J. O. GRIGGS.

OPEN HEARTH FURNACE.

APPLICATION FILED JUNE 2, 1919.

1,331,989.

Patented Feb. 24, 1920.

2 SHEETS—SHEET 1.

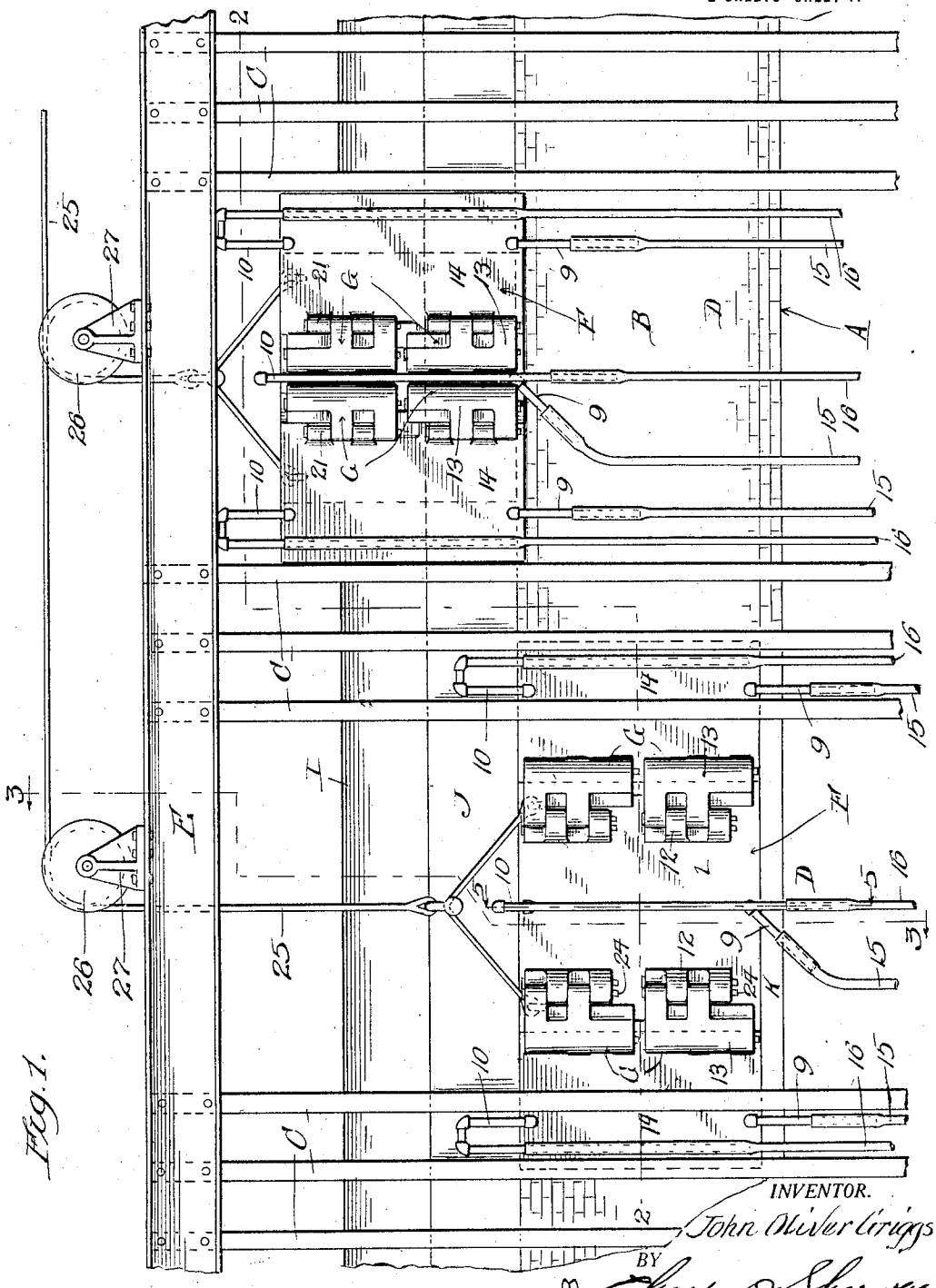


Fig. 1.

INVENTOR.

John Oliver Griggs

BY

Charles O. Sherry,

HIS ATTORNEY.

J. O. GRIGGS.

OPEN HEARTH FURNACE.

APPLICATION FILED JUNE 2, 1919.

1,331,989.

Patented Feb. 24, 1920.

