final position.

Referring more particularly to the drawings, the reference numeral 2 indicates an open hearth shop having ten open hearth furnaces 4 therein. The number of furnaces making up the shop may vary. A steel framework 6 for the furnace is preferably constructed on spaced cars 8 connected together. Four such cars are used to form a single vehicle and it will be understood that a special vehicle could be constructed for this purpose. The cars 8 are mounted on two pairs of tracks 10 which lead into the open hearth shop 2 along the tapping side thereof. The steel framework 6 is preferably constructed in the same general manner as in the patent to Barkley No. 2,741,470, dated April 10, 1956. This construction includes a plurality of rigid arches 12 having spaced apart columns 14. One group of columns 14 is mounted on one pair of cars 8 and the other group of columns on the other cars 8. The columns 14 are considerably shorter than the columns shown in the above mentioned Barkley patent. A very heavy steel plate 16 is fastened to the bottom of each group of columns as by welding. The old furnace may be demolished while the steel framework 6 is being constructed or the steel framework may be constructed prior to the demolition of

the old furnace. After the old furnace is demolished two groups of stub columns 18 are erected at the furnace site, there being one column 18 for each column 14. The spacing of the columns 18 is the same as the spacing of the columns 14. A very heavy steel plate 20 is fastened to and extends between the tops of each group of columns 18. It will be understood that in some instances the stub columns 18 need not be replaced in which case the columns 14 will be placed on old columns 18. It will be also understood that the refractories and pipe work may be mounted on the framework 6 prior to moving it into place.

After the steel framework has been constructed and the columns 18 prepared to receive the columns 14 the cars 8 are moved from the position shown in FIGURE 1 along the tracks 10 to a position at the tapping side of the furnace site. Here two pairs of tracks 22 are laid transversely to the tracks 10 and cars 24 mounted thereon. The cars 24 carry a fabricated steel pedestal 26 which connects the cars so as to form a single vehicle. Mounted on the pedestal 26 are two pair of heavy I-beams 28, one pair above each of the pair of tracks 22. Eight jacks 30 are mounted on the pedestal 26, one on each side at each end of each pair of beams 28. The tops of the columns 14 of each rigid arch are connected by a beam 32. A lifting trunnion 34 having a cut out portion 36 at its lower end is placed on top of the beam 32 at the center of the furnace wieuhthtcthi0Aftou 32 at the center of the furnace with the cut out portion 36 receiving the center beam 32 as best shown in FIGURE 3. A pair of plates 38 are bolted to the bottom of the trunnion 34, one on each side thereof. Matching holes 40 are provided in the trunnion 34 and bars 38 for this purpose. Thus it will be seen that the trunnion 34 is held in position by the bearing on top of the center beam 32 and by the bars 38 engaging beneath the beams 32 adjacent the center. A crane hook 44 connected to the crane 46 engages a pin 48 on the trunnion 34 when the cars 8 are positioned adjacent the tracks 22. The crane lifts the framework 6 from the cars 8 and places it on the beams 28 with the tops of the jacks 30 positioned either below or level with the tops of the beams 28. The cars 24 are moved along the tracks 22 until the columns 14 are located above the columns 18 as shown in FIGURE 6. A plurality of rollers 50 are mounted on the plates 20. The jacks 30 are then raised to lift the framework 6 from the beams 28 and at least the top beams 28 removed. It will be understood that means other than the beams 28 may be provided to support the framework during its travel on the tracks 22. The framework 6 is then lowered by means of the jacks 30 until the plates 16 rest on the rollers 50. Aligned holes 52 are provided in the plates 16 and 20 for receiving bolts 54. The rollers 50 permit movement of the framework 6 so that the holes 52 in the plates 16 and 20 can be aligned. Other means may be provided for moving the framework 6 from the cars 8 to the rollers 50. After the columns 14 and 18 are fastened together by means of the bolts 54, channels 56 are welded to the beams 14 and 18 as shown in FIGURE 7 to further connect the beams 14 and 18 and to prevent dirt from getting into the space between plates 16 and 20.

