A. ROBERTS.

EXPANSION CONTROL FOR COKE OVENS.

APPLICATION FILED AUG. 5, 1915.

1,193,068.

Patented Aug. 1, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

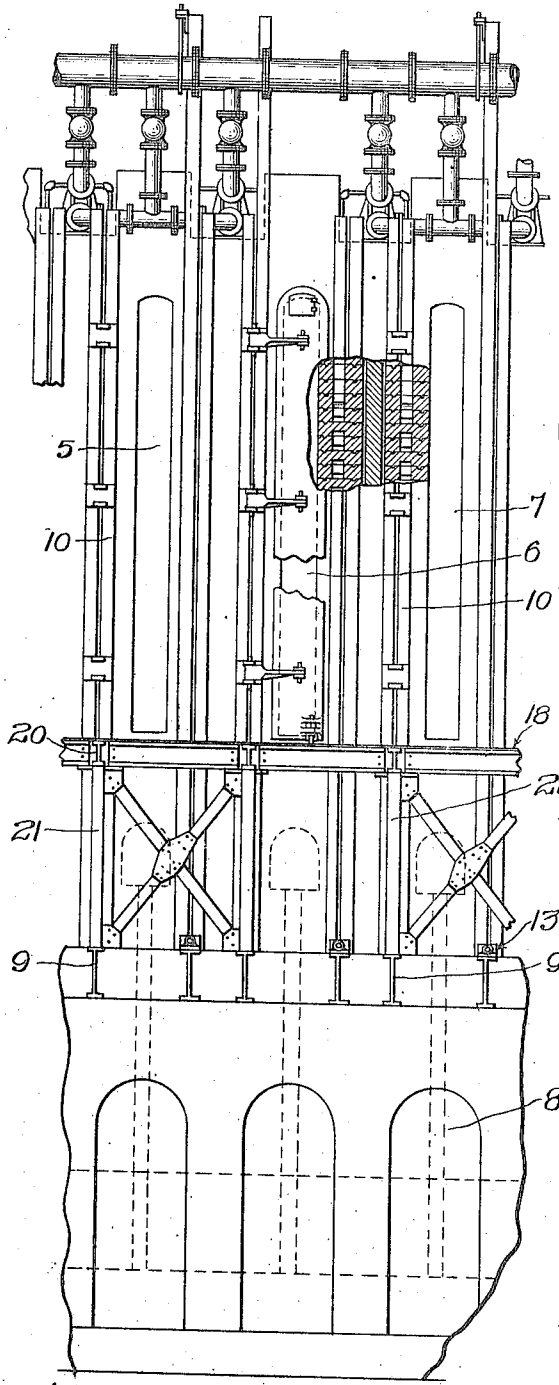


Fig. 3.

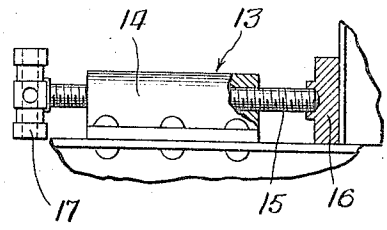
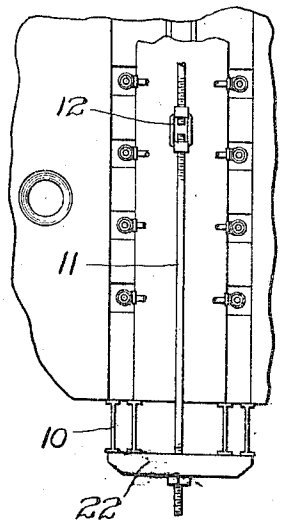


Fig. 4.



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2 SHEETS—SHEET 2.

