

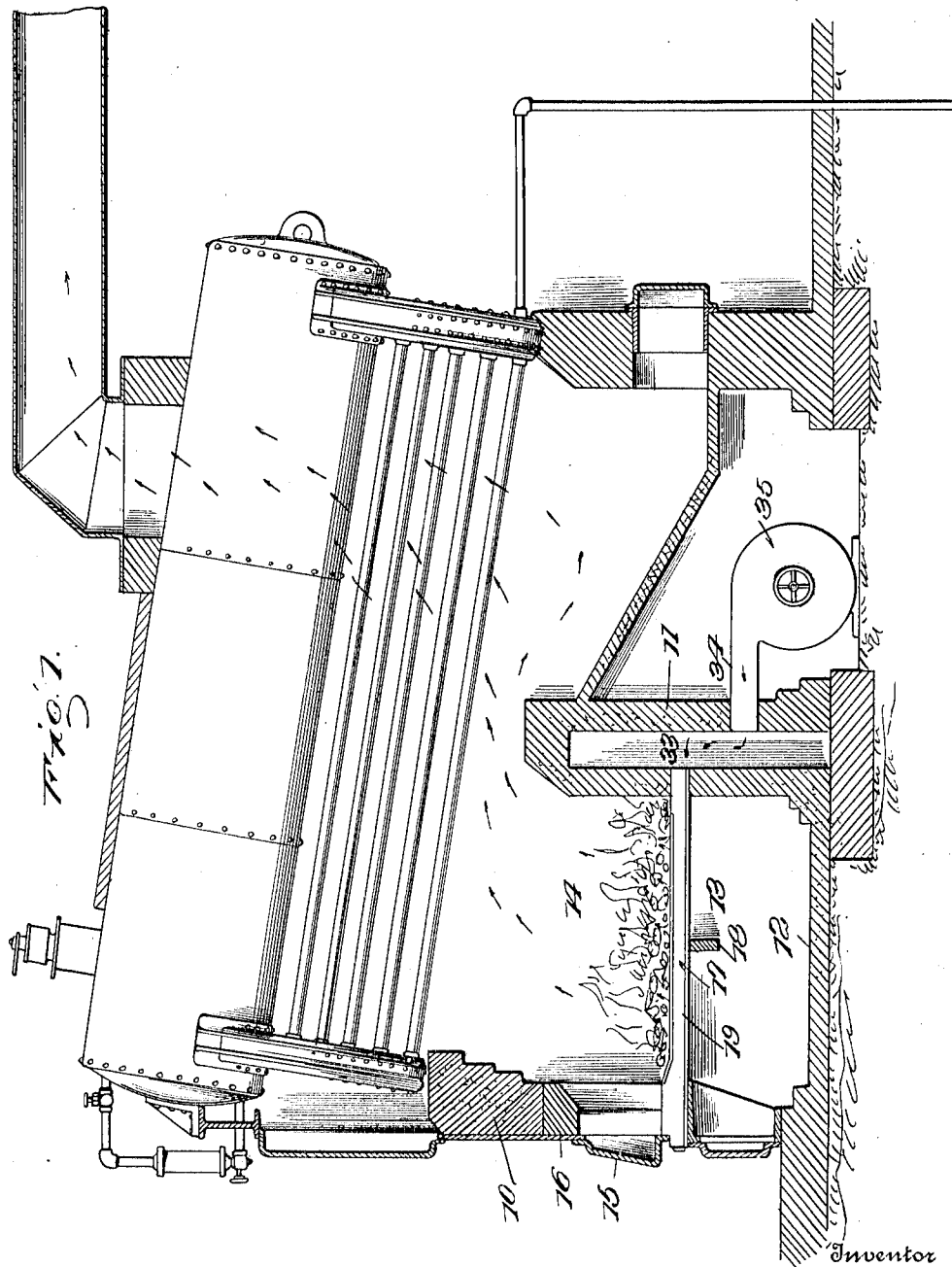
A. B. COATES.
GRATE.

APPLICATION FILED APR. 15, 1913.

Patented June 30, 1914.

2 SHEETS-SHEET 1.

1,102,139.



