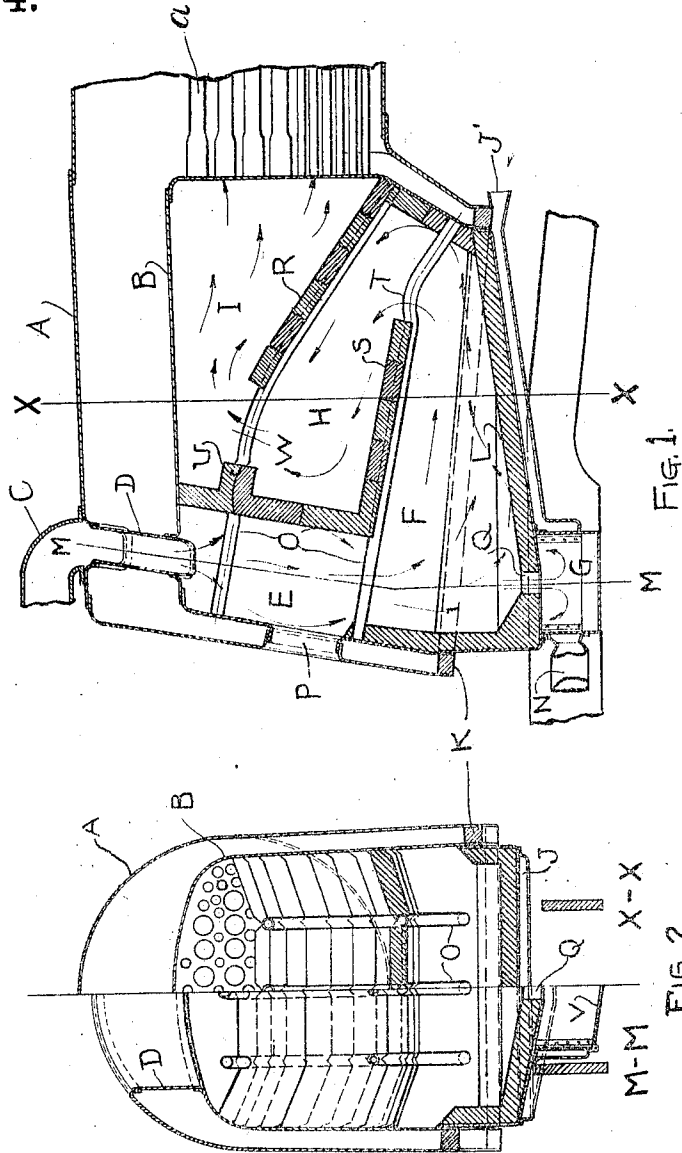


A. G. KINYON.
LOCOMOTIVE FIRE BOX.
APPLICATION FILED DEC. 4, 1916.

1,307,364.

Patented June 24, 1919



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LOCOMOTIVE FIRE-BOX.

1,307,364.

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To all whom it may concern:

Be it known that I, ALONZO G. KINYON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Locomotive Fire-Boxes, of which the following is a specification.

My invention relates more particularly to a fire-box for locomotives or other boilers designed to burn powdered fuel. When such fuel is thoroughly mixed with and supported in the proper amount of air for complete combustion, and introduced into a chamber heated to the ignition temperature, it at once ignites at the very entrance into the chamber and combustion takes place at that point throughout the mass of mingled air and fuel, so that the hottest part of the flame produced is adjacent the inlet into the chamber. The heat is so intense that the incombustible mineral contents of the fuel are immediately melted and form a slag which, being in exceedingly minute drops at first, is apt to be carried a considerable distance by the heated gaseous products of combustion. As a result of this action unless provision is made to the contrary the drops of slag formed in the fire-box of a boiler furnace are to a large extent carried along and deposited on the relatively cool boiler tubes or flues coating the surfaces thereof to such an extent that the efficiency of the boiler is materially reduced.

It is the object of my invention to avoid or prevent the deposition of slag in the boiler tubes in a boiler heated by powdered fuel. And for this purpose I have invented an improved fire-box in which the course of the gaseous products of combustion is such that the slag is deposited therefrom and collected in a suitable receptacle from which it may be from time to time removed or discharged.