2 SHEETS—SHEET 2.

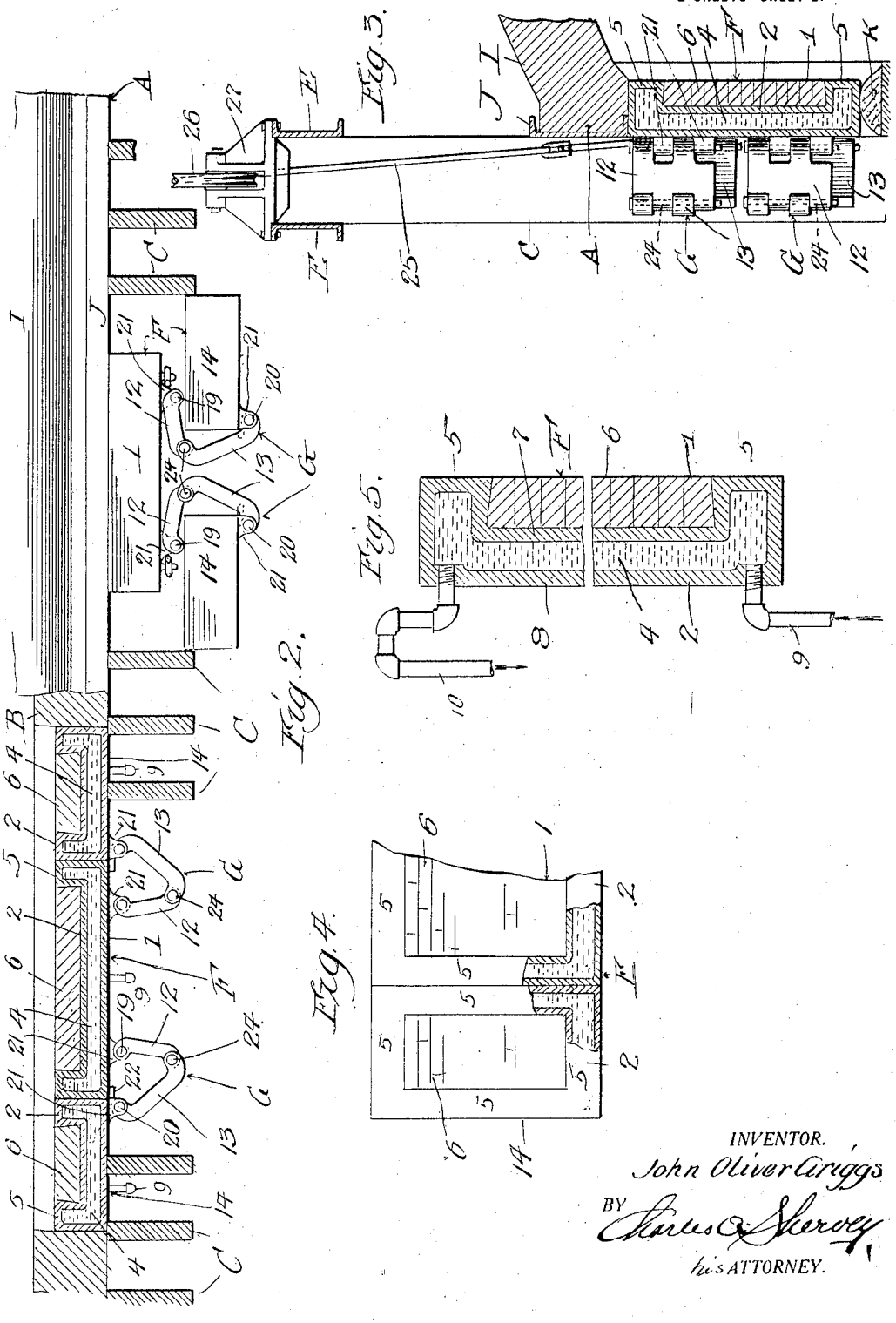


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR.

John Oliver Griggs

BY Charles & Sherrey

his ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN OLIVER GRIGGS, OF YOUNGSTOWN, OHIO.

OPEN-HEARTH FURNACE.

1,331,989. Specification of Letters Patent. Patented Feb. 24, 1920.

Application filed June 2, 1919. Serial No. 301,257.

To all whom it may concern:

Be it known that I, JOHN OLIVER 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 Open-Hearth Furnaces, of which the following is declared to be a full, clear, and exact description.

This invention relates to open hearth furnaces, and more particularly to the back walls thereof, and its principal object is to provide improved means for increasing the efficiency and durability of the back wall, whereby frequent necessity for repairing or rebuilding the same is obviated. Another object is to provide a portable temporary replacement wall of improved construction for temporarily replacing fallen back walls of open hearth furnaces, and constructed and arranged so that the permanent back wall may be rebuilt without materially interrupting the operation of the furnace, and without danger of injury to the workmen rebuilding the wall.

This invention is in the nature of an improvement upon the construction disclosed in my prior application for patent on shields for walls for furnaces, filed October 25, 1918, Serial No. 259,683, in which application a portable replacement wall for open hearth furnaces is shown.