Witnesses
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334

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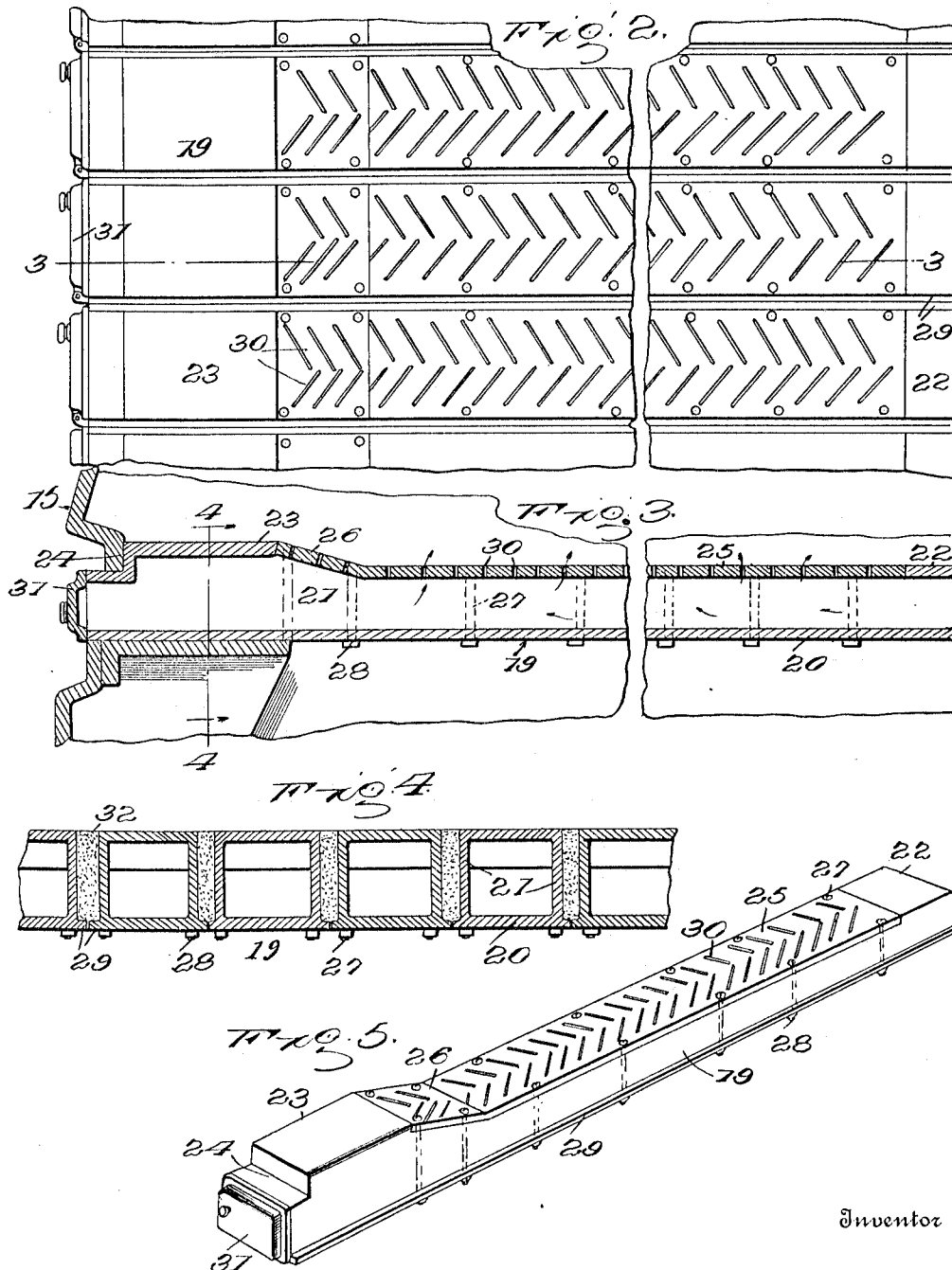
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Inventor

A. B. Coates

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UNITED STATES PATENT OFFICE.

ARCH B. COATES, OF ELLSWORTH, KANSAS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ECONOMY FORCED DRAFT SLACK BURNER COMPANY, OF ELLSWORTH, KANSAS.

GRATE.

1,102,139.

Specification of Letters Patent.

Patented June 30, 1914.

Application filed April 15, 1913. Serial No. 761,378.

To all whom it may concern:

Be it known that I, ARCH B. COATES, citizen of the United States, residing at Ellsworth, in the county of Ellsworth and State of Kansas, have invented certain new and useful Improvements in Grates, of which the following is a specification.