In the accompanying drawing I have shown and in the following specification described a preferred form of my invention, but it will be understood that the specific disclosure is for the purpose of exemplification only, and that the scope of the invention is defined in the following claim in which I have endeavored to distinguish it from the prior art so far as known to me without, however, relinquishing or abandoning any portion or feature thereof

Referring to the drawing Figure 1 is a central, longitudinal, vertical section through the fire-box of a boiler of the locomotive type equipped with my invention; and Fig. 2 is a double transverse vertical section, the right half of said section being upon the line X—X of Fig. 1, and the left half of said section being upon the plane of the bent line M—M of Fig. 1.

The shell of the boiler is indicated at A, the boiler tubes or flues at *a*, and the wall of the fire-box within the boiler at B. The mud-ring of the boiler surrounds the fire-box as usual at K, and a doorway or opening is provided at P through the water space of the boiler as shown, but is normally closely sealed during the operation of the furnace. A pipe or conduit C extends from some suitable source of mixed air and powdered fuel and connects with a burner or entrance flue D extending through the boiler space as shown, and preferably riveted or otherwise secured to the shell of the boiler and the fire-box wall to brace the same. The lower portion of the fire-box F is lined with fire-brick or fire-clay, and the bottom wall L thereof is sloped inwardly from its periphery to the slag discharge Q so that liquids falling upon the floor will run to said opening. Beneath the opening Q is a slag pan G which may be of any suitable design to receive the liquid slag from the hearth or bottom of the fire-box, and preferably comprises a pair of downwardly opening doors or valves V, which may be opened to discharge the slag from the pan. An air flue J extends beneath the hearth or floor of the fire-box and is formed at J' with a flaring opening and surrounds the slag pan G. This air passage is designed to be connected as for example by means of a flexible pipe N with a fan, not shown, which supplies the air for admixture with the powdered fuel. By means of this air flue the air to support combustion is preheated and when the engine is in motion, in case the device is used upon a locomotive, the funnel shaped opening assists the draft of the fan in an obvious manner.

As seen more particularly in Fig. 1 the downward direction of the burner D directs the flaming gases against the bottom of the fire-box, and in order to assist this action, to prevent the direct passage of the gases to the boiler flues and to provide a circuitous route

for the gases in which the slag drops may have opportunity to increase in size by aggregation and to be deposited by impingement, I provide baffle walls O, S and R of fire-brick or other refractory material. The wall O is substantially parallel to the rear wall of the fire-box and but slightly inclined to the vertical, forming a slightly inclined flue E leading from the burner directly to the bottom of the fire-box. From the bottom of the wall O the baffle or partition S extends toward the front of the fire-box leaving however a passage between the forward edge of the same and the front wall of the fire-box, through which the gases from the vertical passage E and the horizontal passage F successively pass to the passage H which is formed between said baffle S and a baffle or partition R extending at an inclination from the lower part of the front wall of the fire-box toward the upper part of the partition O, but terminating short thereof to provide an opening through which the products of combustion may pass and flow forwardly therethrough to the boiler tubes or flues. The upper brick of the wall O is supported upon the pipes W, which are bent at U and the fire-brick formed with a similar recess to prevent the displacement of the wall O along said pipes, and the latter also serve at their forward ends to support the partition or baffle R composed of fire-brick resting thereon. The lower part of the wall O and the entire baffle S are supported upon pipes F which are bent as shown near their forward ends to provide an offset to prevent the brick slipping forward along the same.

It will now be seen that the combustible mixture entering the fire-box through the burner D is immediately ignited and brought to a very high temperature whereby the particles of slag are melted to form drops. The downward direction of the mixture from the burner, assisted by the weight of the molten slag drops, causes the latter to impinge upon the hearth or floor of the fire-box, where they are to a large extent deposited. Many of the finer globules, however, are carried forward with the gaseous products of combustion in the tortuous path shown, the length of which gives them an opportunity to condense into larger drops, and the changes in direction of the gases affords opportunity for impact of the drops upon the baffles and walls whereby the slag is condensed and deposited upon said walls, and by reason of the inclination thereof flows to the floor of the fire-box and through the slag opening and collects in the slag pan, whence it may be dumped by means of the hinged doors.

I claim:

In a locomotive fire box, upper and lower sets of longitudinally extending inclined supporting pipes, upper and lower baffle walls supported on the respective sets of pipes and a substantially upright wall near the front of the fire box but spaced from the front to provide a passage adjacent the same, a burner for pulverized fuel communicating with said passage at the top thereof, and a hearth having an opening directly beneath said passage.

ALONZO G. KINYON.