W. E. CURRAN.

FIRE BRIDGE.

APPLICATION FILED SEPT. 10, 1909.

1,014,377. Patented Jan. 9, 1912.

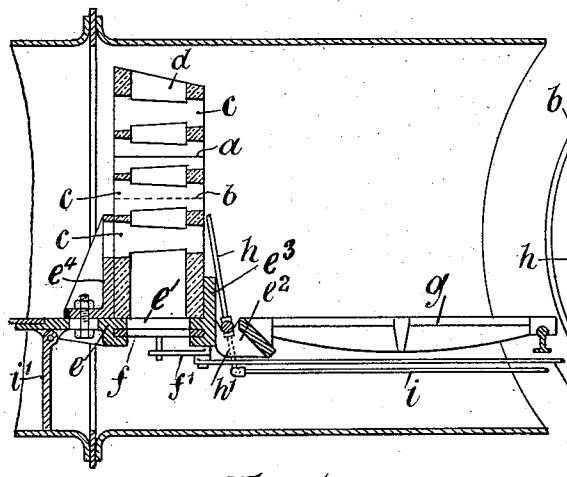

Fig. 1.

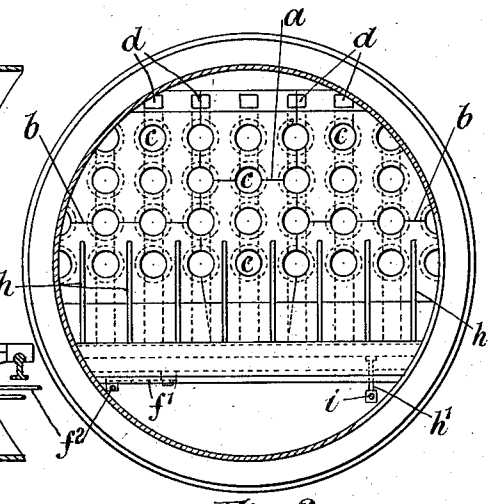

Fig. 2.

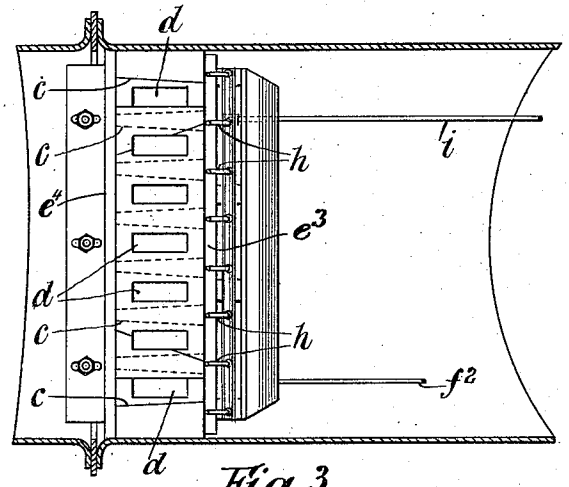

Fig. 3.

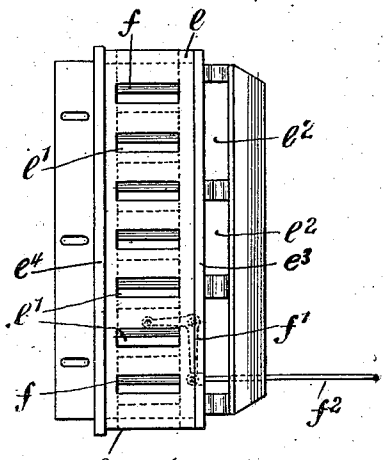

Fig. 4.

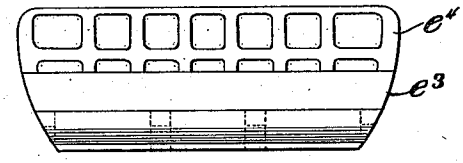

Fig. 5.

WITNESSES

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FIRE-BRIDGE.

