J. O. GRIGGS.

FRONT WALL FOR OPEN HEARTH FURNACES.

APPLICATION FILED JAN. 31, 1921.

1,415,630.

Patented May 9, 1922.

2 SHEETS—SHEET 1.

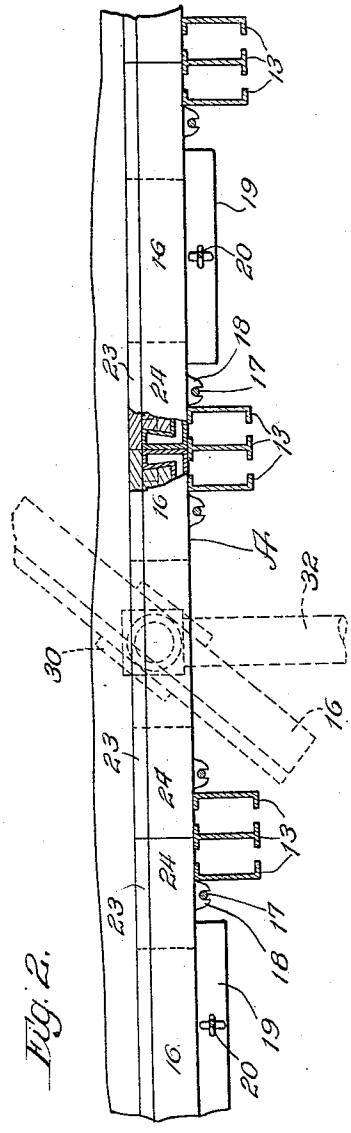


Fig. 2.

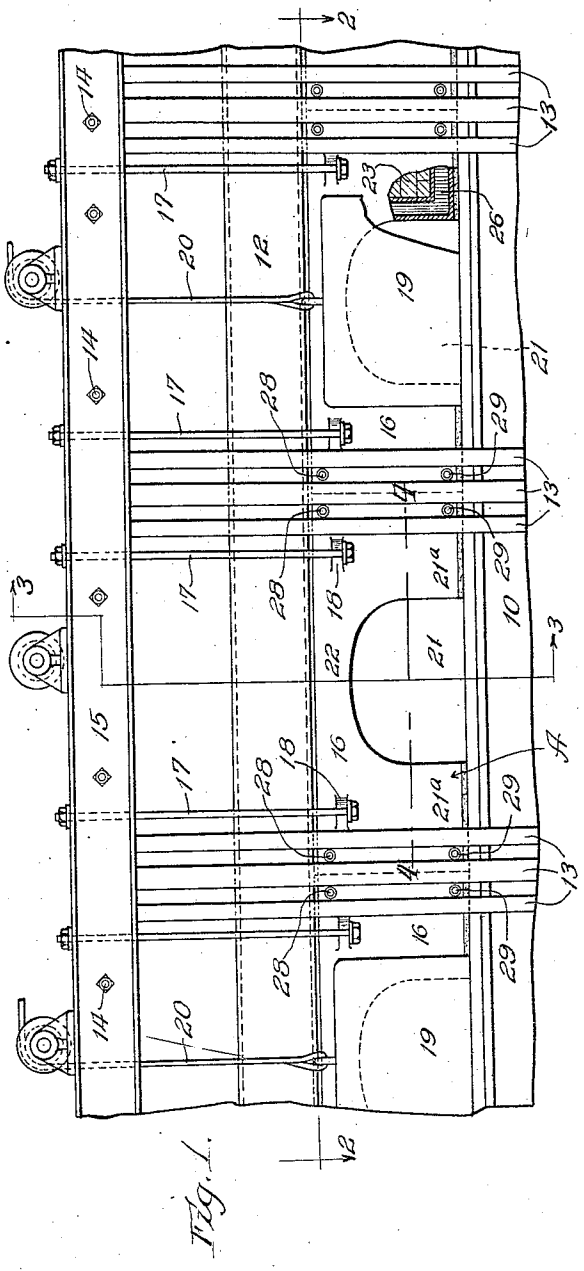


Fig. 1.

