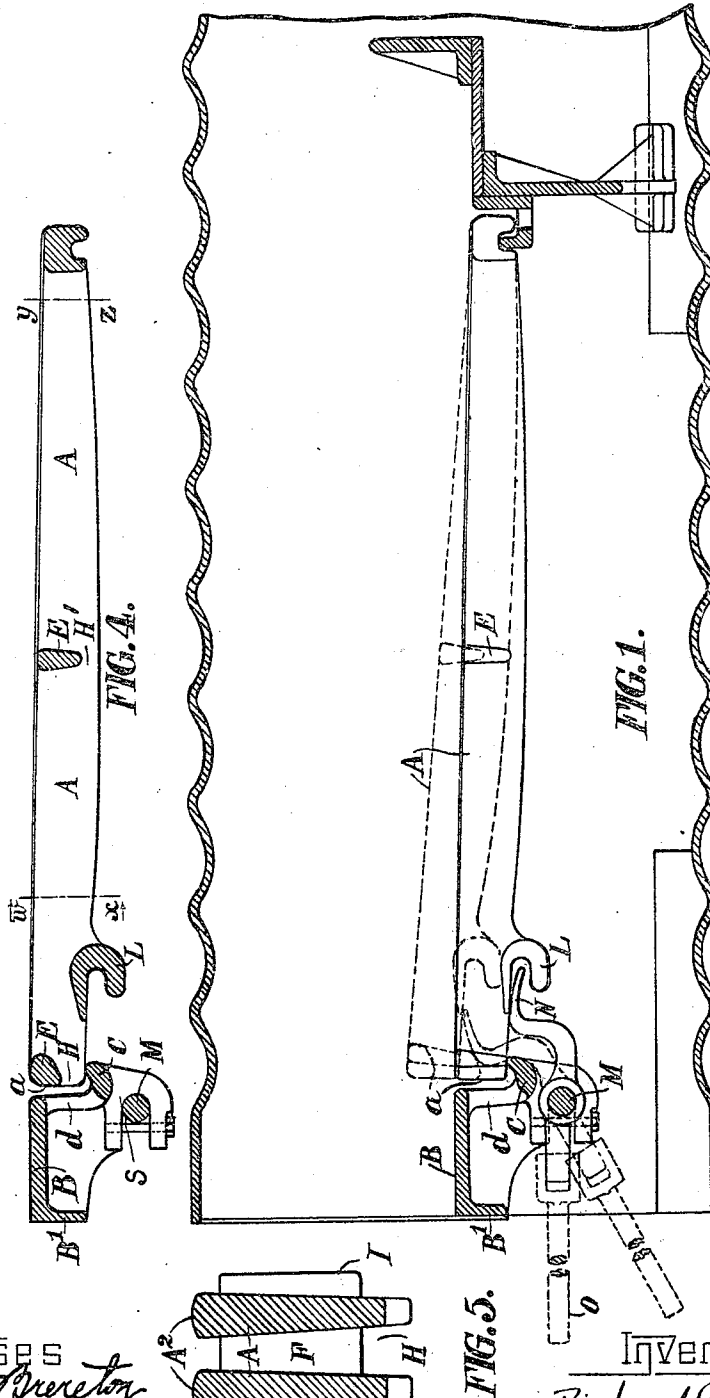


R. CAMPBELL.
FURNACE GRATE AND FIRE BAR.
APPLICATION FILED JUNE 3, 1909.

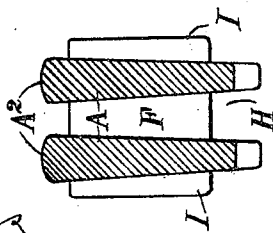
953,514.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.



