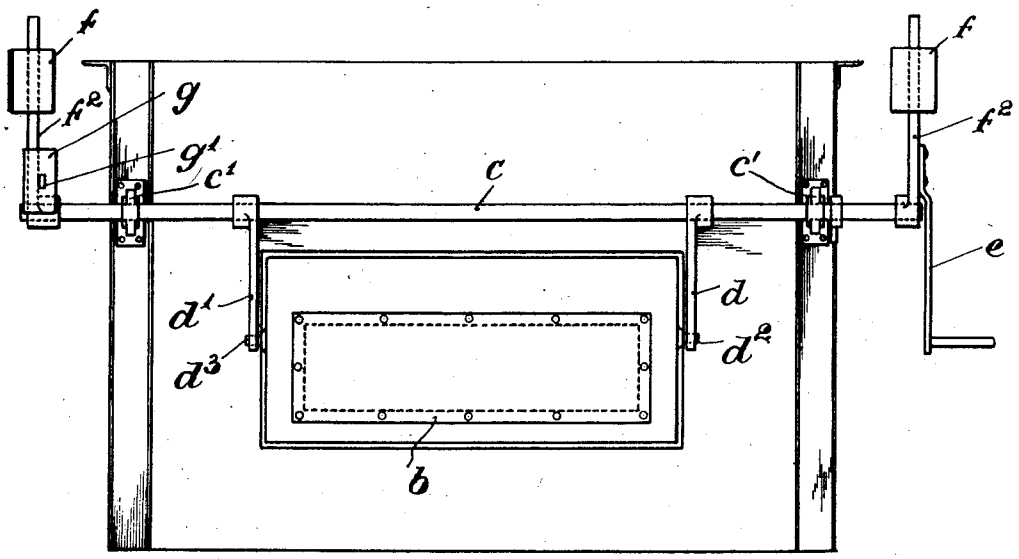
Aug. 12, 1930. A. G. LOBLEY 1,773,049

CLOSURE OPERATOR FOR ANNEALING FURNACES AND THE LIKE

Filed Sept. 22, 1926 4 Sheets-Sheet 1

Fig. 1.



INVENTOR
Alfred Glynne Lobley
by his attys.
Byrnes, Stebbins & Parmelee

Aug. 12, 1930. A. G. LOBLEY 1,773,049

CLOSURE OPERATOR FOR ANNEALING FURNACES AND THE LIKE

Filed Sept. 22, 1926 4 Sheets-Sheet 2

Fig. 2.