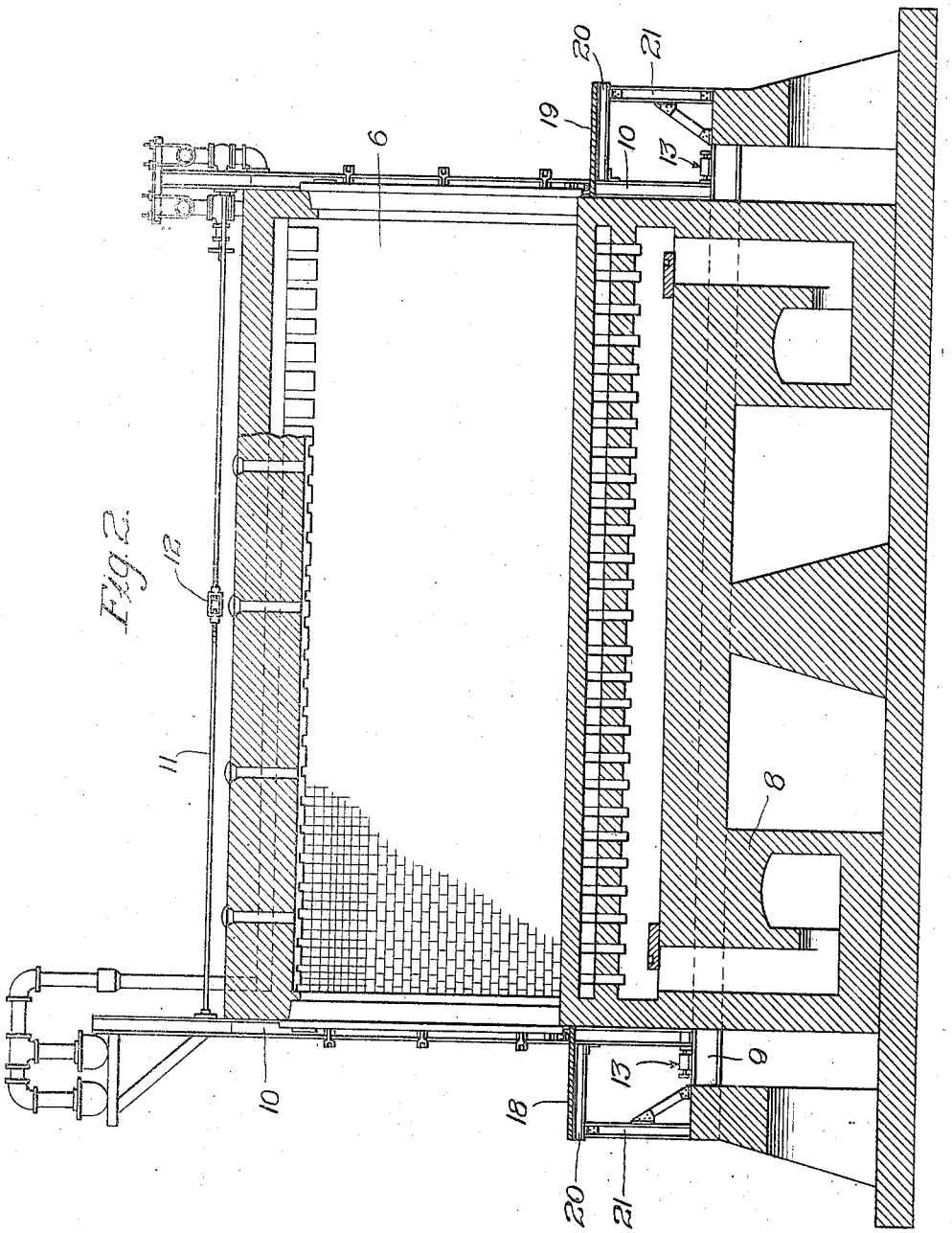


Fig. 2.

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UNITED STATES PATENT OFFICE.

ARTHUR ROBERTS, OF EVANSTON, ILLINOIS.

EXPANSION CONTROL FOR COKE-OVENS.

1,193,068. Specification of Letters Patent. Patented Aug. 1, 1916.