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John O. Griggs.
By Charles J. Sherony,
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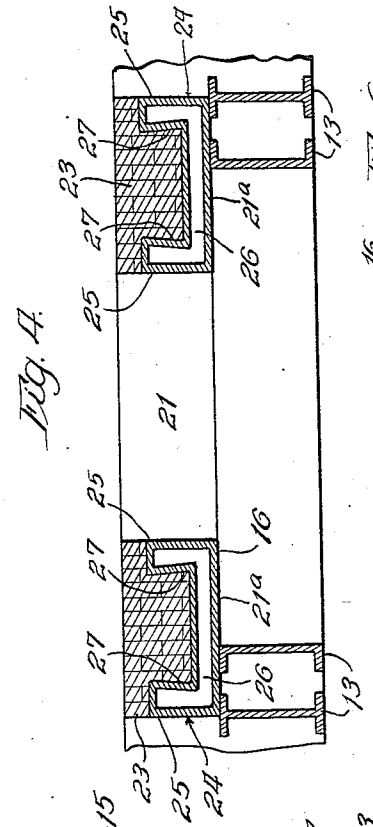


Fig. 4.

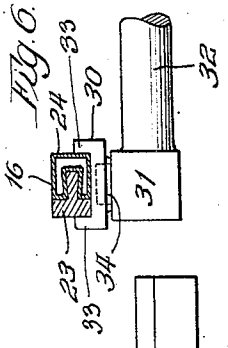


Fig. 6.

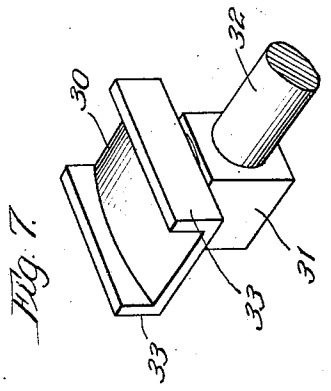


Fig. 7.

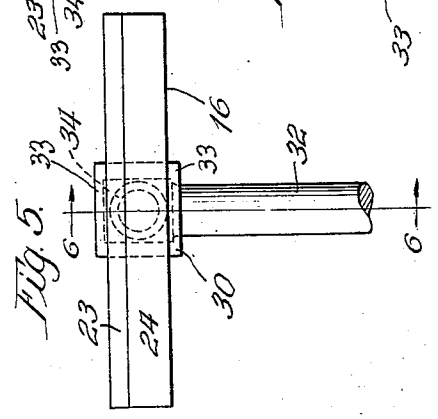


Fig. 5.

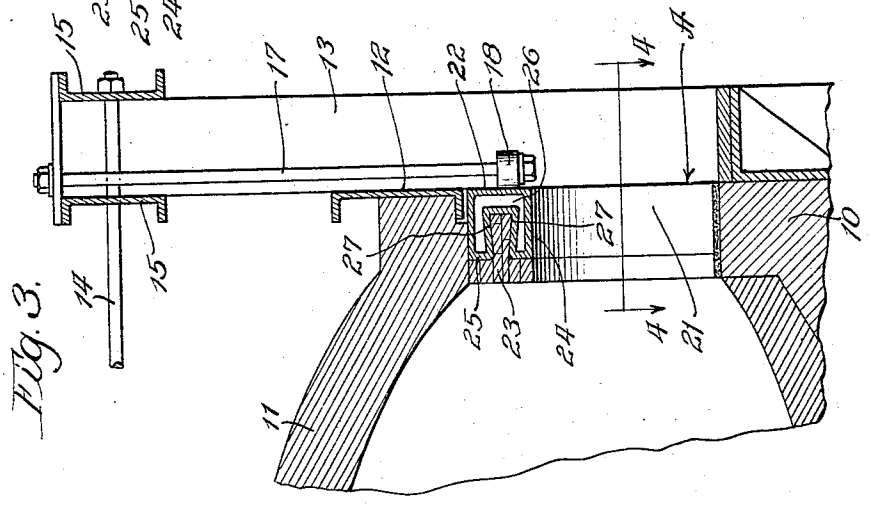


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN O. GRIGGS, OF YOUNGSTOWN, OHIO.

FRONT WALL FOR OPEN-HEARTH FURNACES.

1,415,630. Specification of Letters Patent. Patented May 9, 1922.

Application filed January 31, 1921. Serial No. 441,204.

To all whom it may concern:

Be it known that I, JOHN O. GRIGGS, a citizen of the United States, and a resident of Youngstown, Mahoning County, and State of Ohio, have invented certain new and useful Improvements in Front Walls for Open-Hearth Furnaces, of which the following is declared to be a full, clear, and exact description.

This invention relates to front walls for open hearth furnaces and its principal object is to provide a sectional front wall that may be readily removed from the furnace and replaced while the heat is going on.

