

APPLICATION FILED JULY 29, 1908.

Patented Feb. 8, 1910.

Fig. 2.

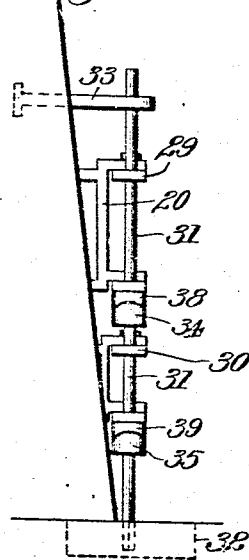


Fig. 1.

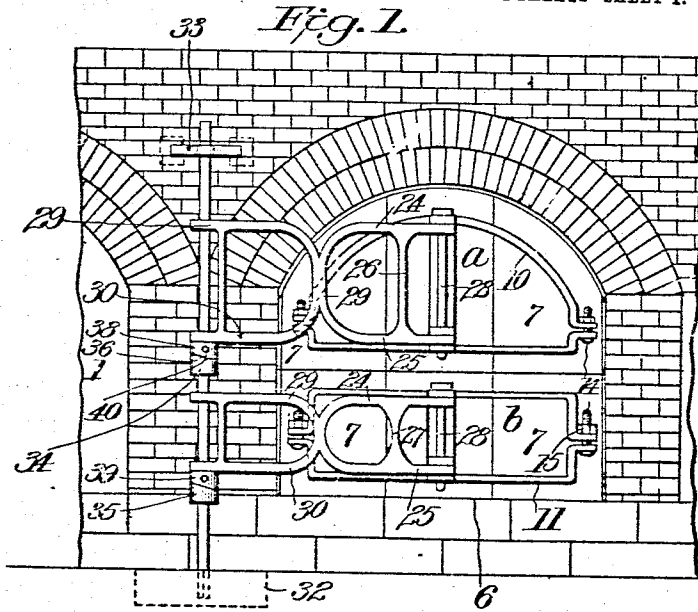
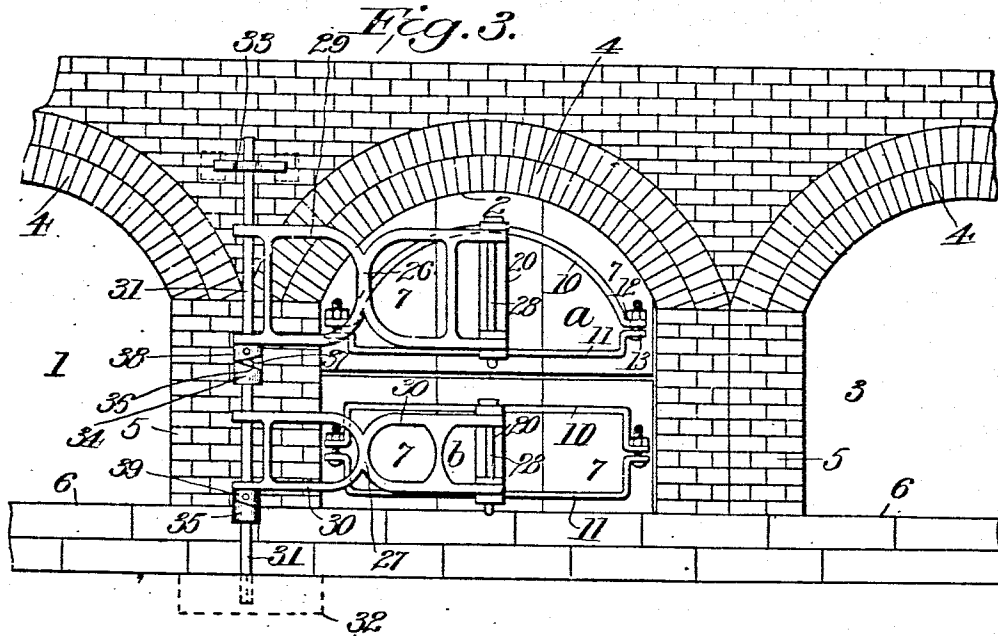


Fig. 3.



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COKE OVEN DOOR.

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948,936.

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2 SHEETS—SHEET 2.

Fig. 4.