1,014,377. Specification of Letters Patent. Patented Jan. 9, 1912.

Application filed September 10, 1909. Serial No. 517,040.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD CURRAN, subject of the King of Great Britain, residing at 29 Corporation road, Grange, Cardiff, in the county of Glamorgan, England, have invented new and useful Improvements in Fire-Bridges, of which the following is a specification.

This invention relates to improved means for effecting the complete combustion of fuel which, in the usual manner, is fed intermittently to a furnace. Under normal circumstances coal thus fed undergoes gasification within the furnace accompanied by a partial combustion of the coal and the generation of only a portion of the heat available therefrom. If the fuel is of a bituminous or semi-bituminous nature, the first effect of re-charging the furnace therewith is the production of smoke-laden, hydro-carbon gases which have considerable calorific value when supplied at a suitable temperature with air containing the oxygen necessary for combustion. In the absence of such heated air, besides the consequent waste of heat, an intolerable nuisance is created by the escape of such smoke-laden gases into the atmosphere. Following the distillation of the volatile ingredient of the fuel there will frequently occur the production of carbon-monoxid due to an insufficient supply of oxygen at this stage of the operation, and such gas which is of high calorific value will escape without being burned if additional air is not supplied while the temperature is high enough to effect ignition. Under normal conditions, to mitigate the losses of heat and the smoke nuisance above mentioned, the layer of fuel on the fire-bars of the furnace is normally kept comparatively thin so that, through holes which are liable to be formed therein, an undue quantity of air will find admission to the furnace between the fire-bars toward the ends of the intervals between the re-charging of the furnace and thereby cause a waste of heat and an otherwise undesirable lowering of the temperature of the furnace.

The object of the present invention is to eliminate the losses of heat and other disadvantages above described, by the provision of a perfect burner of the combustible gases which are generated in the furnace, and this burner is embodied in the fire-bridge or wall which normally serves only as a partition wall between the furnace and the combustion chamber or flue passage beyond the wall. According to the present invention this wall is formed with relatively short passages leading from the furnace face of the wall to the opposite face through which the combustible gases are able to flow without encountering an undue amount of draft-impeding resistance, and within the thickness of the wall these passages are intersected by other passages which lead from the atmosphere through the body of the wall approximately parallel to its two faces, arrangements being made for so supporting the perforated wall that a liberal supply of air obtains access to the last mentioned passages and encounters the combustible gases which are flowing from the furnace through the wall. The conditions will be such that, when a permanent régime has been attained, the perforated mass of material composing the wall will be raised to a state of incandescence such as to insure the ignition of the combustible gases at the point where they are supplied with the additional air necessary for completing the combustion, that is within the body of the wall, with the result that the heat then generated will insure the maintenance of the material of the wall in a state of incandescence and enable it to ignite the relatively cool and voluminous smoke-laden, hydro-carbon gases which are freely evolved on the re-charging of the furnace. When such a burner of the gases evolved is provided as described, a thicker bed of fuel on the furnace-grate can advantageously be maintained, resulting in a higher average of temperature in the furnace and rate of steam generation, thus introducing an indirect gain of efficiency.

Where the perforated wall above described is substituted for the fire-bridge now in use in the cylindrical flue and marine

type of boiler for example, the wall is advantageously raised nearly if not quite up to the crown of the furnace and as a consequence, access to the space beyond the wall will not be available over the wall and therefore an entrance should be provided beneath the wall or as an alternative a portion of the wall must be made readily removable.

The method of construction whereby the air supply to the interior of the perforated wall is provided will be described with reference to the accompanying drawing which shows the embodiment of my invention, Figure 1 being a part longitudinal section:—Fig. 2 a transverse section showing a front view of the wall:—Fig. 3 a plan:—and Figs. 4 and 5 are respectively a plan and a front elevation of the base plate for supporting the wall.