Witnesses
Grace P. Breton
Albert Popham



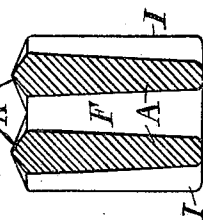
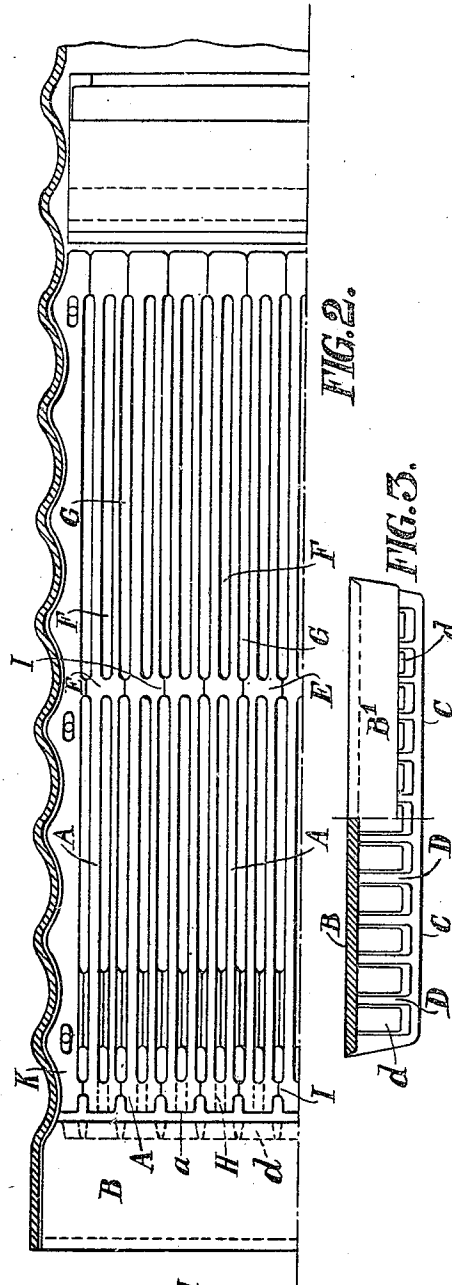
Inventor
Richard Campbell
By Stewart T. Mason
attorney

R. CAMPBELL.
FURNACE GRATE AND FIRE BAR.
APPLICATION FILED JUNE 3, 1909.

953,514.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 2.



Witnesses
Grace P. Drexler
Albert Hopkins

Inventor
Richard Campbell
By Shurtland & Mason
attorneys

UNITED STATES PATENT OFFICE.

RICHARD CAMPBELL, OF LIVERPOOL, ENGLAND.

FURNACE-GRATE AND FIRE-BAR.

953,514.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed June 3, 1909. Serial No. 499,838.

To all whom it may concern:

Be it known that I, RICHARD CAMPBELL, a subject of the King of Great Britain, residing at Liverpool, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Furnace-Grates and Fire-Bars, of which the following is a specification.

This invention relates to furnace grates and has features rendering it applicable to that type of grate in which the bars may be shaken by means of a rocking member adapted to engage with hook pieces or horns on the lower front parts of the bars.

The invention has for its object to provide a construction of furnace grate and firebars in which damage due to burning shall be minimized and the shaking action rendered more efficient in breaking up clinker and in shaking the ash from the bars and causing it to fall through the grate.

A furnace grate embodying the invention will be described with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of a furnace showing my invention; Fig. 2, a sectional plan view; Fig. 3, a half end view and half sectional end view; Fig. 4, a longitudinal section of the front plate, and a fire bar separate from the furnace; Fig. 5, a cross section on an enlarged scale of one of the bars at *w x* of Fig. 4 looking in the direction of the arrow; and Fig. 6, a similar view at *y z*.

The firebars are indicated by A. They are made of any desired dimensions in length and breadth, and broadly speaking, I prefer to cast two, three, or more bars A together, with connecting ribs or spacing blocks E and I at intervals, so as to leave longitudinal air spaces F in each casting, and an air space G between each casting.

The bars A rest on the bearer C and are kept spaced apart by their ribs or spacing blocks E and I, and are confined between the fixed side bars K. The front ends *a* of the bars A are vertical and lie adjacent to the front dead plate B with a small space between, the arrangement being such that when the bars are shaken they do not come out clear of the front dead plate B, or only just rise clear thereof, so that the liability of flue dust or ash falling between the front dead plate B and the bars A is reduced and if any does fall, it falls down into the ash-pit through the spaces *d* between the arms

D. The bearer C has a sloping or rounded surface, so that flue dust or ash will not lodge on it to such an extent as to obstruct the bars A when being forced down.