The construction disclosed in my prior application above referred to, has proved to be highly satisfactory in actual practice. From long continued use, the refractory material, forming the facing of the portable wall, becomes deteriorated and must be replaced. The present invention is designed to increase the life of the refractory material which forms part of the portable wall, and it consists essentially in a portable back wall embodying water cooled means for cooling the refractory material. The invention further consists in a portable, water cooled, back wall for open hearth furnaces having a main portion, and end portions arranged to be placed behind the buck stays of the furnace to protect them against the intense heat. The invention further consists in the several novel features hereinafter fully set forth and claimed.

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

Figure 1 is a side elevation of an open hearth furnace of ordinary construction, partly broken away, and showing two of my improved portable back walls applied thereto;

Fig. 2 is a view thereof, partly in plan and partly in horizontal section, the line of section being indicated by the line 2—2 in Fig. 1;

Fig. 3 is a vertical cross section taken on the line 3—3 of Fig. 1;

Fig. 4 is a rear elevation of a fragment of the portable wall, partly broken away; and

Fig. 5 is a detail, enlarged, vertical cross section taken on the line 5—5 of Fig. 1.

Referring to said drawings, which illustrate a simple embodiment of the present invention, the reference character A designates an open hearth furnace of ordinary and well-known construction, having the usual back wall B reinforced by buck stays C, preferably arranged in groups of two or three slightly spaced apart, and dividing the back wall of the furnace into panels D. The upper ends of the buck stays are connected to longitudinally arranged beams E. The top of the furnace is closed by an arch or roof I, which rises from the top of the back wall B, and a skew back channel iron J, is provided, as usual, at the edge of the roof to support the same, particularly in case the back wall falls in.

The construction of open hearth furnaces is well-known to those skilled in the art to which this invention pertains, and requires no further detailed description, so far as this specification is concerned.

It is a well known fact that during the operation of an open hearth furnace of ordinary construction, the back wall, or a section thereof, occasionally falls in, or it becomes necessary to replace the back walls because of deterioration. If the back wall or a section thereof falls in during a heat, it is the practice to shut down the furnace and permit it to cool sufficiently to permit the workingmen to replace the broken portion of the wall, and this usually takes from eight to fourteen hours, more or less, and the heat "freezes" or retards, as it becomes necessary to shut off the gas, thus entailing great loss—not only in the amount of time necessary for the furnace to cool, but also in the time necessary to rebuild the wall and reheat the metal which, when once "frozen" or

solidified, is not easy to remelt. Furthermore, when the back wall falls in, the buck stays are exposed to the extreme heat and are apt to become permanently injured because of said exposure.

My invention not only obviates the aforementioned dangers, but also obviates shortening the life of the back wall by prematurelv tearing it down. On the contrary, it permits the back wall to be used until entirely gone, or, if it falls in, the replacement wall is lowered into place to cover the opening, and serves as a temporary wall, permitting the heat to go on until completed, and also serves as a shield to protect the workingmen during the rebuilding of the wall while the furnace is still hot.

Furthermore, a portable back wall, containing the invention herein set forth, may be used as a substitute for the permanent or usual back wall employed in open hearth furnaces of ordinary and well known construction, and when the refractory material of the portable back wall reaches such a state of deterioration as to be unsatisfactory for use, the portable back wall may be removed from the furnace and replaced by a portable wall of similar construction, without cooling off the furnace.

As in my prior application above referred to, a portable replacement wall F is supported by any suitable means adjacent the back wall B (when a permanent back wall is used) and is adapted to slide up and down in front of the panels D between the groups of buck stays when in its nested or folded position, as indicated at the right hand end of Figs. 1 and 2. Preferably the portable replacement wall comprises a main body or section 1, and two buck stay wings or end sections 14 movably mounted on and connected to the main section 1. As a preference, the wings or end sections 14 are connected to the main body or section 1 by hingelike structures G, which permit adjustment of the wings upon and away from the main body of the wall from the nested position illustrated, to a position in which the several sections are in alinement with each other, replacing the ordinary permanent back wall. In the illustrated form of connections between the main section 1 and wings 14 one or more hingelike structures G are employed for each wing, each hingelike structure comprising links 12, 13, hingedly connected together in a vertical line by bolts 24. The two leaves are hingedly connected along vertical lines to the main body 1 and wings 14 respectively, by bolts 19, 20, which extend through ears or lugs 21, cast integral with the main body 1 and wings 14. The wings 14 are formed with shouldered portions or lugs 22 against which the main section abuts when the wings are extended into alinement therewith. Said lugs 22 hold the main body 1 in alinement with the wings when the wall is supported in place behind the buck stays. Obviously, the exact form and arrangement of the connections between the main section and the buck stay wings is immaterial to the present invention, broadly considered, as various forms of extensible and pivotal connections will readily suggest themselves to those skilled in this art. Any suitable mechanism may be employed for raising or lowering the replacement wall, and I have shown cables 25 attached to the main sections 1, which cables are trained over sheaves 26 mounted in bearing brackets 27 supported by the beams E. Said cables may run to drums or other hoisting devices (not shown) as is clearly illustrated and described in my prior application, Serial No. 259,683.