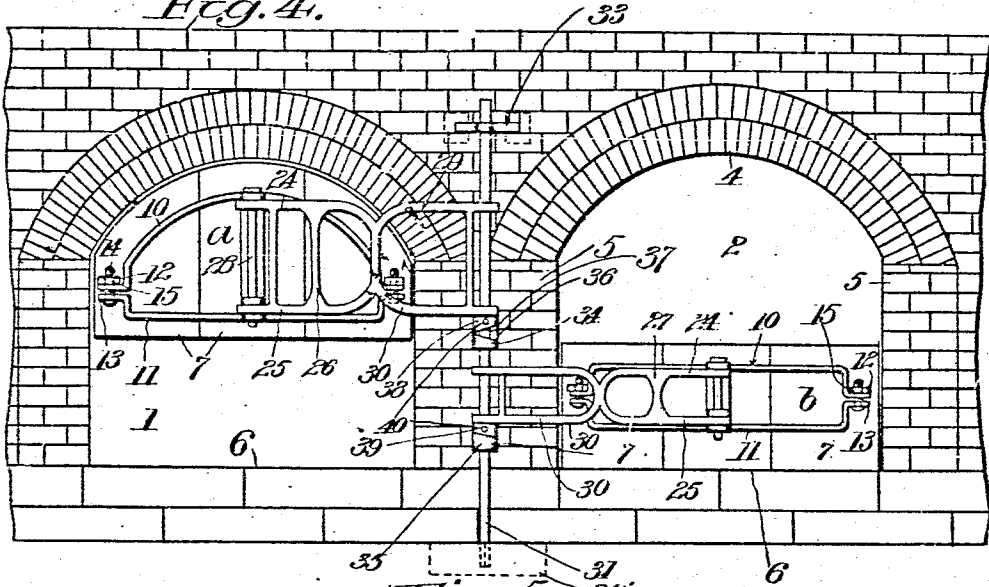


Fig. 5.

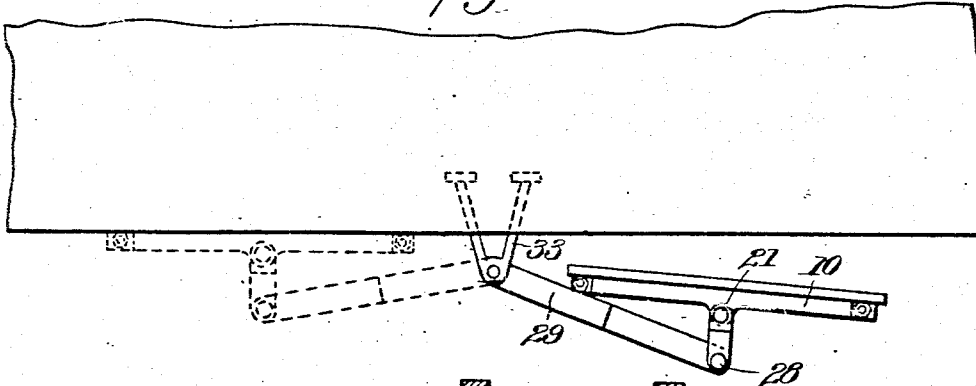


Fig. 6.

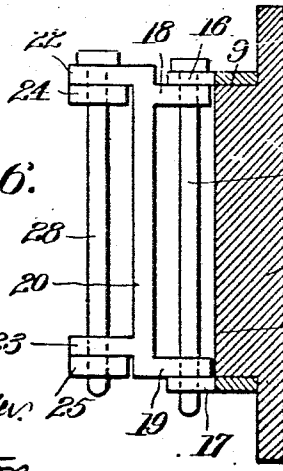
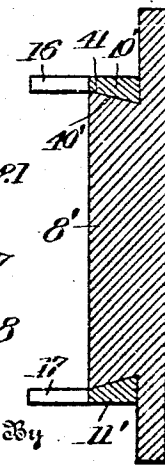


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES FREDERICK PETERS. OF LIGONIER, PENNSYLVANIA.

COKE-OVEN DOOR.

948,936.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed July 29, 1909. Serial No. 510,281.

To all whom it may concern:

Be it known that I, JAMES FREDERICK PETERS, a citizen of the United States, residing at Ligonier, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Coke-Oven Doors, of which the following is a specification.

This invention relates to doors, particularly coke oven doors.

One object of the invention is to provide a coke or other oven door whose metallic parts are not subjected to the direct heat of the furnace, so as to obviate loosening of the parts and to maintain rigidity.

Another object of the invention is to provide double or sectional doors for coke or other ovens which are not supported directly upon their hinges when in operative position, whereby the doors and their mountings are not under strain and by virtue of which warping of the doors is obviated, because the doors set on their own bases and thereby sustain their own weight.