Below the bearer C is arranged a transverse shaft M mounted in brackets S. On the under side of each of the bars A is a horn L, and mounted on the shaft M is a rocking lever, one end N of which is adapted to engage the horn L of any individual grate bar or set of bars. A handle O is provided which may be applied to the outer end of the lever N so that by means of it any individual bar or set of bars can be shaken up and down. The lever N can be moved laterally so as to come into engagement with any one of the horns L. A bar can only be shaken when the end N comes into engagement with the horn on that bar, and when that takes place, each bar is bound to have imparted to it a direct vertical push or pull.

Between the front ends of each pair of bars an air duct or passage H is formed communicating with the longitudinal air spaces G between the main portions of the bars. These air ducts are formed by means of the spacing blocks E and I, the sides of the bars A and the horns L. The last mentioned parts are extended laterally so as to meet and form the lower wall of the duct. The spacing blocks and the horn pieces must also, of course, be of such vertical dimensions that they do not occupy the whole of the depth of the space between the pair of bars. Similarly the spacing blocks E and I at the center of the bars A are so formed as to leave passages H' below them between the bars.

In order to permit the air to have free access to the passages H, apertures *d* are provided between the dead plate B, the bearer C and the depending arms D by means of which the bearer is supported from the dead plate. This arrangement of apertures and passages provides that air entering from the front of the grate below the flange B' of the front plate B, can pass longitudinally through the openings *d* through the conduits H and H' and so along the bars A. There is no flange at the rear of the dead plate B, so that the air has free access through the air ducts *d*.

I provide rounded or angular projections A' on the upper surface of the bars A, the effect of which is to enable the flue dust or ash to fall off the bars, and down through

interstices F G between the bars. This rounded or angular projection A' on the surface of the bars A, decreases toward the front and increases toward the rear of the grate, because in shaking the grate to remove clinker, there is only a small action at the back where the bars are supported or hinged on the rear plate, and a considerably greater action at the front. It will be seen therefore, that the rounded or angular projections require more slope at the back, to induce the ash to fall through the grate. A' shows the slope of the projections at the rear of the bars, A² the slope of the projections at the front of the bars.

I declare that what I claim is:—

1. A furnace grate comprising a series of bars, lateral spacing blocks at the upper part of the front ends thereof, a hook piece or horn attached to the lower front part of each of said bars and extending laterally to meet the adjacent pieces, said spacing blocks, hook pieces and bars forming the walls of air ducts leading to the spaces between the bars, a dead plate adjacent to the upper surface of the front ends of the bars, a bearer arranged below the front ends of said bars, said plate and bearer being spaced apart so as to give free access of the air to the ducts between the bars.

2. A furnace grate comprising a series of bars, lateral spacing blocks at the upper part of the front ends thereof, a hook piece or horn attached to the lower front part of each of said bars and extending laterally to meet the adjacent pieces, said spacing blocks, hook pieces and bars forming the walls of air ducts leading to the spaces between the bars, a dead plate adjacent to the upper sur-

face of the front ends of the bars, a bearer arranged below the front ends of said bars, a series of arms depending from said plate and supporting said bearer, said arms being spaced apart so as to leave apertures opposite the air ducts between the bars.

3. A furnace grate comprising a series of bars, each formed with a projecting rib on its upper surface, said rib being highest at the rear of said bars and tapering toward the front, means for shaking said bars from the front, lateral spacing blocks located at intervals in the length of said bars, said blocks being of such vertical dimensions as to leave longitudinal passages for air to enter and flow between the bars, a dead plate adjacent to the upper surface of the front ends of the bars, a bearer arranged below the front ends of said bars, said plate and bearer being spaced apart so as to give free access of the air to the apertures between the bars and the lateral spacing blocks, substantially as described.

4. A furnace grate comprising a series of bars, each formed with a projecting rib on its upper surface, said rib being formed so that its surface slopes downward to each side and also from the rear to the front end of the bar, means for shaking said bars from the front and means for supporting said bars in position.

In witness whereof, I have hereunto signed my name this 24th day of May 1909, in the presence of two subscribing witnesses.

R. CAMPBELL.

Witnesses:

G. C. DYMOND,

T. S. SHILLINGTON.