My invention relates to an improved grate construction and more particularly a grate for steam boilers and has for its primary object the provision of a grate which will insure a more complete combustion of the fuel and which will consequently cause a considerable saving in the cost of fuel.

A further object of my invention is to provide a grate including a plurality of grate bars positioned one immediately adjacent another with the space between the bars filled with asbestos or other suitable packing, the grate in effect forming a continuous floor for the reception of the fuel, thus preventing all waste, due to the passage of fine pieces of coal or the like through the spaces now left between grate bars in the usual grate constructions.

A further object of my invention is to provide a hollow grate bar having draft openings in its upper face and a normally closed door at one end, and to provide a grate construction embodying said bars wherein air under pressure is forced into the grate bars and through the draft openings to the bed of the fire. And a still further object of my invention is to so construct the individual grate bars that the portions of said bars having the draft openings and upon which the bed of fire rests may be removed from the body of the grate bars and replaced in case they become burned out, broken or otherwise injured.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings, and then specifically pointed out in the claims which are attached to and form a part of this application.

In the drawings: Figure 1 is a sectional view of a conventional form of boiler and boiler furnace, showing the application of a grate constructed in accordance with my present invention; Fig. 2 is a fragmentary top plan view of the grate; Fig. 3 is a longitudinal sectional view on the line 3—3 of Fig. 2; Fig. 4 is a transverse sectional view

on the line 4—4 of Fig. 3, looking in the direction of the arrows; Fig. 5 is a perspective view of one of the grate bars employed in the grate shown in Figs. 1 to 4 inclusive of the drawings.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

To insure a clearer understanding of the construction and operation of my improved grate I have illustrated the same in connection with a boiler and boiler furnace of conventional type in which 10 indicates the front wall of the furnace, 11 the bridge wall, 12 the floor or base, 13 the ash pit and 14 the fire box.

The front wall is provided with the usual door openings and doors permitting communication with the ash pit and fire box, the door to the fire box being indicated by the numeral 15 and being hinged to swing into closed position against an inverted U-shaped door frame 16. The outer end of the grate, indicated as a whole by the numeral 17, forms the lower portion of the door casing for the door 15 and the grate is supported intermediate its length by a transverse supporting bar 18 and at its rear end by the bridge wall.

Referring more specifically to Figs. 2 to 5 inclusive of the drawings, it will be noted that the grate is made up of a plurality of separate and unconnected grate bars each indicated as a whole by the numeral 19. Each of these grate bars consists of a base 20, vertical side walls 21 and bridge members 22 and 23 connecting the end portions of the side walls, all of said parts being cast or otherwise integrally formed. It will be noted that at the outer end of the grate bar the side walls are somewhat higher than throughout the remainder of their length and that as a consequence the bridge member at said end of the bar is elevated above the main body of the bar. At the extreme outer end however, the grate bar as a whole is reduced to normal size to provide an angular seat 24 against which the door 15 of the fire box closes.

A draft plate closes the top of the grate bar between the bridge members, said draft plate comprising a section 25 extending parallel with the base 20 from the bridge mem-

ber 22 to a point adjacent the bridge member 23 and an inclined section 26 resting on the side walls between the rear end of said latter bridge member and the forward end of the section 25. The draft plate is secured to the body of the grate bar proper by bolts 27 passed through the draft plate and the side walls of the grate bar and secured in place by nuts 28, the heads of the bolts being countersunk in the upper face of the draft plate. It will therefore be apparent that each grate bar is in fact tubular and unobstructed throughout its length, being open at both ends.

15 The longitudinal edges of the base 20 of each grate bar are extended somewhat to provide spacer flanges 29, the purpose of which will be hereinafter explained and the draft plate is provided with a plurality of draft openings in the form of narrow, elongated, unconnected slots 30. These slots may be arranged in any suitable position with respect to each other although the herringbone arrangement illustrated in the drawings is preferred. Each of the tubular grate bars thus formed is provided at its outer end with a hinged door or closure 31 which is preferably air tight in its construction and in building up a grate from these grate bars the outer ends of the bars are supported in the position usually occupied by the lower portion of the door casing in such a manner that the door of the fire box will close against the door seat 24 formed by the bars while the rear ends of the grate bars are passed into and supported by the bridge wall. The bars are mounted one beside the other with the spacer flanges of one bearing against the spacer flanges of the adjacent bars to space the body portions of the bars a slight distance from each other to allow for expansion of the metal when heated. The space thus formed between the upper portions of the grate bars is filled by a packing 32 of asbestos wool or other suitable heat resisting material which will prevent the accumulation of ashes and the like between the bars and which will at the same time permit the bars to expand. In employing this type of grate construction the bridge wall of the furnace is of hollow construction to provide an air chamber 33 communicating with the grate bars which project by their rear ends into this chamber.