Another object of the invention resides in the provision of a door for coke or other ovens embodying such characteristics that it and its mountings are spaced from the oven so that the oven may be relined when occasion requires without removing the door and its mountings from the furnace.

Another object of the invention is to provide a coke or other oven door composed preferably of upper and lower sections having mountings embodying parts operable to raise them, said parts operating to permit a free gravitating swinging of the doors to their operative positions.

It is still further designed to provide a door for coke or other ovens composed of a plurality of silica or other refractory bricks which are bound together by metallic elements that are exposed to the air, and not to the heat of the furnace, whether the door be in operative or inoperative position.

A still further object of the invention resides in the provision of a refractory door for coke or other ovens which is so mounted that it may be employed as a closure for one end of a coke oven or for the same end of an adjacent oven or be so positioned at the same end of the adjacent oven that its parts which have become heated, as the result of being placed in operative position in a working oven, that a person will not be liable to seriously burn himself in the event of coming

accidentally into contact with the door when open. Furthermore by turning the heated side toward the adjacent oven, it does not allow the temperature of the brick to change too rapidly, thereby giving much longer life to the door.

With the above and other objects in view, the present invention consists in the combination and arrangement of parts herein- after more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes may be made in the form, proportion, size and minor details without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a front view of a coke oven and a portion of another oven illustrating my improved doors acting as closures for the end of the oven. Fig. 2 is an end view of a portion of an oven illustrating end views of my improved doors in operative position. Fig. 3 illustrates a group of parallel ovens illustrating my improved doors in operative position at the intermediate oven, the upper door being raised slightly with regard to the lower door prior to swinging the doors outwardly. Fig. 4 illustrates the position of the upper door when swung out of coöperative relation with the lower door and into position in the adjacent oven. Fig. 5 is a top plan view. Fig. 6 is a transverse sectional view through one of the doors. Fig. 7 is a transverse section through a door showing a modified form of door and the metallic members connected thereto.

Referring now more particularly to the accompanying drawings, the reference characters 1, 2 and 3 indicate a group of parallel coke ovens which are open at both ends, as usual, and whose openings each include an arch 4, side facing walls 5 and a hearth 6.

The characters *a* and *b* indicate upper and lower doors, each composed of a plurality of silica or other refractory bricks or the like 7, and preferably imperforate. Each brick is preferably provided with a projecting portion 8 on its outer face, so that when the plurality of bricks 7 of each door are assembled, the projecting portions 8 form a shoulder 9 to receive the upper and lower metallic or other straps 10 and 11, respectively. These straps embrace said shoulder and have their ends deflected to form

meeting faces 12 and 13, respectively, through which are passed the bolts 14, having nuts 15 operable thereon, so that the straps 10 and 11 may be bound tightly upon the shoulder 9 of the doors 7 to bind the bricks tightly together. The metallic straps 10 and 11 and their securing means are secured adjacent the outer face of the doors without any part thereof projecting through the doors so that the metallic parts are not subjected in any way to the direct heat of the oven when the doors are closed, but are exposed absolutely to the air when the doors are in closed position.

The upper and lower metallic straps 10 and 11 are provided with the outwardly directed perforated ears 16 and 17, respectively, adjacent which are disposed the ears 18 and 19, respectively, of a link 20 (see Fig. 6). Passed through the ears of the upper and lower straps and said ears of the link 20 is a hinge pintle 21, the link 20 being also provided with upper and lower perforated ears 22 and 23, to permit of the passage therethrough of a hinge pintle 28 which passes also through the perforated arms 24 and 25 of the hinges 26 and 27. The hinges 26 and 27 of the upper and lower doors *a* and *b*, respectively, are provided with other arms 29 and 30, which are perforated to embrace the supporting upright or hinge pintle 31, whose lower end is squared and fitted in a rectangular opening or in any other suitable manner secured in a concrete or other base 32 adjacent the walls of the ovens and preferably intermediate adjacent ovens and in spaced relation to the walls thereof for the support of the hinges, there being a V-shaped or other form of bracket 33 secured in any suitable manner within the walls of the oven structure, or secured in any suitable manner to the outer face of the walls of the structure for the support of the upper end of the supporting upright or pintle 31.

The pintle 31 has fixedly secured thereto in any suitable manner the upper and lower cams 34 and 35, which are disposed in spaced relation to each other and whose cam faces 36 cooperate with the cam face 37 formed on each of the rotatable upper and lower cams 38 and 39, respectively, each of which latter has one or more sockets 40 into which may be inserted a rod or other implement (not shown), to permit of turning of the rotatable cams 38 and 39 for the purpose of raising and lowering the doors for reasons hereinafter explained.