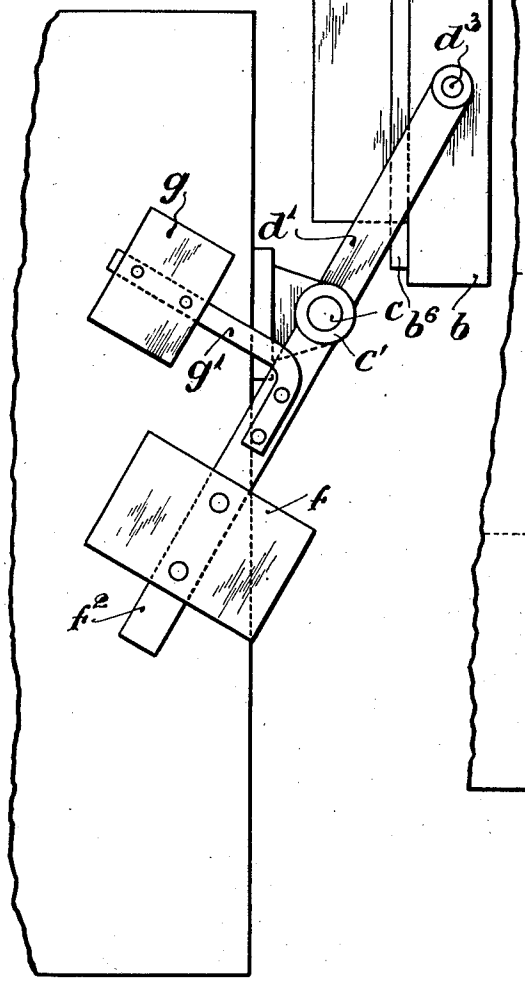
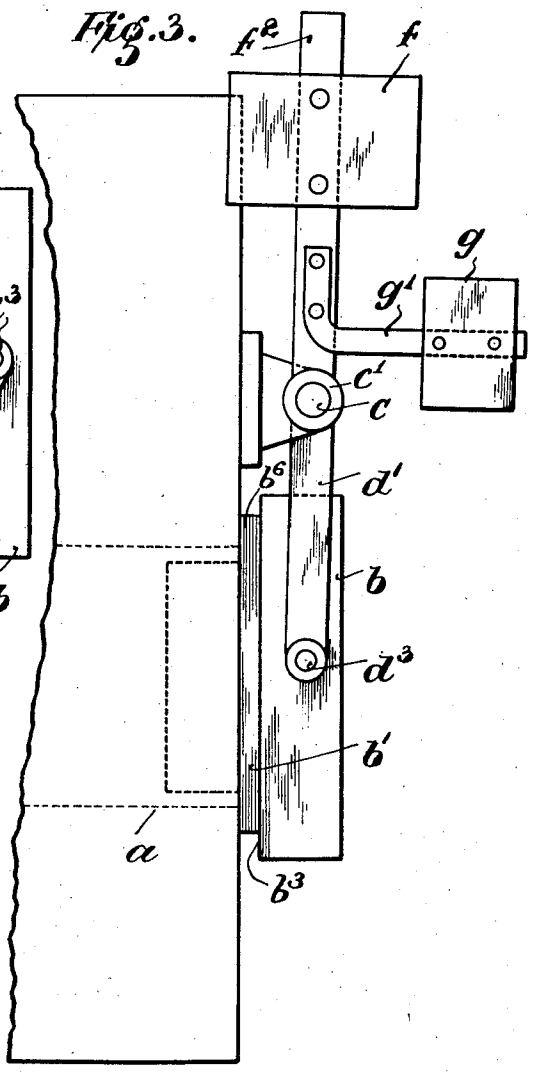


Fig. 3.



INVENTOR

Alfred Glynne Lobley

by his Attys.

Byrnes, Stubbs & Parmelee

Aug. 12, 1930. A. G. LOBLEY 1,773,049

CLOSURE OPERATOR FOR ANNEALING FURNACES AND THE LIKE

Filed Sept. 22, 1926 4 Sheets-Sheet 3

Fig. 4.

