J. O. GRIGGS.

OPEN HEARTH FURNACE.

APPLICATION FILED JAN. 20, 1919.

1,320,387.

Patented Nov. 4, 1919.

2 SHEETS—SHEET 1.

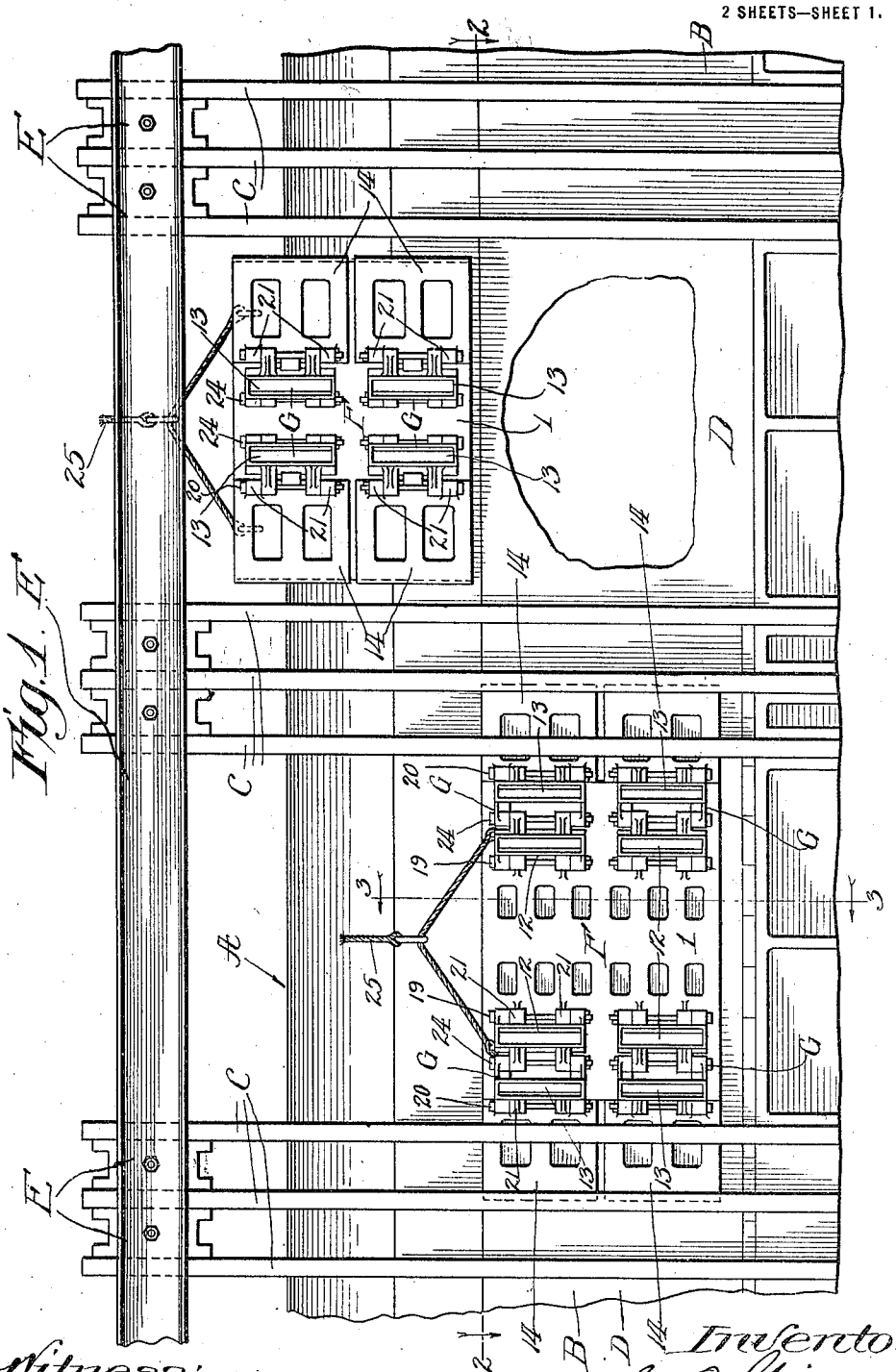


Fig. 1.