Continuation of application Serial No. 10,042, filed February 23, 1915. This application filed August 5, 1915. Serial No. 43,751.

To all whom it may concern:

Be it known that I, ARTHUR ROBERTS, a citizen of the United States, residing at Evanston, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Expansion Control for Coke-Ovens and the like, of which the following is a specification.

This application is a continuation of my copending application for Letters Patent of the United States, Serial Number 10042 which was filed February 23, 1915.

In the construction of closed retort coke ovens, or what is generally known as by-product coke ovens, the retort walls are ordinarily built up from bricks or blocks of desired form. Usually some effort is made to bind these blocks together by the use of a suitable form of cement, but it is found in practice that very often the cement will not adhere to the blocks with sufficient strength to properly bind the walls together. Furthermore, cements for this purpose must be of special composition in order to withstand the extremely high temperatures to which the oven walls are subjected, and such cements do not ordinarily exert any marked amount of binding action until the walls have been heated to a high temperature. When the ovens are initially heated, the walls necessarily expand, and a considerable portion of this expansion takes place prior to the time when the walls are sufficiently heated to secure any marked degree of binding action from the cement. As a consequence, the expansion is virtually that occasioned in a pile of blocks or bricks loosely laid together. The result is that it frequently happens that, by the time the walls have been raised to working temperature, there have been formed very serious cracks and openings in them, so that even from the beginning of the run of the ovens, there occur serious losses of the distillate gases. When no provision is made for keeping the walls constantly under a desired pressure or stress, the fluctuations occurring from time to time with changes in working temperature will still further augment the leaks in the walls, so that in time the losses of the distillate gases through these leaks become very serious.

The main object of the present invention is to provide means for maintaining the oven walls under a desired amount of compression or stress at all times, so as to keep the oven walls as nearly gas-tight as possible, even when the oven is comparatively cold, as well as after it has reached working temperature.

Another object in this connection is to provide control devices whereby the walls may be allowed to expand as their temperature is raised, while, nevertheless, keeping them under the desired amount of compression or stress at all times.

Another object of the invention is to provide a construction such that the compression in the walls of each oven may be controlled independently of the compressions existing in the walls of the other ovens of a bench, so that the compression existing in the walls of each oven may be controlled independently of the other ovens, thereby compensating for inequalities of temperature and other conditions in the various ovens of the bench. This feature of the invention will also permit repairs to be made in the walls of one or more ovens of the bench without disturbing the walls of adjacent ovens.

Other objects and uses will appear from a detailed description of the invention which consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings: Figure 1 shows an end elevation of three adjacent ovens of a bench of ovens, the doors being removed from the two outside ovens which are illustrated in the figure, and a portion of the walls of two adjacent ovens being broken away so as to reveal the interior construction; Fig. 2 is a vertical section taken through the central portion of one of the ovens; Fig. 3 is an enlarged detail of a simple construction of device for controlling the movements of the lower ends of the struts. Fig. 4 is a detail view of a modified form of connection between the tie or stress rods and the upper ends of two adjacent struts.

In Fig. 1, I have illustrated three ovens designated 5, 6 and 7, respectively. The walls of these ovens may be of any suitable construction, but, for purposes of convenience, I have shown them as being of the general type illustrated in Patent No. 1132685. As shown in the said Letters Patent and as shown particularly in Fig. 1 herein, the walls of each oven are independ-

ent of the walls of the adjacent ovens, so that each oven wall may expand and contact or otherwise adjust itself independently of the other oven walls. Such a construction may be distinguished from a construction in which the several ovens have their adjacent walls built solidly together or so joined that they cannot expand and contract or otherwise adjust themselves independently.