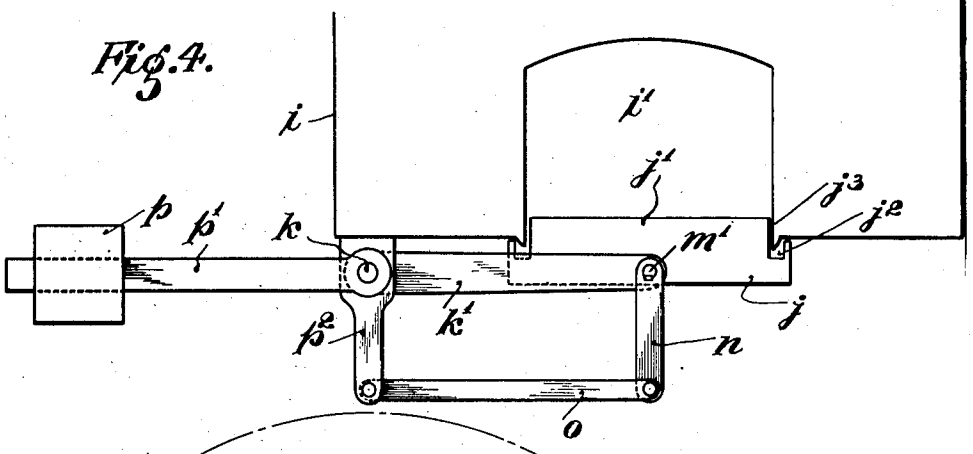
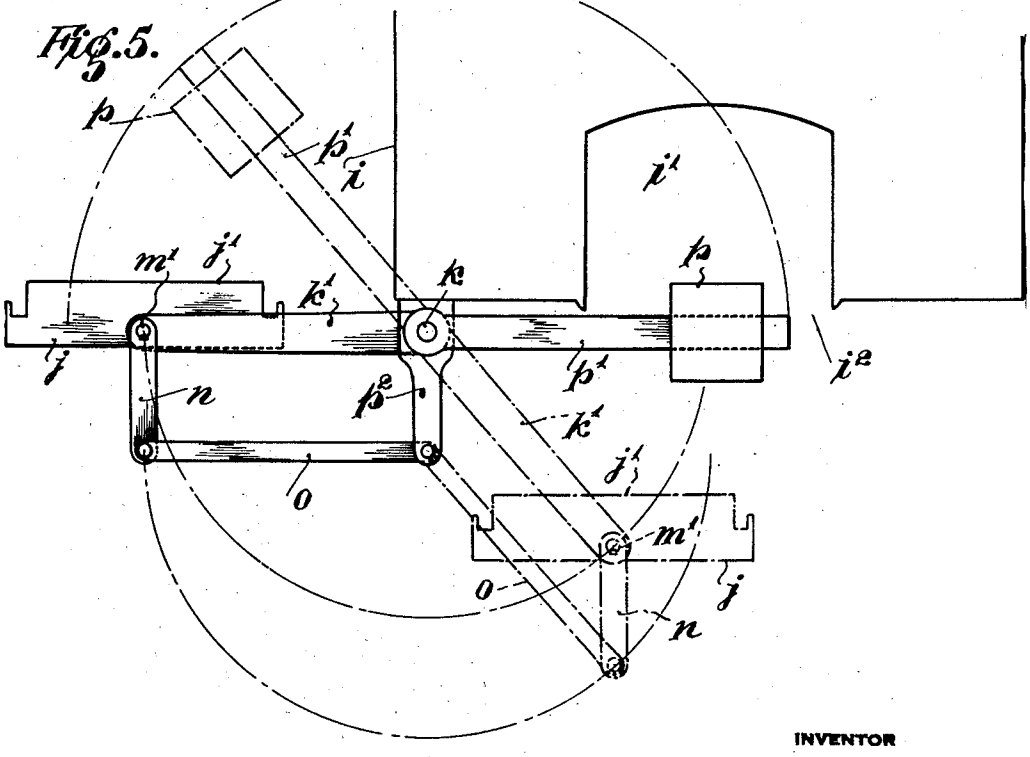


Fig. 5.



INVENTOR

Alfred Glynne Lobley

by his Attys.

Byrnes, Stebbins + Parmelee

Aug. 12, 1930. A. G. LOBLEY 1,773,049

CLOSURE OPERATOR FOR ANNEALING FURNACES AND THE LIKE

Filed Sept. 22, 1926 4 Sheets-Sheet 4

Fig. 6.