It is well known that the front and back walls of open hearth furnaces become deteriorated and often fall into the furnace, and cause great damage and loss of time, labor and material. Deterioration is principally due to the intense heat, and action of the gases, and chemicals on the brick walls. I have heretofore devised a removable back wall for open hearth furnaces which may be readily replaced while the heat is going on, and such back wall is disclosed in my prior patents, one of which is No. 1353830, dated September 28, 1920. Up to the present time, so far as I am aware, no successful attempt has been made to provide a removable and replaceable front wall, the difficulties and obstacles present in the usual open hearth furnace having been (it is my belief) impossible to overcome. Like the usual back wall, the front wall of an open hearth furnace is a built-up brick structure, having door openings therein, opened and closed by doors. The brick front wall extends behind vertical supports arranged in groups and known as buck stays. In case the front wall falls in, the furnace must be shut down for a considerable length of time to enable the workmen to rebuild the wall. It may occur that only a part of the wall becomes deteriorated to such an extent that such part falls in, but even in that event the furnace must be shut down for repairs.

With the use of a front wall embodying the present invention, the furnace need not be shut down in case the front wall or any part thereof becomes deteriorated to such an extent that it is liable to fall in, or in case it or any part thereof does actually fall in, but it may be quickly replaced by a whole or fresh wall or section while the heat is going on, and thus the heat is saved, and the time, labor and loss of material are saved.

The invention consists in a portable, removable and replaceable sectional front wall for open hearth furnaces, extending behind the buck stays and having a door opening in each section. It further consists in a front wall section of this description constructed of a refractory facing carried by a water cooled jacket. It further consists in a front wall as described, together with means for removably holding it in place behind the buck stays, and together with means whereby it may be removed from behind the buck stays, and replaced by another like front wall. It further consists in the several novel features hereinafter fully set forth and claimed.

The invention is clearly illustrated in the accompanying drawings, in which:—

Fig. 1 is a front elevation of a fragment of an open hearth furnace containing a simple embodiment of the present invention; Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1; Fig. 3 is a fragmental vertical section taken on line 3—3 of Fig. 1; Fig. 4 is a detail horizontal section taken on line 4—4 of Figs. 1 and 3; Fig. 5 is a plan of a front wall section and a fragment of a charging machine arm which is employed for handling the wall sections in removing and replacing them; Fig. 6 is a detail view of a wall section and a certain carrying arm, the view being partly in side elevation and partly in vertical section, and the line of section being taken on line 6—6 of Fig. 5 and Fig. 7 is a perspective view of a fragment of said charging arm and a certain saddle used in handling the wall sections.

Referring to said drawings, which illustrate a simple embodiment of the present invention, the reference character 10 designates the base and 11 the arched top or roof of an open hearth furnace of ordinary construction. The top is carried at the front by a skew back channel iron beam 12 which is supported by buck stays 13 usually arranged in groups of two or three as seen in Figs. 1 and 2. A channel iron beam is also located at the back of the furnace, and is supported by buck stays and the opposing buck stays are tied together by tie rods 14 which usually pass through channel bar beams 15 above the furnace (see Fig. 3). The construction above described leaves an open, lengthwise extending space or gap between the front edge portion of the top or roof and the base, in which the front wall,

forming the subject matter of this specification, is removably placed, and it will now be described.

The front wall, designated by A comprises a plurality of sections 16 which are placed end to end behind the buck stays 13 and are supported in place by supports, here shown as comprising rods 17 carried by the channel bars 15 and having heads engaging with the under sides of lugs 18 on the wall sections. Said lugs 18 are placed close to the buck stays so as to leave a clear space on each section between the lugs for the passage of the doors 19. The latter are supported as usual by cables 20 that extend to suitable door operating mechanism.

Each front wall section is formed with a door opening 21, through which the furnace is charged, and said opening preferably extends up from the bottom of the wall section, leaving two legs 21ª at the sides thereof connected by an arch like part 22. The legs 21ª extend down to within a short distance of the base and the space between their lower sides and base may be filled in with dolomite or other refractory material. The door 19 covers said opening but may be raised to uncover it when access to the furnace is desired.