The several ovens of the bench are carried upon a suitable foundation 8. This foundation portion never rises in temperature to anywhere near the extent of the ovens above. Across the foundation and beneath each oven wall there extends a stress member 9. The stress members are shown as taking the form of I-beams, but it will be apparent that many other forms of construction might be substituted without departing from the spirit of my invention. As is shown in Fig. 2, these stress members preferably extend through the entire width of the bench, and project some distance beyond the ends of the ovens themselves. They are buried in the upper portion of the foundation, and, therefore, remain at a substantially constant relatively low temperature. Consequently, they do not expand or contract to any material extent. The oven walls preferably rest upon and are supported by the stress members 9. As the said walls expand with rise of temperature, their end portions slide on the stress members, and are thus disposed from their initial positions. In line with the ends of the oven walls, I provide the vertical struts 10, the lower ends of said struts resting upon or being supported by the stress members. It will be evident that, during the expansion of walls, these struts will be forced apart in pairs, the lower end of each strut sliding or moving with respect to the stress member on which it is mounted. The upper portions of the struts extend above the tops of the ovens, and the tie rods 11 join together said upper portions. Turn buckles 12 are provided for taking up the slack in the tie rods, so as to maintain the upper portions of the struts in firm solid contact with the ends of the walls.

Mounted on the projecting portions of the stress members 9, are the take-up devices 13. These serve as abutments for the lower ends of the struts, and they serve to exert a pressure on said lower ends, thereby maintaining the lower ends of the struts in firm solid engagement with the lower portions of the walls. In the particular arrangement illustrated, each of the take-up devices 13 includes a block 14 riveted or otherwise connected to the stress member, and within said block there works a screw-threaded pin 15. This pin 15 seats against a pressure block 16 on the lower end of the strut, and the head 17 is suitably formed to receive a turning rod, wrench, or other similar device.

In operation, when the ovens are cold, the turn buckles and take-up devices are tightened up, so as to bring the struts into solid engagement with the walls and under the desired pressure. As the oven walls are heated up, when the bench is brought into operation, the various turn buckles and take-up devices are slacked off from time to time, so as to permit of the proper amount of expansion in the walls, but nevertheless this slacking off can be so adjusted and controlled in each oven as to maintain the walls thereof under the desired amount of compression at all times. At the same time the compression existing within each wall can be controlled independently of all of the other walls. In this way, each wall can be kept practically gas-tight at all times, merely by controlling the pressure existing within each.

In Fig. 2, there are shown the running platforms 18 and 19 along the sides of the bench. These platforms are carried by the brackets 20 which have their inner ends supported by the struts and the outer ends of the piers 21. These piers in turn are connected to the outer ends of the stress members, and, therefore, remain a fixed distance apart. By reason of the relative movement of the struts, it follows that the brackets 20 will be forced apart as the ovens expand. However, these brackets are enabled to slide on the piers for this purpose. By laying the platforms 18 and 19 on the brackets 20, or by forming the platforms in sections, these platforms will not interfere with the independent movement of the struts, which independent movement is desirable for the purpose of independently controlling the expansion existing in the various oven walls.

While I have herein shown and described only one particular embodiment of my invention, in which embodiment use is made of continuous stress members in the form of I beams running through the foundation from side to side beneath the various oven walls, still it will be evident that the essential feature, as far as this element of the construction is concerned, is the provision of abutments against which the lower ends of the struts may take, which abutments may be adjusted back and forth according to the movements of the lower ends of the struts, and for the purpose of maintaining the struts in solid engagement with the ends of the walls. These abutments may be supported in any desired manner and are not necessarily connected to I beams.

In Fig. 4, I have shown a modified form of connection for taking up the stresses exerted by the upper ends of the struts. In this modified form of construction an equalizer bar 22 bears against two adjacent struts, and a tie rod connects into the equalizer bar between the struts. Thus the tie

rod takes the thrust from both struts. Nevertheless each strut is free to move independently of the other struts, the equalizer bars permitting such movement.

While I have herein shown and described only a single general embodiment of my invention, still it will be understood that many other arrangements might be substituted for that illustrated without departing from the spirit of my invention.

