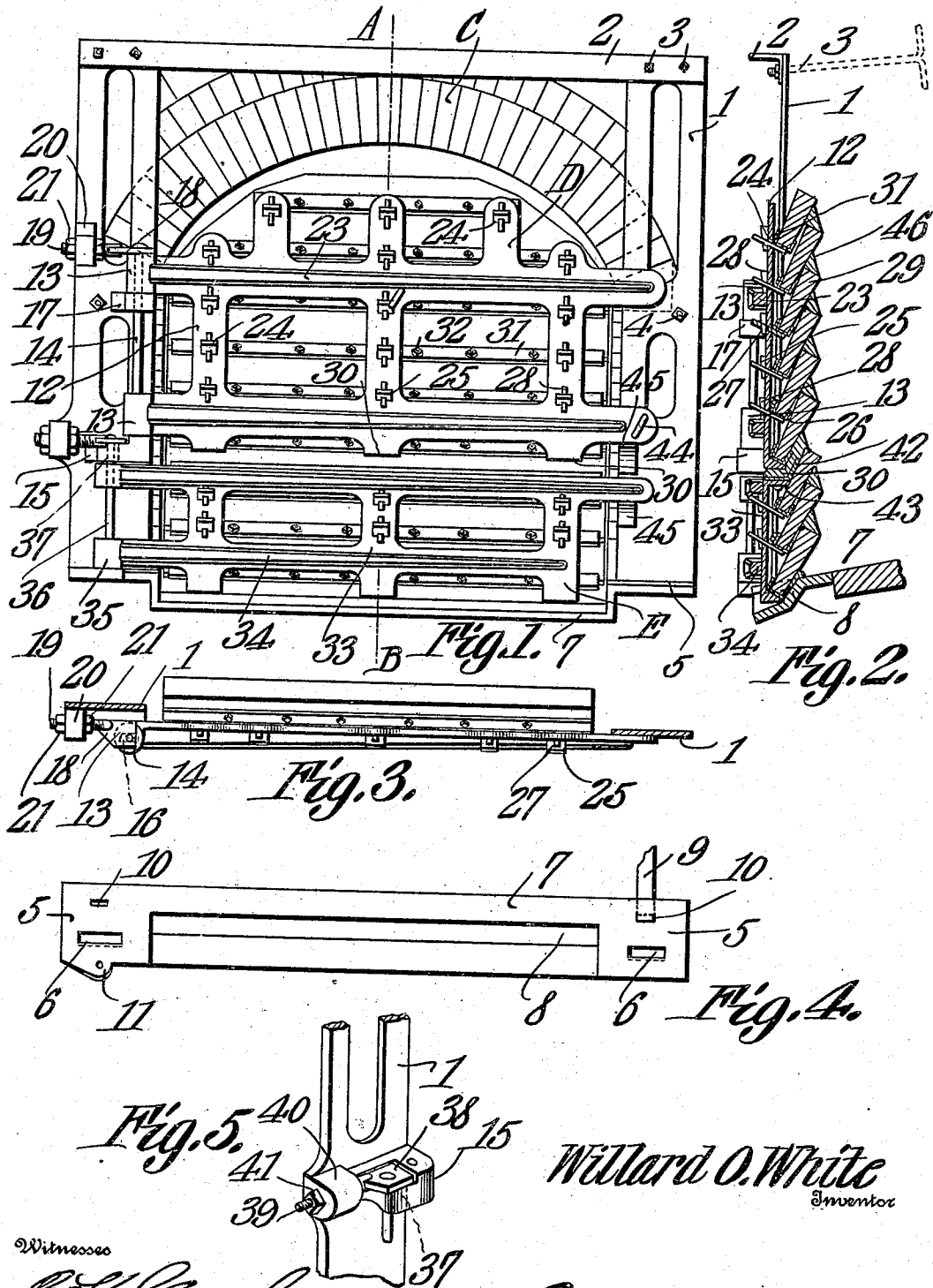


W. O. WHITE.
DOOR FOR COKE OVENS.
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Patented Nov. 30, 1909.



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UNITED STATES PATENT OFFICE.

WILLARD OLNEY WHITE, OF REPUBLIC, PENNSYLVANIA.

DOOR FOR COKE-OVENS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLARD O. WHITE, a citizen of the United States, residing at Republic, in the county of Fayette and State of Pennsylvania, have invented a new and useful Door for Coke-Ovens, of which the following is a specification.

This invention relates to doors for coke ovens and the like and its object is to provide a device of this character formed of metal which is protected so as to be prevented from becoming overheated.

Another object is to provide a door constituting a rack for supporting superposed tiers of fire-brick or the like which constitute the protecting material.

Another object is to provide a door-frame of novel form having hinges of special form for connecting the door thereto.

Another object is to provide a door of this character which does not require the use of expensive shapes of fire-brick, and in which absolutely no portion of the metal of the door is exposed to the heat.

Another object is to provide a door of this type which offers no hindrance to the expansion or contraction of either the brick or metal parts of the door.

Another object is to provide a door which can be greatly varied as to height and width without requiring any variation in the size or form of the metal parts.

Another object is to provide a door, the fire-brick of which can be removed at any point on the door without disturbing the adjoining bricks.

Another object is to provide a door which can be readily adapted to various sizes and forms of door openings and to various hinge devices or other means of support.

Another object is to provide a simple and effective hinge for the door by means of which the door can be adjusted to overcome the usual distortion occurring in the door opening of the oven.

With these and other objects in view the invention consists in certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a front elevation of the door of a coke oven, a portion of the arch being shown. Fig. 2 is a section on line A—B Fig. 1. Fig. 3 is a

plan view of the door, the side plates or uprights of the door frame being shown in section. Fig. 4 is a top plan view of the door sill, one of the side strips being shown attached thereto. Fig. 5 is a perspective view of one of the hinge lugs and showing the pintle-adjusting device mounted thereon.

Referring to the figures by characters of reference C designates the arch of the oven, and arranged at the sides thereof are metal uprights 1, connected at their upper ends by an angle-iron 2. Preferably two anchor straps 3 are connected to the upper end of each of the uprights 1, and another anchor strap 4 preferably extends from each of the uprights and adjacent the spring line of the arch C. The lower end of each upright has a projection 5 designed to be seated within a slot 6 formed in the elevated end of a metal sill 7, which, as shown particularly in Fig. 2, has an inclined shoulder 8 constituting an abutment for the door. Anchoring straps 9 are preferably inserted in openings 10 formed in the end portions of the sill and are designed to extend to the rear wall of the oven. Obviously by providing the anchoring straps such as described the various parts of the door frame can be securely held to the oven structure without danger of becoming dislodged. As shown in Fig. 4 one end of the sill 7 has a lug 10, for the purpose hereinafter set forth.

The door herein described is applicable to beehive or rectangular types of coke ovens and can be made up of either two or four hinged sections. In the drawings the door has been shown made up of two sections. The upper door section D consists of a metal frame 12 having ears 13 extending from one end thereof for the reception of a pintle 14, which is mounted at its lower end within an elongated lug 15, while the upper portion of the pintle is designed to slide within a slot 16, formed within a lug 17, the two lugs 15 and 17 being arranged upon one of the uprights 1. The upper extremity of the pintle 14 is attached to an adjusting plate 18, which bears upon the upper ear 13 and is located at one end of a screw-threaded stem 19 slidably mounted within an ear 20 which projects from the upright 1 on which the lugs 15 and 17 are mounted. The stem 19 has nuts 21 mounted thereon at opposite sides of the ear 20, these nuts constituting means for shifting the stem 19 longitudinally and holding it in an adjusted posi-

tion, said shifting action being sufficient to move the pintle 14 within the slot 16 and thus tilting the door frame 12 so as to allow for any distortion of the door opening which might occur as a result of the action of the heat. The ears 13 are formed at one end of reinforcing webs or strips 23 extending from one side to the other of the door frame 12.

The door frame 12 is provided with superposed series of inclined slots 24, the slots of each series being disposed in horizontal alinement. The slots of each series are designed to receive lugs 25 extending from an angle-iron 26, each of these lugs being formed with a slot 27 for the reception of a key 28. Each angle-iron 26 is of course held in an inclined position by the lugs 25 extending through the inclined slots 24, and each of these angle irons constitutes the seat of a course of fire-bricks 29, the bricks of each course being disposed close together and arranged so as to lap the joints between the bricks of the next adjoining course, the bricks of each course being disposed close together and arranged to lap the preceding course sufficiently to cover the supporting angle next above.

By referring to Fig. 2 it will be seen that ledges 30 are formed along the bottom of the door frame 12, and that the lower angle-iron 26 rests thereon. All of the angle-irons have clamping strips 31 bolted or otherwise secured thereto, the bricks 29 being interposed between the angle-irons and the clamping strips, and the bolts being extended between the bricks. It is of course to be understood that the upper courses of fire-brick are to be varied in length so as to conform to the variable width of the arched portion of the door opening.

In assembling the bricks upon the inner face of the door-frame a row of bricks can be clamped to an angle iron and said iron then fastened to the metal frame 12 as a unit, or, if preferred, the angle irons can first be secured to the frame and the bricks then placed thereon and brought to position by the bolts 32 and strips 31. It will be seen that the nuts of the bolts 32 are all accessible from the outer side of the door, so that a brick can be placed in or removed from position in any horizontal row without disturbing the adjacent rows.

The lower door section E is similar to the section D only on a smaller scale, this door section being made up of a frame 33, having reinforcing ribs 34 extending from side to side thereof, and merging at one end into ears 35, for the reception of a pintle 36 the lower end of which is mounted within the lug 11 upon the sill 7. The upper end of this pintle is designed to slide within a slot 37 formed within the lug 15 heretofore referred to, the upper terminal of the pintle being attached to an adjusting plate 38

slidably mounted on the lug 15 and attached to one end of a screw-threaded stem 39, which is slidably mounted within an ear 40 extending from the standard 1. This stem 39 has nuts 41 thereon by means of which it can be adjusted longitudinally and held so as to tilt the lower door section to bring it into proper relation with the door opening in the event of distortion. The inner face of the door frame 33 has superposed tiers of fire-brick mounted in the same manner as described in connection with the upper door section. The lower angle-iron and tier of bricks upon the upper door section are prevented from closing against and breaking the top bricks of the lower door section, because of an angle-iron or plate 42, which is riveted or otherwise secured upon ears 43 extending inwardly from the upper edge of the lower door section.

As shown in Fig. 1, portions of the door sections D and E are designed to swing against the upright 1 shown at the right of the door opening, and, if desired, one of these lapping portions of the upper door section can be provided with eye-bolts 44, which may be engaged by a lever which permits the door to be manipulated by an operator standing away from the heat. This is especially designed for use on very large doors. For doors standing against an inclined oven front the door frame is preferably made to close against the upright 1 shown at the right of Fig. 1 and to rest on lugs 45 outstanding from said upright.

When it is desired to use the door the various joints are filled with plastic loam or clay and the reëntrant angles formed by the overlapping brick ends are also filled. This filling has been indicated at 46. By using a mixture which will glaze under the oven heat the entire mass of brick can be cemented together. One mudding will last till the bricks are worn out or until one or more of them have become dislodged as a result of careless handling. The only mudding required each time the doors are opened is that necessary at the bottom, sides and between the sections of the door. Before the door is closed a layer of plastic loam or clay is placed on the sill 7 and the lower door section E moved thereagainst so as to cause it to fully protect the lower metal portion of the door. Another layer of plastic loam or clay is then placed upon the angle-plate 43, and when the upper door section E is moved to closed position this layer will completely seal the joint between the two sections, and, at the same time, protect the lower angle-iron 26 of the upper door section and the angle-plate 43.

Any irregularities which may develop either in the setting or through the action of heat on the oven wall and tending to throw the doors out of proper alinement, can be

overcome very readily by adjusting the upper hinges of the two door sections. It will be noted that the lower hinge is set out of alinement with the upper hinge so that its pintle may be withdrawn without interference.

It will be seen that a door constructed in the manner herein set forth will be very lasting and is comparatively inexpensive, because it does not require the use of any expensive shapes of fire-brick and the brick employed completely protect the metal parts of the door. Obviously the vent at the top of the door can be easily varied either by modifying the shape of the top row of the bricks or by using a plastic loam. The arrangement of the parts avoids all hindrance to the expansion or contraction of the brick or metal parts and importance is attached to the fact that by mounting the bricks in the manner disclosed any of them can be conveniently removed without the necessity of disturbing any of the adjacent bricks.