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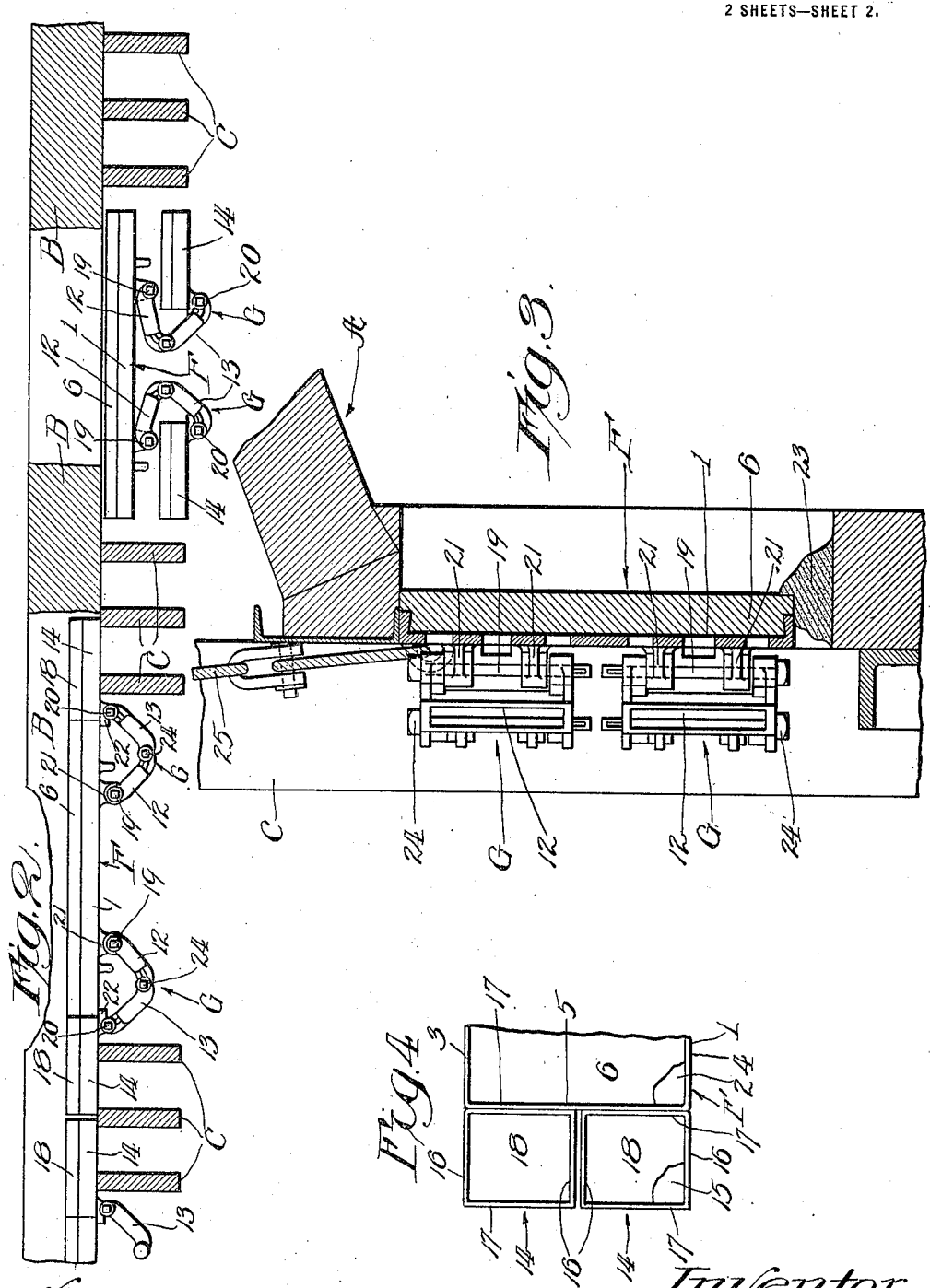
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UNITED STATES PATENT OFFICE.

JOHN O. GRIGGS, OF PEORIA, ILLINOIS.

OPEN-HEARTH FURNACE.

1,320,387. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed January 20, 1919. Serial No. 272,001.

To all whom it may concern:

Be it known that I, JOHN OLIVER GRIGGS, a citizen of the United States, and a resident of Peoria, Peoria county, State of Illinois, 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 its principal object is to provide improved means whereby deteriorated or fallen back walls of open hearth furnaces may be temporarily replaced and the wall rebuilt without materially interrupting the operation of the furnace.

This invention is in the nature of an improvement upon my prior application for patent on shields for walls for furnaces, filed October 25, 1918, Serial No. 259,683, to which reference is herein made.

In actual practice, with a shield constructed in accordance with the disclosure of said prior application, it has been found that the parts are apt to warp and become slightly distorted, due to the tremendous heat developed in the furnace, and that, occasionally, it becomes somewhat difficult to move the end section or buck-stay wings of the shield into place behind the buck-stays. In view of the heat issuing from a broken wall of the furnace, it is impossible for the workingmen to approach close to the wall, and for this reason the work of moving the end sections to positions behind the buck-stays is done with long poles or rods which makes it still more difficult to manipulate the end sections. This invention has reference more particularly to the supporting means for the end sections, or buck-stay wings and designs to provide supporting means which will permit the buck-stay wings to be readily and quickly adjusted from an inoperative position to an operative position behind the buck-stays. As in the device of my prior application, the device may be used as a shield to protect workingmen against the extreme heat while replacing a back wall or section thereof. The invention consists in the several novel features hereinafter fully shown, described and particularly defined in the claims.