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

I claim:

1. The method of constructing an open hearth furnace comprising erecting on a wheeled vehicle a steel framework having a supporting frame with two groups of columns spaced apart lengthwise of the furnace, longi-

tudinal generally horizontal beams extending between and fixedly connecting the tops of said columns, and structure fixed to and extending upwardly and outwardly from both of said groups of columns, erecting corresponding stub columns at the furnace site, connecting a lifting trunnion to said framework, engaging the lifting trunnion with a crane and removing the framework from the vehicle, transporting the framework to the furnace site and positioning the first named columns on the stub columns in alignment therewith, fastening the first named columns to the stub columns in fixed relationship to keep them in alignment, and removing the lifting trunnion.

2. The method of constructing an open hearth furnace comprising erecting on a wheeled vehicle a steel framework having a rigid arch supporting frame with two groups of columns spaced apart lengthwise of the furnace and structure fixed to and extending upwardly and outwardly from both of the said groups of columns, the columns of each group being connected by a plate fastened to and extending between the bottoms of the columns, moving the wheeled vehicle with the steel framework to a position adjacent the tapping side of the furnace, erecting two groups of stub columns at the furnace site with the columns of each group being connected by a plate fastened to and extending between the columns, providing rollers on said last named plates, connecting a lifting trunnion to said framework, engaging the lifting trunnion with a crane and removing the framework from the vehicle, positioning the framework on the rollers with the first named columns aligned with the corresponding stub columns, and fastening the rigid arch columns to the stub columns in fixed relationship to keep them in alignment.

3. An open hearth furnace comprising a steel framework having a supporting frame with two groups of columns spaced apart lengthwise of the furnace, longitudinal generally horizontal beams extending between and fixedly connecting the tops of said columns and structure fixed to and extending upwardly and outwardly from the top of both of said groups of columns, a plurality of plates fastened to the bottoms of said columns, corresponding stub columns spaced in the same manner as the first named columns, a plurality of plates fastened to the tops of said stub columns beneath said first named plates, rollers between each of the last named plates and the plate thereabove, and means for fastening the first named columns to the stub columns in fixed relationship to keep them in alignment.

4. An open hearth furnace comprising a supporting frame having two groups of columns spaced apart lengthwise of the furnace, longitudinal generally horizontal beams extending between and fixedly connecting the tops of said columns, and structure fixed to and extending upwardly and outwardly from the top of both of said groups of columns, two groups of stub columns, the spacing and number of columns in the first two groups being the same as in the second two groups, and means for fastening each of the first named columns to the corresponding stub columns in fixed relationship to keep them in alignment.

5. An open hearth furnace comprising a rigid arch supporting frame having two groups of columns spaced apart lengthwise of the furnace, and structure fixed to and extending upwardly and outwardly from both of said groups of columns, the columns of each group being connected by a plate fastened to and extending between the bottoms of the columns, two groups of stub columns in alignment with the said two groups of columns, a plate fastened to the top of each of the groups of stub columns beneath the corresponding plate on the first columns, rollers between each of the last named plates and the plate thereabove, and means for fastening the rigid arch columns to the stub columns to keep them in alignment.

6. The method of constructing an open hearth furnace comprising erecting at a position removed from the furnace site a steel framework having a supporting frame with two groups of supporting columns spaced apart lengthwise of the furnace, longitudinal generally horizontal beams extending between and fixedly connecting the tops of said supporting columns, and structure fixed to and extending upwardly and outwardly from both of said groups of supporting columns, connecting the columns of each group by a plate fastened to and extending between the bottoms of the columns, erecting two groups of stub columns at the furnace site with the columns of each group of stub columns being connected by a plate fastened to and extending between the stub columns, providing rollers on said last named plates, positioning the framework on the rollers until each of the supporting columns are aligned with a corresponding stub column, and fastening the supporting columns to the aligned stub columns in fixed relationship to keep them in alignment.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,112,920 December 3, 1963

Myron E. Strate

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 28, strike out "32 at the center of the furnace wieuhthtcthiOAftou".

Signed and sealed this 28th day of April 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents