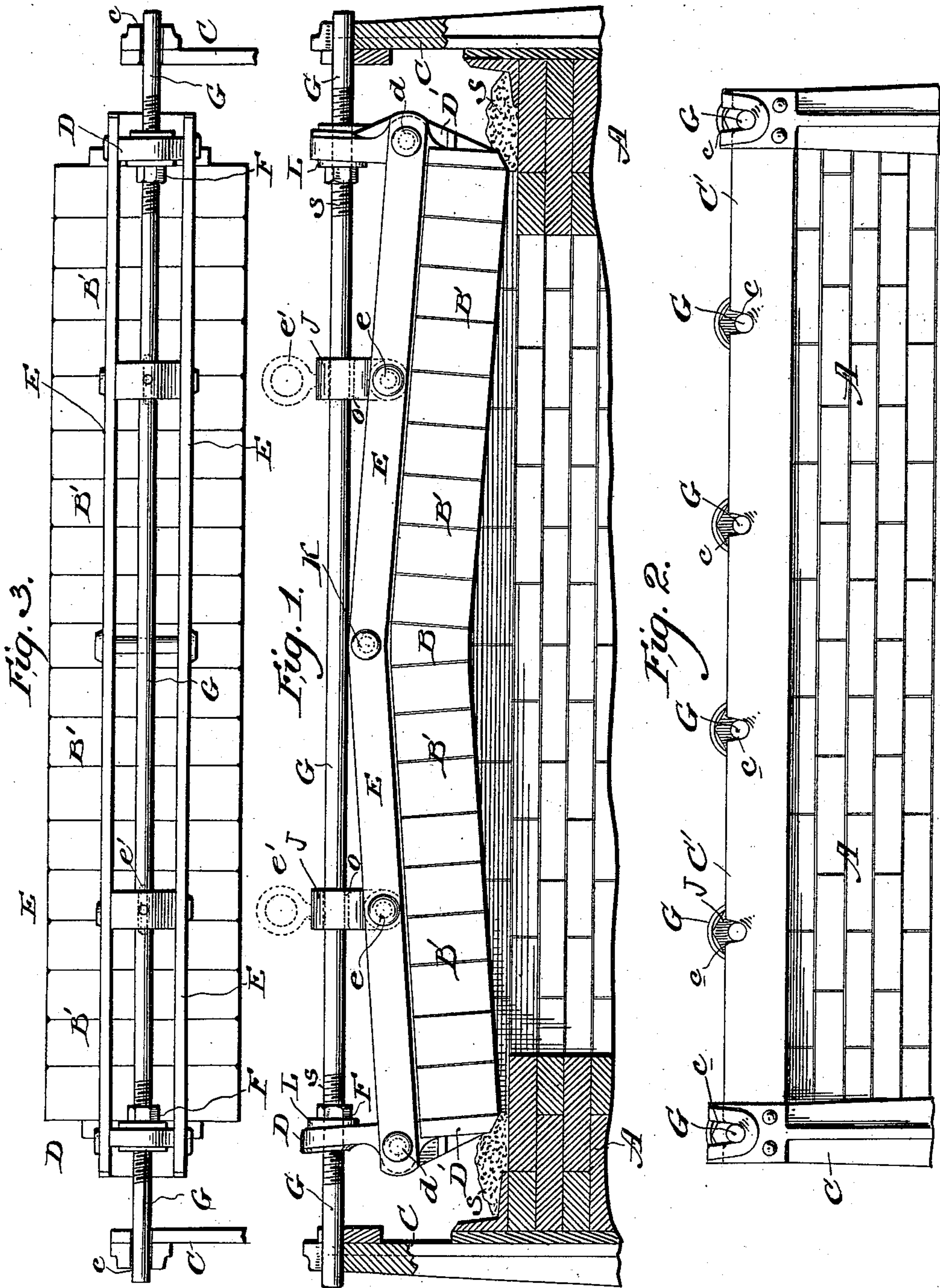


(No Model.)

J. E. BOTT.
FURNACE ROOF.

No. 534,252.

Patented Feb. 19, 1895.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOSEPH ELTON BOTT, OF STOCKPORT, ENGLAND, ASSIGNOR OF ONE-HALF
TO T. BENNETT PHILLIPS, OF PHILADELPHIA, PENNSYLVANIA, EXECU-
TOR OF HOWARD CRAMP, DECEASED.

FURNACE-ROOF.

SPECIFICATION forming part of Letters Patent No. 534,252, dated February 19, 1895.

Application filed July 21, 1892. Renewed July 21, 1894. Serial No. 518,281. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ELTON BOTT, of Stockport, England, have invented a certain new and useful Improvement in Furnace-Roofs; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification.

My invention has relation to roofs for open-hearth, annealing, puddling, Siemens-Martin, reheating, glass and other like furnaces, and consists in the construction hereinafter particularly described and claimed.

My present invention has special reference to the class of invention patented to me by Letters Patent of Great Britain, No. 14,800, of 1884, and for which application for Letters Patent has also been made in the United States of even date herewith.

The object of my present invention is to provide a furnace-roof of the construction substantially as patented in the above mentioned Letters Patent but in which the weight of the roof is borne by special vertical supports so as to prevent the sliding of the roof upon the upper face of the vertical end walls during expansion and contraction of the roof, and thereby obviate the consequent friction between the fire brick of the roof and the upper edges of the end walls, prevent disintegration of the parts coming in frictional contact and allow of an easier and freer movement of the roof-sections during expansion and contraction.

I will now describe my invention so that others skilled in the art to which it appertains may make and use the same, reference being had to the accompanying drawings forming part of this specification in which similar letters refer to similar parts.

Figure 1 is a partially sectional side elevation representing my improved construction, with the roof adjusted in position upon the furnace. Fig. 2 is a front view representing the roof support. Fig. 3 is a plan view of a section of the roof.

The roof, B, is constructed of removable arched sections having grip clamps or levers, D, provided at each end of the roof frame connected by the tension bars, E, and pivoted or fulcrumed at the extremities of said tension bars, E, upon the pivots, *d*. Through the up-

per end of the levers, D, is provided a horizontal connecting thrust rod, G, upon the respective ends of which are provided the lock-nuts, F, on screw-threads, *s*, cut in the said rod, G. Between the lock-nut, F, and the inner face of the levers, D, a tapered washer, L, is provided to give an even bearing to the lock-nut, F. As these lock-nuts, F, are screwed out the lower clamping jaws, D', of the levers, D, are forced inwardly toward each other gripping the bricks B', which have been arranged in series below the tension bars, E, preferably in an arched form, and binding them tightly together to form a roof-section.

In practice the bricks forming a roof-section are in the first instance laid upon a suitable former or templet when the tension bars, E, with their grip clamps, D', D', opened out are placed in position upon them. The necessary pressure is then exercised upon the clamp jaws, D', by means of the nuts, F, to impart co-hesive pressure to the bricks and to so hold them securely in position, when the whole may be placed upon the furnace for operation.

In order to keep the tension bars, E, and thrust rod G, parallel and central with the side bars interposing lugs or projections, J, are secured between the bars, E, by a rivet or ferrule, *e*, the upward projection, J, being perforated with an elongated orifice, *o*, for the passage of the thrust rod, G, thus preventing side movement of the same. Intermediate spacing ferrules are also provided between the rods, E, as at K, according to the strain upon each section. Although shown as applied to an angular roof the tension bars may be curved and a radial brick arch or other form may be employed. Vertical uprights, C, are secured to or provided upon the end walls, A, at desired intervals, having the cross beam or support, C', secured by riveting or otherwise to their upper ends. The upper edge of the beam, C', is secured about on a level with the rods, G, and is provided with the recesses, *c*; which act as bearings for the end of the rods G, and allow the said rods, G, to slide thereon as each roof section expands or contracts, supporting and carrying the roof, B, while at the same time the lower edges of the bricks, B', which are over the walls, A, are in close proximity with the up-

per edge of the walls, A, though they do not bear upon the same. Therefore as the bricks of the roof, B, expand and contract under the influence of the heated furnace the ends of the roof-section merely expand over the walls, A, without sliding upon or coming in contact therewith; all leakage being prevented by providing loose sand, S, upon the walls, A, between it and the ends of the roof section. Eyes, e', are provided preferably upon the projections, J, for the engagement of the hooks of the crane chains used in the removal or replacement of the roof.

It will be seen from the drawings and construction described that the tension bars, E are removed from contact with the bricks, B', thus preventing conduction of heat to the metal framework of the roof by contact and preventing the consequent deterioration of the metal such as inevitably occurs when fire bricks are clamped in immediate contact with metal, which is the common or usual form of construction of roof-sections.

In my invention every portion of the metal frame is exposed to a constant current of air. I have shown a preferable construction of support for carrying the roof-section clear of the walls, A, but do not limit myself to this specific construction as other forms of support may be employed in carrying out my invention.

It will be seen that in the construction of roof described damaged or injured sections may be quickly and readily removed even when the melting furnace is in full operation without the danger of losing a charge or having to suspend operations to make necessary repairs.

It is clear that the roof-sections may be constructed of any desired length or width by elongating the sections and multiplying their number, the whole being joined together by the construction described in one solid section.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a roof furnace, a metallic frame composed of tension bars, E, pivoted levers, D, and thrust rods, G, series of removable bricks, B', forming a sectional lining of the roof, said bricks secured and held firmly in position to the frame by the clamping jaws, D', of the lever, D, connected and secured together as

described, supporting plates secured to the walls of the furnace, and recesses provided therein for carrying the outer ends of the rods, G, and supporting the roof structure, substantially as described.

2. In a furnace roof, a metallic frame composed of tension bars, E, pivoted levers, D, and thrust rods, G, series of removable bricks, B', forming a sectional lining of the roof, said bricks secured and held firmly in position to the roof-frame by the clamping jaws, D', connected and secured together as described, and supporting uprights, C, secured to the walls, A, carrying the horizontal beams, C', said rods, G, carried in recesses, c, provided in the beams, C', supporting the weight of the roof, substantially as described.

3. In a sectional furnace roof, a series of bricks, B', forming the lining thereof, said bricks removably clamped to a metallic roof frame by the clamping jaws, D', thrust rods G, acting on said jaws to clamp the bricks between the same, said roof frame and lining constructed in sections as described, vertical supports, C, secured to the walls of the furnace, and cross bars, C', provided upon the vertical supports, C, carrying the bars, G, and supporting the roof and the lining clear of the upper edges of the furnace walls, as and for the purposes, substantially as described.

4. A furnace roof composed of a series of interchangeable bricks or other non-combustible material forming a lining clamped in sections to a metallic roof frame, an interstice or air space provided between the upper edge of the bricks or lining and the lower edge of the metallic roof frame, said roof frame and lining provided with horizontally disposed bars secured to the same, vertically disposed plates secured to two opposite walls of the furnace extending above the top of the furnace walls proper, and recesses provided in said plates at or near the top thereof for retaining the ends of the supporting bars, G, and carrying said roof and lining clear of the upper edges of the said furnace walls preventing friction and abrasion during the contraction and expansion, substantially as described.

In witness whereof I have hereunto set my hand this 15th day of July, A. D. 1892.

JOSEPH ELTON BOTT.

Witnesses:

H. GORDON MCCOUCH,
HORACE PETTIT.