Obviously various changes may be made in the construction and arrangement of the parts without departing from the spirit or sacrificing the advantages of the invention.

What is claimed is:—

1. A door including a frame, and superposed separately removable substantially parallel, inclined tiers of refractory material carried by the frame.

2. A door including a frame, and separately removable substantially parallel inclined tiers of refractory material upon the frame, each tier lapping the next adjoining tier thereabove.

3. A door including a frame, and separately removable inclined tiers of refractory material constituting a covering for one face of the frame, each tier lapping an adjoining tier.

4. A door including a frame, superposed supporting members detachably connected to the frame, and a tier of refractory material carried by each of the supporting members, each tier concealing the supporting member of an adjoining tier.

5. A door including a frame, supporting members detachably connected thereto, and a series of fire-bricks carried by each of said members, the bricks of one series concealing the supporting member of an adjoining series.

6. A door including a frame, superposed angular supporting members thereon, and a series of fire-brick mounted upon each member, the brick of each series lapping the next adjoining supporting member and the bricks thereon.

7. A door including a frame, angular supporting members detachably secured thereto and disposed one above the other, a series of fire bricks upon each of said members, means for detachably securing the bricks upon the

members, and a refractory filling interposed between the bricks of the adjoining series.

8. A door including an open frame, supporting members detachably mounted upon one face of the frame and arranged one above the other, fire-bricks mounted upon said members, clamping devices bearing upon the bricks, and means engaging said devices and exposed through the frame for binding said devices upon the bricks.

9. A door including an open frame, superposed supporting members upon one face of the frame, a tier of refractory material mounted upon each member, a clamping strip bearing upon each tier of refractory material and between said tier and the frame, means engaging the strips for binding them upon the refractory material, said means being accessible through the frame, each tier of refractory material lapping the adjoining tier and its supporting member.

10. A door including a frame, said frame having openings therein, superposed angular supporting members upon one face of the frame, lugs thereon removably mounted within the openings, means engaging the lugs for detachably securing them within the openings, and tiers of refractory material mounted upon the supporting members, each tier lapping the next adjoining tier thereabove and the supporting member thereof.

11. A door including upper and lower movably supported sections, each section including a frame, and tiers of refractory material constituting a covering for one face of the frame, each tier lapping one of the adjoining tiers, and an angle-plate upon the frame of the lower section and bearing against the upper tier of said section, said plate constituting a loam support.

12. A door including upper and lower movable sections, each section consisting of a plate, removable tiers of refractory material upon each plate and constituting a covering for one face thereof, each tier lapping one of the adjoining tiers and means secured upon the lower section and bearing against the upper tier thereon for limiting the movement of the upper section in one direction, said means constituting a loam support.

13. A door including a sill having a longitudinal shoulder, the ends of the sill being apertured, standards bearing upon said ends and projecting into the apertures, a connection between the upper ends of the standards, and a door hingedly connected to one of the standards, said door including upper and lower sections, each section consisting of a frame, and separately removable tiers of refractory material upon one face of and constituting a covering for the frame, each tier lapping one of the adjoining tiers, said lower section being movable against the shoulder upon the sill, and an angular

plate upon the upper portion of the lower section, and constituting a guard for the upper tier upon said section, said plate forming a support for a mudding material.

- 5 14. In a coke oven a sill having a longitudinally extending shouldered portion, there being apertures within the end portions of the sill, an anchoring strap engaging each end portion of the sill, standards
10 bearing upon said end portions and projecting into certain of the apertures, a connection between the upper ends of the standards, anchoring straps extending from the standards, upper and lower door sections,
15 and hinged connections between said sections and one of the standards, said connections

tions including separately tiltable pintles for independently tilting the sections.

15. In a coke oven the combination with a sill and standards upstanding therefrom, 20 of slotted lugs upon one of the standards, upper and lower door sections bearing upon the lugs, pintles constituting connections between the lugs and sections, and means for tilting the pintles within the lugs. 25

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLARD OLNEY WHITE.

Witnesses:

H. GUY BAER,
GEO. W. SEMANS.