The hinges are spaced considerably from the doors when in operative position, by virtue of the peculiar link 20, and like the upper and lower straps 10 and 11 and the other metallic parts of the door mechanism, are not exposed at any time to the direct heat of the oven, but exposed absolutely to the

atmosphere, so that neither the straps nor the hinges can at any time become unduly heated, and thereby rendered so hot as to seriously injure persons or to contract and expand to such proportions as to result in separation of the metallic parts from the door or otherwise to become loose with relation to the door and other cooperating parts.

As shown in Fig. 1, the doors are closed at oven 2, with the lower door resting directly upon the hearth of the oven and the upper door resting directly upon the upper edge of the lower door, by virtue of which, the hinges are relieved of any strain because the doors are only steadied thereby and not supported by the hinges when the doors are closed. It is the custom to "mud" the cracks between the doors and between the edges thereof and the walls of the oven. To open the doors, a rod or other suitable implement (not shown) is disposed in one of the sockets 40 of the upper cam 38 and the latter rotated to cause its cam face to ride upon the cam face of the cam 34. This operation causes the cam 38 to move upwardly on the hinge pintle 31, and being disposed beneath the upper hinge, causes a slight elevation of the latter, as shown in Fig. 3, when the upper door may be thrown outwardly from the end of the oven 2 to the position shown in Fig. 4, wherein it will be seen that the door *a* is supported by its hinges at the mouth of the adjacent oven 1. If the oven 1 is provided with doors, and they are closed, the door *a* of oven 2 may be disposed adjacent the upper door of oven 1, but in any event, the upper door of the oven 2 preferably has that face thereof which has been subjected to the heat of the oven so turned toward oven 1 that the metallic straps 10 and 11 and the other metallic parts, including the hinges, are still turned away from the structure, so that at no time are any of the metallic parts subjected to the direct heat of the ovens, while that surface of the doors which has become heated is generally turned toward the structure. If desired, the peculiar link connection 20 between the hinge and door will permit the metallic parts of the door to be turned toward the adjacent oven. When the upper door is thrown outwardly away from the oven 2, it may swing upon the hinge pintle 21 of the link 20 while the link 20 may swing upon the hinge pintle 28 to permit the door to be swung entirely around, as shown in Figs. 4 and 5. Thus the upper door has a double swinging movement so that, while the hinge of the upper door is substantially parallel therewith, when the door is in operative position, the door may be swung, if desired, into engagement at one end with its hinge, as may be apparent by the full lines in Fig. 5.

The lower door and its hinge embodies the same characteristics and is preferably of

the same construction, save that it may differ slightly in shape at its upper edge and be smaller or larger, as may be desired. Thus by operating the lower cam 39 in the same manner as the cam 38, the lower door *b* may be raised and swung open and closed the same as door *a*.

By virtue of the cam mechanisms, the upper and lower doors may be easily closed, because the cam mechanisms provide for a free and easy return swing of the doors to their operative positions, as will be understood.

In Fig. 7 there is shown a modified form of door, the only difference between the modified form and the form first described, however, residing in the projecting portions 8' having their edges beveled to form a dove-tailed shoulder 40' adapted to receive the beveled or dove-tailed faces 41 of the upper and lower straps 10' and 11'.

It will be seen that the hinge supporting means is disposed in spaced relation to the walls of the ovens, by virtue of which the linings 5 at the sides of the oven, as well as the hearth and arch thereof may be repaired, if necessary, without removing the doors or their supporting means from the structure. It will also be seen that those surfaces of the doors and their aggroupments, which are not subjected to the direct heat of the oven, may be exposed to the atmosphere whether the doors be in open or closed position. It will also be seen that the hinges proper are spaced from the doors so that at no time do they become unduly heated. It will also be apparent that the iron parts of the device are not subjected to direct heat of the furnace, and when subjected to any heat at all, it is only when the doors are at rest; hence warping is obviated because the doors, when subjected to heat, are not under strain.

What is claimed is:—

1. In a door mechanism for coke ovens, a door supporting means including an upright, upper and lower doors hingedly connected to said upright, upper and lower cams fixed on the upright, one below the hinge of each door, a movable cam mounted upon each fixed cam and upon which movable cams the hinges of the upper and lower doors are disposed, whereby operation of the movable cams upon the fixed cams will effect a raising and lowering of the doors, the movable cams being operable to lower the doors by gravity.