55 This chamber should be formed air tight and an air supply pipe 34 leads from this chamber to any suitable source of compressed air supply such as a blower, conventionally shown at 35.

60 It will be apparent that when the blower is driven air will be forced into the air chamber 35 and from the chamber into the tubular grate bars passing from the grate bars through the draft openings 30 in the draft plates and so directly to the bed of

the fire providing an efficient forced draft, the strength of which may be readily governed by suitable adjustment of the blower.

It will of course be understood that in use, the doors 31 of all the grate bars will be closed and that all air passing into the grate bars will therefore pass through the bed of fuel contained upon the grate bars. The draft openings 30 are so narrow that very little ash will fall through, but it will be apparent that the interior of the draft bars may be readily cleaned out at any time merely by opening the doors 31 when the air from the blower will pass directly through the draft bars, blowing out any ashes or other foreign matter contained therein.

The grate bars may be made in various sizes and proportions to suit the type of fire box in which they are to be used and may of course be supported in any suitable manner in the fire box.

The type of grate construction above described will greatly increase the efficiency and capacity of boilers as it will burn more coal to the square foot of grate surface than is possible with grates now in use, due to the forced draft provided and to the fact that this draft may be readily regulated and thus kept within the limits of capacity of the flues and stack of the furnace. As the draft plates are formed separately from the rest of the grate bars they may be removed and replaced if broken, burned out or otherwise damaged. Because of this forced draft there are but few ashes left and practically no clinkers and the fires may be readily cleaned out for this reason. Furthermore, each grate bar being entirely separate and independent of the others is perfectly free to expand and in addition can be readily removed for repairs without necessitating the removal of the other grate bars.

It will of course be understood that various changes, within the scope of the appended claims, may at any time be made in the construction of the individual grate bars or in the manner of assembling the same to form a complete grate, without in the slightest degree departing from the spirit of my invention.

Having thus described the invention, what is claimed as new is:

1. In a grate construction, a grate bar including a base, side walls and bridge members connecting the end portions of the side walls, all of said parts being integrally formed, and draft plates connecting the intermediate portions of the side walls and provided with draft openings, and detachable securing devices inserted through the draft plate into and through the side walls.
2. A hollow grate bar comprising a base, side walls rising therefrom throughout the length of the same, and bridge members con-

necting the upper edges of the side walls at the front and rear ends of the same, the front bridge member being stepped at its front end to form a seat for the fire-box door.

3. A hollow grate bar comprising a continuous plane uninterrupted base, side walls rising from the base, said walls being higher at their front ends than at their rear ends, bridge members connecting the tops of the side walls at the front and rear ends of the same, and a draft place secured upon the upper edges of the side walls and provided with a plurality of draft openings, said draft plate comprising a section extending from the rear bridge member parallel with the base and a second section extending from the front end of the first-mentioned section upwardly and forwardly to the front bridge member.

4. In a grate construction, the combination of a plurality of hollow grate bars having laterally directed flanges and provided in their upper walls with draft openings, said grate bars being positioned so that the flanges of one bar bear against the flanges of the adjacent bars to space the same apart, and a packing of heat resisting material positioned between the bodies of the bars and resting upon the flanges.

5. In a grate construction, the combina-

tion of a plurality of hollow grate bars having laterally directed flanges and provided in their upper walls with draft openings, said grate bars being positioned so that the flanges of one bar bear against the flanges of the adjacent bars to space the same apart, and a packing of asbestos filling the entire space between the bars and supported directly by said flanges.

6. In a grate construction, the combination with supports for a grate, of a plurality of hollow grate bars positioned upon the supports, said bars being rectangular in cross section and having laterally directed spacer flanges along their lower edges to space their body portions apart, the spacer flanges of each bar bearing against the spacer flanges of adjacent bars, a packing of asbestos filling the entire space between the grate bars and resting directly on the spacer flanges, said grate bars being formed in their upper wall with draft openings, and a swinging closure for the front end of each grate bar.

In testimony whereof I affix my signature in presence of two witnesses.

ARCH B. COATES. [L. s.]

Witnesses:

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