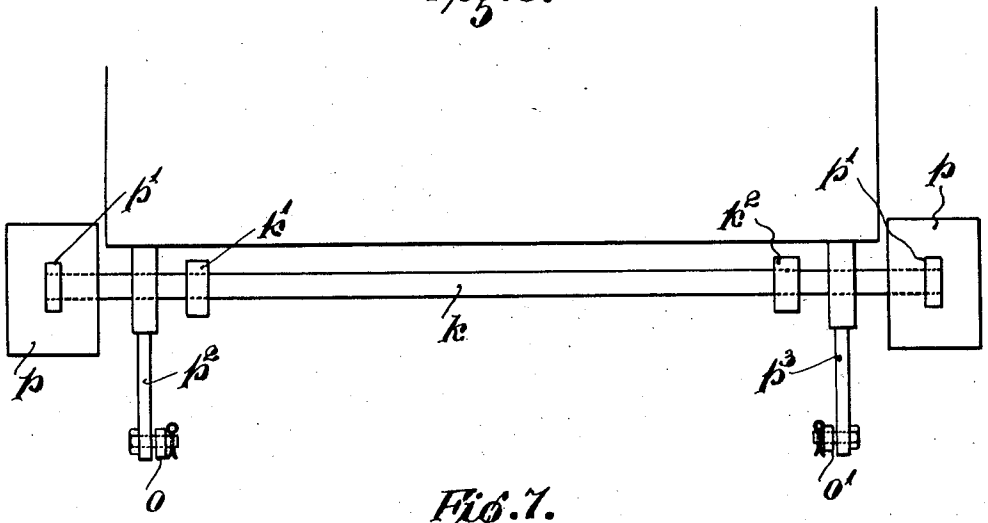
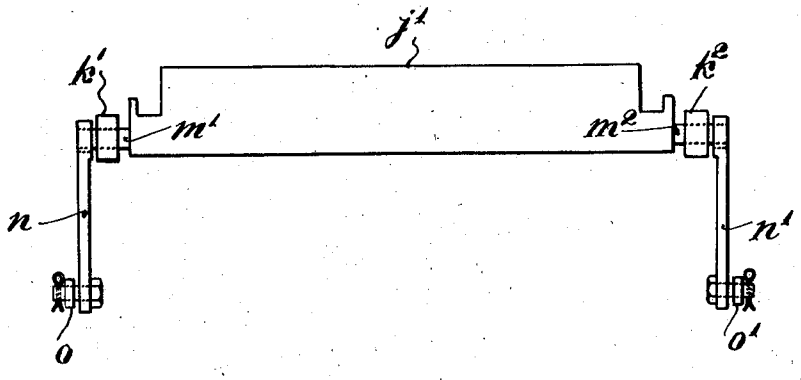


Fig. 7.



INVENTOR

Alfred Glynne Lobley

by Lewis Atty.

Byrnes, Stebbins + Parmelee

Patented Aug. 12, 1930 1,773,049

UNITED STATES PATENT OFFICE

ALFRED GLYNNE LOBLEY, OF CHAPEL-EN-LE-FRITH, ENGLAND, ASSIGNOR TO BIRMINGHAM ELECTRIC FURNACES LIMITED, OF BIRMINGHAM, ENGLAND, A COMPANY OF GREAT BRITAIN

CLOSURE OPERATOR FOR ANNEALING FURNACES AND THE LIKE

Application filed September 22, 1926, Serial No. 136,966, and in Great Britain October 1, 1925.

This invention relates to annealing and other furnaces, muffles, ovens and the like, and comprises improvements in the mounting or suspension of the doors or closures for the working chambers of such furnaces or the like; said improvements being also applicable to the mounting of removable working-chamber bottoms, grates and similar members that need to be displaced from and restored to their normal working positions for charging or other purposes.

According to the said invention, it is proposed to suspend or mount the door or similar closure member of a furnace or the like from or upon a swinging linkage system to which the said closure member is so connected that, throughout its movement in relation to the complementary charging or other aperture, the closure member remains or is retained in substantial parallelism with the plane containing the said aperture. The improved suspension thus realizes the advantages that, when applied to an end-charging furnace, it enables the door to be opened without involving the turning of the hot face thereof towards the operator, whilst when applied to a bottom-loading furnace, it enables the closure member to be also used as a platform for carrying the working charges.

The closure member and its suspension or mounting may be, and preferably is, balanced or counterweighted by a system of weights which not only facilitate or ease the opening and closing operations, or the movement of the closure from and into its normal working position, but may also serve to retain the said member in both its normal working or "closed" position and in its charging or "open" position, whilst in further accordance with the said invention, the door or closure member of the improved system comprises a part which, in the closed or working position, sockets into or is located within the charging aperture and is surrounded by or associated with a seal which assists or promotes efficient working of a furnace or the like both by excluding external air from the working chamber and by substantially reducing heat losses.