2. In a door mechanism for coke ovens, the combination with door supporting means, a door, metallic members secured to the outer face only of the door, said metallic members having a pair of ears, a hinge connected to the supporting means, and a link including a body portion provided with a pair of lugs pivotally connected to said ears and also having another pair of lugs pivotally secured to said hinge, so that the door

has a double swinging movement upon its hinge when the hinge is swung upon said supporting means.

3. In a door mechanism for coke ovens, the combination with door supporting means, a door, metallic members secured to the outer face only of the door, said metallic members having a pair of ears, a hinge connected to the said supporting means, a link including a body portion provided with a pair of lugs pivotally connected to said ears and also having another pair of lugs pivotally secured to said hinge, so that the door has a double swinging movement upon its hinge when the hinge is swung upon said supporting means, and a cam mechanism mounted upon said supporting means and operable to raise the door and to provide for a lowering and gravitating closing of the door.

4. A coke oven door comprising a plurality of refractory elements, each provided with a projecting portion, supporting straps embracing the projecting portions of said refractory elements to bind them together, a link having pivotal connection with said straps, and a hinge for the door having pivotal connection with said link.

5. A coke oven door comprising refractory material, metallic members secured to the refractory material, a link having portions projecting from one side and pivotally connected to said members and having other portions projecting from its opposite side, and a hinge having pivotal connection with the last mentioned projecting portions of the link.

6. In a door mechanism for coke ovens, the combination of door supporting means disposed in spaced relation to the oven, upper and lower doors hingedly connected to said supporting means, means whereby the upper door may be raised and lowered upon said supporting means when it is opened and closed, and means whereby the lower door may be raised and lowered upon said supporting means when it is opened and closed.

7. In a door mechanism for coke ovens, door supporting means, upper and lower doors hingedly connected to said supporting means, a cam mechanism whereby the upper door may be raised and lowered, and a cam mechanism whereby the lower door may be raised and lowered, the cam mechanism being operable to lower the doors by gravity.

8. In a door mechanism for coke ovens, door supporting means, upper and lower doors, each composed of refractory material, metallic members secured to the outer face only of the doors, hinges connected to said supporting means, and a link having connection with said hinges and the metallic members of the doors.

9. A coke oven door composed of a plurality of refractory elements, each having a projecting refractory portion, metallic mem-

bers disposed against that side of the door only which is not subjected to the direct heat of the oven, means for securing said metallic members together to bind the refractory elements, said securing means being disposed in spaced relation to the door, and hinges connected to said metallic members.

10. In a door mechanism for coke ovens, the combination with door supporting means, upper and lower doors, each composed of refractory material, metallic members secured to the outer face only of the doors, hinges connected to the supporting means, and a link having pivotal connection with each hinge and also having pivotal connection with the corresponding door so that the doors may have a double swinging movement upon their hinges when the hinges are swung upon said supporting means.

20 11. In a door mechanism for coke ovens, the combination with an oven, door supporting means, upper and lower doors hingedly connected to said supporting means, the lower door being adapted to rest directly upon the hearth of the oven when it is closed, the upper door being adapted to rest directly upon the lower door when closed, whereby the doors are set on their own bases and hinges thereof relieved of strain, a cam mechanism whereby the upper door may be raised and lowered, and a cam mechanism whereby the lower door may be raised and lowered, the doors lowering by gravity.

35 12. In a door mechanism for coke ovens, the combination with an oven, door supporting means, upper and lower doors hingedly connected to said supporting means, the

lower door being adapted to rest directly upon the hearth of the oven when it is closed, the upper door being adapted to rest directly upon the lower door when closed, whereby the doors are set on their own bases and the hinges thereof relieved of strain, means whereby the upper door may be raised and lowered, and means whereby the lower door may be raised and lowered.

13. In a door mechanism for coke ovens, the combination with an oven, of door supporting means, upper and lower doors hingedly connected to said supporting means, the lower door being adapted to rest directly upon the hearth of the oven when closed, and the upper door being adapted to rest directly upon the lower door when the upper door is closed, whereby the doors rest upon their own bases to relieve them and their mountings of strain when in operative position.

14. In a door mechanism for coke ovens, a concrete pier, a door supporting means mounted at its lower end in said pier and held thereby in spaced relation to the oven, upper and lower doors hingedly connected to said supporting means, means whereby the upper door may be raised and lowered upon said supporting means when it is opened and closed, and means whereby the lower door may be raised and lowered upon said supporting means when it is opened and closed.

In testimony whereof I affix my signature, in presence of two witnesses.

JAMES FREDERICK PETERS.

Witnesses:

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AMBROSE AREY.