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

Figure 1 is a side elevation of a fragment of an open hearth furnace showing two temporary replacement wall structures embodying a simple form of the present invention applied to the furnace. Fig. 2 is a horizontal section thereof taken on the line 2—2 of Fig. 1, showing both shields lowered to cover breaks in the wall. Fig. 3 is a vertical cross section taken on the line 3—3 of Fig. 1, and Fig. 4 is a rear elevation of a fragment of the shield

It is a well known fact that during the operation of an open-hearth furnace, the back wall or a section thereof occasionally falls in, or it becomes necessary to replace the back wall 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 the gas off, 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 re-heat the metal, which, when once "frozen" or solidified is not an easy matter to remelt. Furthermore, when a back wall falls in, the buck-stays are exposed to the extreme heat and are apt to become permanently injured because of such exposure.

My invention obviates the foregoing dangers and also obviates shortening the life of the wall by prematurely tearing down, but on the contrary permitting it to be used until completely gone, or if it falls in, the shield or temporary 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 serving as a shield to protect the workingmen during the rebuilding of the wall while the furnace is still hot.

While the invention is intended primarily for use in open hearth furnaces it is applicable to other furnaces of like construction, and, I therefore, do not wish to be limited to its use on open hearth furnaces.

In the accompanying 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 back wall B reinforced by the 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 C, are connected to longitudinally arranged beams E. 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.

As in my prior application, a shield or temporary replacement wall F is supported adjacent the back wall by any suitable means, and adapted to slide up and down in front of the panels D, between the groups of buck-stays, and while the main body or section 1, of said shield or temporary replacement wall may be constructed in different ways, and the desired results be obtained, I prefer the construction shown, which comprises a casing made with a rear wall 2, top and bottom walls 3 and 4, and end walls 5. In this casing there is built up a front wall or facing 6, of brick or other fire resisting or refractory material which lies in juxtaposition to the back wall B, when lowered, or replaces it when said wall falls in or is torn down for replacement on account of deterioration.

As in my prior application, there are wings or end sections, 14, movably connected to the main section 1, which normally are supported behind the main body 1, of the shield, but which are capable of being readily thrust behind the buck-stays C, to protect them from the intense heat in the furnace in case the parts of the wall behind the buck-stays fall in or are removed because of deterioration. These buck-stay wings are of the same general construction as the main section 1, that is to say, each is preferably formed of a casing having a back wall 15, top and bottom walls 16, and end walls 17, in which is built up a facing or filling 18, of fire brick or other fire resisting or refractory material.

The means shown for supporting said buck-stay wings in such condition that they may be readily thrust behind the buck-stays, comprises a hinge-like arrangement of substantial construction, pivotally connected to the main section and to the wings, which permits the wings to be freely moved upon the pivotal connections of the hinge-like structures, and permits adjustment of the wings upon or away from the main body of the temporary wall, after they have been moved into alinement with it to thereby close up any gaps or spaces between the adjacent edges of the main section and wings. In the illustrated form of hinge-like connections between the main section 1, and the wings 14, one or more hinge-like structures G, are employed for each wing, each hinge-like structure comprising two leaves or links 12, 13, hingedly connected together in a vertical line by bolts 24, the two leaves of each hinge being hingedly connected along vertical lines to the main body 1 and wings 14, respectively, by bolts 19, 20. The casings of the main section 1 and wings 14, may be provided with perforated ears or lugs 21 cast integral therewith or bolted thereto, for the reception of the bolts 19 and 20. The wings are formed with shouldered portions 22, against which the main sections abut where the wings are extended into alinement therewith.

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. The form shown, however, is very simple and substantial, and effectively supports the end sections or wings in position, ready to be thrust behind the adjacent buck-stays in case the wall behind the same and behind the main section crumbles and falls away or in case it is intentionally broken down after a part thereof has deteriorated or crumbled away.

Any suitable mechanism may be employed for raising and lowering the shield or temporary replacement wall, and I have shown cables 25 attached to the main sections of the shields, which cables may run to drums or other hoisting device as is clearly illustrated and described in my prior application.