Referring to the drawing, the fire-bridge or wall is shown constructed of six blocks which are molded from fire-clay or other substance of a highly refractory character. In the drawing the horizontal joint *a* between the two centrally situated blocks is on a different level from the joints *b b* between the two blocks on each wing, for the purpose of giving stability to the structure of the bridge, but the number, proportions and dimensions of the blocks may be varied to suit the size and shape of the furnace within which the wall is fitted. The blocks which compose the wall are perforated, passages *c* being provided leading from the furnace directly through the wall and other vertically directed passages *d* leading from the base to the top of the wall and so disposed as to intersect the before mentioned passages *c*. The horizontal passages *c* are shown of circular section and the vertical passages *d* of rectangular section, but the shape of the profile of the section is not material except in respect of the facility of manufacture of the block. The wall rests on a base-plate *e* in which are formed apertures e^1 for the admission of air from the space below the fire-grate to the vertical passages *d*. These apertures are commanded by a valve *f* of the hit-and-miss type displaceable by a bell-crank f^1 and rod f^2 to enable the rate of air admission to be controlled. The wall is held between a fixed flange e^3 of the base-plate and a flange e^4 which is adjustable to provide for a variation in the thickness of the wall.

To prevent the choking of the lower rows of passages *c* by the accumulation of fuel, ash or clinker at the foot of the wall, apertures e^2 are provided in the base-plate *e* these apertures being situated between the wall and the extremities of the fire-bars *g* which are supported by the base-plate. These apertures e^2 will permit of the upward insertion of a pricker from the space beneath the fire-grate to remove the accumulated ash or clinker without requiring the furnace door to be opened.

Alternatively a rocker having upwardly directed prongs *h* and a downwardly directed operating arm h^1 may be supported on the webs which separate the apertures e^2 so that by means of a rod *i* the rocker may be angularly moved and the obstructing ash and clinker displaced.

A hinged door i^1 normally closed, is so fitted as to be readily opened to facilitate admission beneath the base-plate to the flue-passage or combustion chamber at the back of the fire-bridge or wall.

I claim:

1. In a furnace fire-bridge, a base-plate having apertures, a fixed flange on said base-plate, an adjustable flange on said base-plate and between said flanges a wall composed of a plurality of refractory blocks having straight vertical passages above said apertures and straight horizontal passages extending through the thickness of said wall and intersecting said vertical passages.

2. In a furnace fire-bridge, a base-plate having apertures, a hit-and-miss valve adjacent to said apertures, means for operating said valve, a fixed flange on said base-plate, an adjustable flange on said base-plate and between said flanges a wall composed of a plurality of refractory blocks having straight vertical passages above said apertures and straight horizontal passages extending through the thickness of said wall and intersecting said vertical passages.

3. In a furnace fire-bridge, a base-plate having apertures, a hit-and-miss valve adjacent to said apertures, a bell-crank connected to said valve, a rod connected to said bell-crank, a fixed flange on said base-plate, an adjustable flange on said base-plate and between said flanges a wall composed of a plurality of refractory blocks having straight vertical passages above said apertures and straight horizontal passages extending through the thickness of said wall and intersecting said vertical passages.

4. In a furnace fire-bridge, a base-plate having two rows of apertures, a fixed flange on said base-plate, an adjustable flange on said base-plate and between said flanges a wall composed of a plurality of refractory blocks having straight vertical passages above the rear row of said apertures and straight horizontal passages extending through the thickness of said wall and intersecting said vertical passages.

5. In a furnace fire-bridge, a base-plate having two rows of apertures, a wall composed of a plurality of refractory blocks having straight vertical passages above the rear row of said apertures and straight hori-

zontal passages extending through the thickness of said wall and intersecting said vertical passages, a rocker mounted in front of said wall having upwardly directed prongs and a downwardly directed arm and a rod connected to said rocker-arm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM EDWARD CURRAN.

Witnesses:
WILLIAM L. MORGAN,
ALBERT S. PHILLIPS.