In the drawings:

Fig. 1 is a front view of one form of apparatus constructed in accordance with my invention;

Fig. 2 is a side elevation of an end of the furnace shown in Fig. 1, in which the operating mechanism is shown with the closure in its open position;

Fig. 3 is a view similar to Fig. 2 showing the parts in their closed position;

Fig. 4 is a view similar to Fig. 3 showing a furnace with a bottom closure, with the closure in closed position;

Fig. 5 is a view similar to Fig. 4 with a closure in its open position;

Fig. 6 is a side elevation of the mechanism shown in Fig. 4, from the shaft side; and

Fig. 7 is a view similar to Fig. 6 from the closure end of the structure.

In the accompanying drawings, Figures 1 to 3 show an application of the invention to the balanced and self-retaining suspension of a door for an end-charging annealing or like furnace, whilst Figures 4 to 7 show an application to the mounting of the bottom closure of a bottom-loading furnace.

Describing first the end-charging system, Figure 1 is an elevation of the charging or door end of the furnace, showing the general arrangement of the balanced door-suspension. In this view, the several parts are shown in the positions they assume when the door is closed.

Figures 2 and 3 are side views, upon a larger scale, respectively showing the door in the open and closed positions, and illustrating the arrangement or disposition of the balance and retaining weights.

In the application of the invention illustrated in the said Figures 1 to 3, where the furnace has a rectangular mouth or charging aperture a, the door b is provided, on its inner side, with a rectangular closure or projecting portion b^1 adapted, when the said door is closed, to socket into the said aperture as shown, whilst the inner face b^3 of the part of the door body b which surrounds the said socketing closure b^1 may be adapted to bed closely against the end of the furnace frame-work in the vicinity of the aperture a and may be faced with a refractory mate-

rial b^6 of a more or less compressible nature such as asbestos, which, on the closing of the door, makes a practically sealed joint between the latter and the furnace wall to prevent the admission of air into, and heat losses from, the working chamber by way of the charging aperture. This aperture is rather larger than the closure portion of the door to permit the latter entering and leaving with a parallel motion as hereinafter described.

For suspending such a door so that the closure portion thereof may be thus socketed into or engaged with the furnace mouth, and also to ensure that the hot inner face shall remain presented to the furnace end or away from the operator during manipulation, a parallel-motion suspension is adopted in which the door-structure is so pivoted to swinging links that it automatically preserves a perpendicular position throughout its range of movement. In the example shown in Figures 1 to 3, a rotatory shaft c is mounted horizontally in suitable bearings c^1 above the mouth of the furnace and has fixed to it, a pair of arms d, d^1 which swing in planes immediately outwards of the ends of the door, or in a plane substantially perpendicular to the plane of the wall through which the furnace opening extends and from which arms the door is pivotally suspended at d^2, d^3. The shaft is fitted or connected with a winch handle e or other means of actuation, and the free pivotal connections d^2, d^3, between the door ends and the suspension arms are arranged above the centre of gravity of the door; or alternatively the door is counterweighted below the pivots, so that it will hang in a perpendicular plane during opening and closing. The actuation of such a mechanism in the opening direction removes the door from in front of the furnace mouth and takes the same to a position wholly above and clear of the said mouth, leaving the latter unobstructed for access to the working chamber as shown in Figure 2, whilst actuation of the suspension in the reverse direction swings the door back to the mouth-closing position as shown in Figures 1 and 3.

Weighted levers or other balance weights may be applied to the operating shaft or other parts of the suspension to balance the weight of the moving parts and render the system self-retaining in both the closed or fully opened positions of the door. In the construction shown, weights f that balance the weight of the door are applied to levers f^2 fixed to the ends of the shaft c that carry the door-suspension arms; these weighted levers being disposed on the opposite side of the shaft to the suspension arms and are carried clear of the end of the furnace structure so that they will swing in planes outwards of and parallel with the sides of the latter during actuation of the mechanism. An additional retaining weight g is carried from an extension g^1 on one of the balance levers in such relation to the centre of the shaft c that, when the balanced door is in either of the positions shown in Figures 2 and 3, the said weight is either above or below the said shaft centre and exerts by gravity a leverage on the system that effectually prevents displacement of the door from such position. In other words, the suspension is self-retaining in both the "open" and "closed' positions.

As regards the balanced suspension for the removable door or bottom of a bottom-loading furnace is shown in Figures 4 to 7.