The usual open hearth furnace is formed with several panels, and preferably one of the shields or temporary replacement walls is associated with each panel. In the drawings I have shown two panels and two shields, one of the shields in Figs. 1 and 2, being shown as lowered and placed in position to completely replace a portion of fallen back wall, the other shield shown in Fig. 1 being raised above the back wall, and the back wall being shown as having a portion broken out over which the shield may be lowered to close the gap in the wall and permit the continuation of the heat. In Fig. 2, one of the shields is shown in position covering a small gap or break in the wall.

Normally, the shields are supported above the back walls of the furnace with the buck-stay wings folded back to lie between the groups of buck-stays. In case a break occurs in the back wall below any of the shields the shield above the break, with its wings nested, is lowered so as to cover the opening in the wall, thereby permitting the heat to go on. If the entire back wall falls away, the shields, with their nested wings, are lowered to the opening and pushed into the interior of the furnace far enough to permit the buck-stay wings to be swung upon the hinge connections to unnest them;

the wings are thereupon unnested and moved into alinement with the main sections of the shields behind the buck-stays. In this condition they are suspended from the cables and bear against the buck-stays, the shouldered portions 22 of the wings forming stops, holding the main sections in alinement with the wings. It is customary to throw refractory material into any crevices or gaps that may be present between the shield and bottom of the opening. Such material is illustrated at 23.

After a break in the wall has taken place, or it has crumbled away, very little time is required to place the shields in position and consequently, the heat may go on without interruption, thereby avoiding any waste of time and saving a great deal of labor and expenses which would otherwise occur in case it became necessary to shut down the furnace because of a break or caving in of the wall.

After the heat has been tapped, the furnace is permitted to cool somewhat and the buck-stay wings are swung back into position between the buck-stay, after which the shields may be raised gradually and the workingmen may build up the broken wall, the shields acting to shield the workingmen from the intense heat. After each course of brick has been laid, the shield may be raised sufficiently for the workingmen to lay another course and in this manner the entire wall may be rebuilt.

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. In a device of the character described, in combination with a furnace wall and its buck-stays, of a temporary replacement wall adapted to cover a deteriorated furnace wall or replace a fallen portion thereof to prevent "freezing" or retardation of the heat, comprising a main section and buck-stay wings, and pivotally connected wing supports between said main section and wings, pivotally connected to said main section and wings.

2. In a device of the character described, in combination with a furnace wall and its buck-stays, of a temporary replacement wall adapted to cover a deteriorated furnace wall or replace a fallen portion thereof to prevent "freezing" or retardation of the heat, comprising a main section adapted to extend along a panel between the buck stays, and end sections capable of being moved into position behind the buck-stays, and supports for the wings, comprising supporting members, pivotally connected to the main section, and other supporting members pivotally connected to the wings, the supporting members for each wing being pivotally connected together.

3. In a device of the character described, in combination with a furnace wall and its buck-stays, of a temporary replacement wall adapted to cover a deteriorated furnace wall or replace a fallen portion thereof to prevent "freezing" or retardation of the heat, comprising a main section adapted to extend along a panel between the buck-stays, and end sections capable of being moved into position behind the buck-stays, and supports for the wings comprising hinged together supporting members pivotally connected to said main section and one to each wing.

4. In a device of the character described, in combination with a furnace wall and its buck-stays, of a temporary replacement wall adapted to cover a deteriorated furnace wall or replace a fallen portion thereof to prevent "freezing" or retardation of the heat, comprising a main section adapted to extend along a panel between the buck-stays, and end sections capable of being moved into position behind the buck-stays, and supports for the wings comprising pivotally connected hinge leaves, the ends of which are pivotally connected to the main section and to each wing, respectively.

5. In a device of the character described, in combination with a furnace wall and its buck-stays, of a temporary replacement wall adapted to cover a deteriorated furnace wall or replace a fallen portion thereof to prevent "freezing" or retardation of the heat, comprising a main section adapted to extend along a panel between the buck-stays, and end sections capable of being moved into position behind the buck-stays and supports for the wings comprising jointed connections between the main section and each wing pivotally connected with said section and wing.

6. In a device of the character described, a temporary replacement wall adapted to cover a gap or break in the wall of a furnace, comprising the main section and an end section adjustably connected to the main section by pivotally connected hinge leaves, which are also pivotally connected to the main section and end section, respectively.

7. In a device of the character described, a temporary replacement wall adapted to cover a gap or break in a furnace wall, comprising a main section and an end section, and hinge members pivotally connected to each other and pivotally connected to the main section and to the end section, respectively.

8. In a device of the character described, a temporary replacement wall adapted to

cover a gap or break in a furnace wall, comprising a main section and an end section, connected thereto by swinging members having fixed pivotal connections with the main section and end section, respectively.

9. In a device of the character described, a temporary replacement wall adapted to cover a gap or break in a furnace wall, comprising a main section and an end section, said end section having a shouldered portion forming a stop for the main section when the wing is extended.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."