In its preferred construction, each panel or section 16 comprises a facing 23 of brick or other refractory material and a water cooled supporting jacket 24. The jacket is formed with a hollow flange 25 which runs around its entire margin and the hollow of said flange opens to the water chamber 26 of the jacket. The brick are built up between said flanges 25 and the marginal rows of brick have flanges that project over the water jacket flange to thereby protect it against the heat and to provide a continuous brick front wall or facing on the inner side of the furnace. The inner side 27 of the flange 25 slopes back (see Fig. 4) and the outer sides of the marginal bricks are sloped to conform thereto, thus providing an interlocking connection between the brick and jacket.

Water connections are made with the several jackets and these connections may be made at the top and bottom thereof as at 28, 29, the lower ones constituting the inlet connection and the upper ones the outlet connections. Water or other cooling medium is circulated through the jackets for the purpose of cooling the refractory facing.

In case it becomes necessary to remove one of the front wall sections from any cause whatever, the usual charging machine (not shown) may be employed for this purpose, it being understood that each section is a heavy and cumbersome structure. In view of the fact that the front face of the front wall must be left free and unobstructed for the door, I have provided a door handling saddle 30 (see Fig. 7) which may be readily secured to the head 31 of the charging arm 32 of the charging machine and which saddle is constructed to take hold of the front wall sections without the need of any projecting lugs or other protuberances on the wall. The upper face of the saddle 30 is preferably made arch shaped so as to conform to the shape of the top of the door opening in the front wall, and it has two upwardly projecting side flanges 33 that straddle the wall. The saddle is swiveled upon the charging arm head on a vertical pin 34, whereby it and the wall section may be swung about on said arm in removing and replacing a wall section.

In use, the front wall A is held in place behind the buck stays 13 by the rods 17. When it becomes necessary to replace one of the sections, the charging machine is run in front of the door opening of that section, the saddle 30 attached to the charging arm 32 and the latter then moved forward bringing the saddle into the door opening, and then raising the arm until the saddle 32 engages the wall. The water connections are then disconnected, the supporting rods 17 disconnected from the section and the charging arm moved forward bringing the wall section into the interior of the furnace. The charging machine is then moved laterally to bring one edge of the wall section clear of the adjacent buck stays, and the charging arm is thereupon moved back, thereby drawing said free end of the wall section through the opening between the buck stays, its other end encountering the adjacent end portion of the adjacent wall section and permitting the section (which is being removed) to be swung out through the opening between the buck stays. After being removed, it is set down and a fresh section is picked up by the carrying arm, moved in front of said opening between the buck stays, placed at an oblique angle to the arm 32 (see Fig. 2) and inserted through said opening. The arm is then shifted laterally to bring one end of the wall section behind the adjacent buck stay and the arm is then moved backward, thereby drawing the wall section into place behind the buck stay at the other end of the section. The supporting rods 17 are then connected up with the section, the water connections made, and the carrying arm detached from the section.

It is to be observed that very little time is required to change the wall sections and that no interruption of the heat is necessary to make the change. The danger of the front wall falling in may be wholly avoided by observing its condition and making the change before it arrives at a dangerous state.

The present front wall saves the time and

labor of tearing down the "bank" and saves this material, which is otherwise destroyed. It is easily adapted to standard makes of open hearth furnaces now in use.

More or less variation of the exact details of construction is possible without departing from the spirit of this invention; I desire, therefore, not to limit myself to the exact form of the construction shown and described, but intend, in the following claims, to point out all of the invention disclosed herein.

I claim as new and desire to secure by Letters Patent:

1. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed with a door opening therein through which access may be had to the interior of the furnace.

2. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable water-jacketed front wall sections, set end to end behind the buck stays, and each formed with a door opening therein through which access may be had to the interior of the furnace.

3. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed with a door opening extending up from its bottom through which access may be had to the interior of the furnace.

4. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed of a facing of refractory material and a water cooled jacket supporting said facing, and each section having a door opening therein through which access may be had to the interior of the furnace.

5. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed of a facing of brick and a water cooled jacket supporting said brick, and each section having a door opening therein through which access may be had to the interior of the furnace.

6. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed of a facing of brick and a water cooled jacket having a marginal flange over which the bricks project, and each section having a door opening therein through which access may be had to the interior of the furnace.

7. A front wall for open hearth furnaces having buck stays, comprising a plurality of portable, removable and replaceable front wall sections, set end to end behind the buck stays, and each formed with a door opening therein, through which a swiveled saddle may take hold of the wall section above the door opening, whereby said wall section may be handled in removing or replacing it.

JOHN O. GRIGGS.