Figure 4 is an elevation showing the door-bottom and suspension mechanism in the normal or working position.

Figure 5 shows the charging position and also illustrates, in dotted lines, how the suspension, during the movement of the bottom to and from its working position, maintains the said bottom in a horizontal plane, parallel with the plane containing the charging aperture of the furnace.

Figure 6 is an elevation from a point of view at right angles to Figures 4 and 5, and Figure 7 is a detail view showing the connection of the bottom with the linkage.

In these figures, i indicates the furnace structure, and i^1 the working chamber which is open at i^2 to the underside of the said structure and is adapted to be closed by the door or removable bottom j. This bottom comprises, on its upper side, a closure portion j^1 that also constitutes a platform or support for the furnace charges and is adapted, in the working position, to socket into the aperture i^2 as shown in Figure 4; sealing of the joint between the door-body and the parts of the furnace structure surrounding the aperture i^2 being provided for either by facing one or other of the opposed surfaces with compressible refractory material or by forming a gutter at j^2 round the door to contain sand or similar material in which a rib formation surrounding the aperture i^2 makes a seal in the working position of the door.

The door suspension system is a parallel motion linkage and comprises a rotatable shaft k which is disposed along the underside of the furnace parallel with the bottom aperture i^2 and is furnished with a pair or carrier arms k^1, k^2, that move with the shaft and whose extremities are formed with bearings for fulcrum-studs m^1, m^2 that project from the opposite ends of the bottom in the longitudinal centre of the latter. These fulcrum studs have keyed to them, a pair of depending links n, n^1, which are definitely located at right angles to the said bottom, and are also connected, by the pivoted radius rods o, o^1, to a pair of fixed perpendicular hangers or anchorage brackets p^2, p^3 that depend from the furnace structure in the plane of the shaft k; the distance between the centres of the shaft k and studs m^1, m^2 being equal to the

distance between the centres of the radius-rod pivots. This parallel-motion suspension linkage provides for the swinging of the bottom from the working position Figure 4 to the loading position clear of the furnace (Figure 5) and vice versa, whilst by virtue of the fact that the door fulcrum studs are keyed to linkage members n, n^1, which are constrained, by their associated members, to maintain perpendicularity throughout the movement in both directions, the bottom itself is positively retained or held in a horizontal plane in all positions of the suspension. A sufficient surrounding clearance (as shown in Figures 4 and 5) is provided between the closure part of the horizontally-supported bottom and the bottom aperture of the furnace to permit of the said closure part entering and leaving the said aperture on completion of the closing movement and on commencement of the opening movement.

The bottom and suspension mechanism is balanced to assist opening and closing by a weight p which may be applied to levers or arms p^1 extending from the shaft k in the opposite direction to the bottom-carrier arms k^1, k^2 and so arranged that they swing clear of the ends of the furnace structure. These weights may be sufficiently heavy to overbalance the door and suspension and thus also serve to automatically retain the door in both the working and charging positions.

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

1. A furnace having an opening through a wall thereof, a closure for the opening having a portion adapted to extend into the opening, fixed supporting means, and a pair of arms for supporting the closure pivotally connected to the supporting means and the closure, said arms lying in a plane which is substantially parallel with the plane of the furnace wall through which the opening extends when the closure is in closing position, whereby in the first opening movement of the closure, the closure wil be moved in a plane substantially perpendicular to the plane of said furnace wall.

2. A furnace having an opening through a wall thereof, a closure for the opening having a portion adapted to extend into the opening, supporting brackets connected to the furnace, a shaft mounted in said brackets, a pair of parallel arms connected to the shaft, a pivotal connection between the outer ends of said arms and the closure, said arms lying in a plane which is substantially parallel with the plane of the furnace wall through which the opening extends when the closure is in either of its extreme positions, whereby in the first opening movement of the closure, the closure will be moved in a plane substantially perpendicular to the plane of said furnace wall, and counter-balancing means for the closure connected to said shaft.

In testimony whereof I have hereunto set my hand.

ALFRED GLYNNE LOBLEY.