In the embodiment of the invention illustrated, each section of the replacement wall, comprises a facing 6, of brick, or other fire resisting or refractory material, and a water cooled jacket 2, for supporting said brick or other fire resisting or refractory material, which water jacket is formed along its top, bottom and ends, and with a framelike, lateral, hollow projection 5, which surrounds the refractory material, and the cavity thereof communicates with the hollow space or cavity 4 of the main portion of the jacket. One wall, 7, of the jacket forms the back for the refractory material and the other wall, 8, of the jacket forms the outer face of the wall and contains the ears or lugs 21 to which the hingelike members G are pivotally secured.

Water is supplied to the sections, 1, 14, through supply pipes 9, and carried away from the sections by return pipes 10. For convenience, flexible pipes 15, 16, may be connected to the ends of the pipes 9, 10, the pipes 15, leading to a suitable source of water supply, such as is usually had in plants where open hearth furnaces are employed. The pipes 16 may lead to a sewer or other place where the water is discharged.

Normally, when a permanent back wall B is used in the furnace, the portable wall F is suspended, as shown at the right in Fig. 1, with the buck stay wings nested or folded back (see Fig. 2). The pipes 9, 10, may be connected to the sections 1, 14, if desired, or may be kept in readiness for connection thereto. In case a small break occurs in a panel D, the portable wall thereabove may be lowered to cover the break, the pipes 9, 10, connected to the water jacket of the main section 1, and water circulated through the water jacket. When the back wall B falls in, the nested wall F is pushed into the furnace and the buck stay wings 14 swung into alinement with the main section 1 and the entire wall F pulled up against the skew back channel iron J (see Fig. 3), with the

buck stay wings held behind the buck stays. The pipes 9, 10, are then coupled to the water jackets of the sections 1, 14, and water circulated therethrough. Refractory material K is thrown into any crevices, to close them.

The invention may be used as a part of the furnace structure, to act as a substitute for the usual back wall. In this case the device occupies the position illustrated at the left hand of Fig. 2. In case the refractory material thereof becomes worn out, the sections may be easily and quickly removed and replaced by others.

It will be readily apparent that by circulating water through the water jackets, much of the heat absorbed by the refractory material of the replacement wall, will be conducted to and absorbed by the water circulating through the jackets, and will be carried away. The temperature of the wall is thus kept in a moderate state, thereby preventing the rapid deterioration of the refractory material. Moreover, a cheaper grade of fire brick may be employed in the replacement wall than heretofore.

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 portable back wall for open hearth furnaces, comprising a facing of refractory material, and a portable water cooled jacket supporting said facing.

2. A portable back wall for open hearth furnaces, comprising a facing of refractory material, a portable water cooled jacket supporting said facing, and means for movably supporting said portable wall.

3. A portable back wall for open hearth furnaces, comprising a portable main section and buck stay wings adjustably mounted thereon, said main section and buck stay wings having facings of refractory material, and water cooled jackets supporting the facings.

4. A portable back wall for open hearth furnaces, comprising a portable main section and buck stay wings hingedly connected thereto, said main section and buck stay wings having facings of refractory material and water cooled jackets supporting the facings.

5. A portable back wall for open hearth furnaces, comprising a portable main section and two buck stay wings adjustably mounted thereon, said main section and buck stay wings comprising water jackets having hollow, framelike borders, and facings of refractory material supported in said framelike borders.

6. The combination with an open hearth furnace having buck stays, of a portable back wall adapted to be supported behind the buck stays, and having a water cooled jacket.

7. The combination with an open hearth furnace, having buck stays, of a portable back wall adapted to be supported behind the buck stays, and comprising a main section, and two buck stay wings adjustably connected thereto, said main section and buck stay wings comprising facings of refractory material and water cooled jackets supporting the facings.

8. The combination with an open hearth furnace and its buck stays, of a portable water cooled back wall having portions extending behind the buck stays.

9. The combination with an open hearth furnace and its buck stays, of a portable back wall, having a main section and two buck stay wings hingedly connected thereto, said section and buck stay wings having facings of refractory material and water cooled jackets supporting said facings.

10. The combination with an open hearth furnace and its buck stays, of a portable back wall, consisting of water cooled sections having portions arranged to extend behind the buck stays.

Youngstown, Ohio, May 31, 1919.

JOHN OLIVER GRIGGS.