I claim:

1. The combination with a plurality of coke ovens, each oven having heating walls and the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, of a strut in engagement with each end of each heating wall, means for limiting the distance between the upper ends of the struts for each heating wall and for compressing said ends against the wall, and means for limiting the distance between the lower ends of the said struts and for compressing said ends against the wall.

2. The combination with a plurality of coke ovens, each oven having heating walls and the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, of a strut in engagement with each end of each heating wall, and means for limiting the distance between the struts of each heating wall and for compressing said struts against the ends of the wall.

3. The combination with a plurality of coke ovens, each oven having heating walls and the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, of means of maintaining each heating wall under a desired amount of compression independently of the other heating walls.

4. The combination with a plurality of coke ovens, each oven having heating walls and the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, of means for maintaining the upper portion of each heating wall under a desired amount of compression independently of the other heating walls, and means for maintaining the lower portion of each heating wall under a desired amount of compression independently of the other heating walls.

5. In a bench of coke ovens having heating walls the combination with a suitable foundation, of a stress member in said foundation beneath each heating wall and supporting the same, the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, a strut adjacent to each end of each heating wall, each strut having its lower end adjacent to the corresponding stress member, and an adjustable connection between the lower end of each strut and the corresponding stress member of suitable construction to permit the said lower end to move lengthwise of the stress member, and means for maintaining the upper ends of the struts of each heating wall in firm engagement with such heating wall.

6. In a bench of coke ovens having heating walls the combination with a suitable foundation, of a bearing in said foundation for supporting each heating wall, the heating walls of each oven being independent of the adjacent heating walls of the adjacent ovens, whereby the heating walls of each oven are free to expand and contract independently of the heating walls of the adjacent ovens, and means for maintaining each heating wall under a desired amount of compression during such expansion or contraction independently of the other heating walls.

7. In a bench of coke ovens wherein there are walls between adjacent carbonizing chambers, the combination with a suitable foundation, of a bearing in said foundation for supporting each wall, each wall being independent of the remaining walls, whereby each wall is free to expand and contract independently of the remaining walls, and means for maintaining each wall under a desired amount of compression during such expansion or contraction independently of the other walls.

8. The combination with a plurality of coke ovens, there being walls between consecutive carbonizing chambers, and each of said walls being independent of the other walls, whereby each wall is free to expand and contract independently of the remaining walls, of means for maintaining each wall under a desired amount of compression independently of the remaining walls.

9. In a bench of coke ovens having heating walls, the walls of each oven being free to expand and contract independently of the walls of the adjacent ovens, a foundation whereon said walls are carried, and means for maintaining selected walls under adjustable compression independently of the other walls.

10. In a bench of coke ovens having walls,

the walls of each oven being free to expand and contract independently of the walls of the adjacent ovens, means for maintaining selected walls under compression while permitting said walls to expand under control, independently of the other walls.

11. In a bench of coke ovens having walls, selected ones of said walls being free to expand and contract independently of the other walls, means for permitting expansion of said selected walls under control, and independently of the other walls.

12. In a bench of coke ovens having walls, selected ones of said walls being free to expand and contract independently of the other walls, means for maintaining a desired amount of compression on said selected walls, independently of the other walls.

13. In a bench of coke ovens having walls, selected ones of said walls being free to expand and contract independently of the other walls, means for maintaining a desired amount of compression on one portion of each selected wall independently of the other portions of said selected walls.

14. In a bench of coke ovens, the combination with a suitable foundation, of a plurality of coke ovens mounted thereon, each oven having heating walls, and the heating walls of each oven being independent of the heating walls of the other ovens, the contiguous walls of adjacent ovens being mounted in close proximity to each other, whereby the heating walls of each oven are enabled to freely adjust themselves independently of the walls of the other ovens.

ARTHUR ROBERTS.

Witnesses:

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EPHRAIM BANNING.