

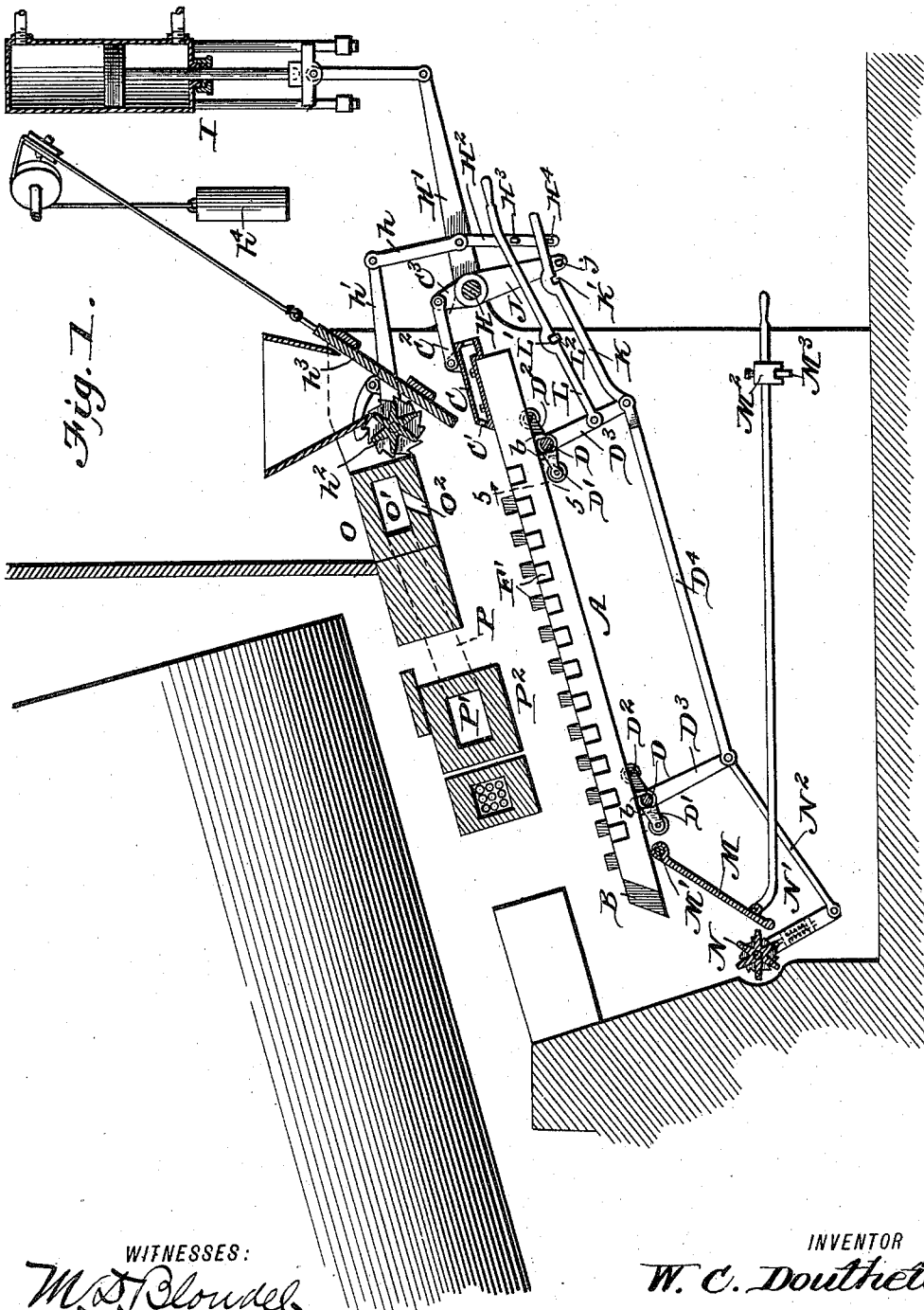
(No Model.)

2 Sheets—Sheet 1.

W. C. DOUTHETT.
STEAM BOILER FURNACE.

No. 579,340.

Patented Mar. 23, 1897.



WITNESSES:
M. D. Bloudek
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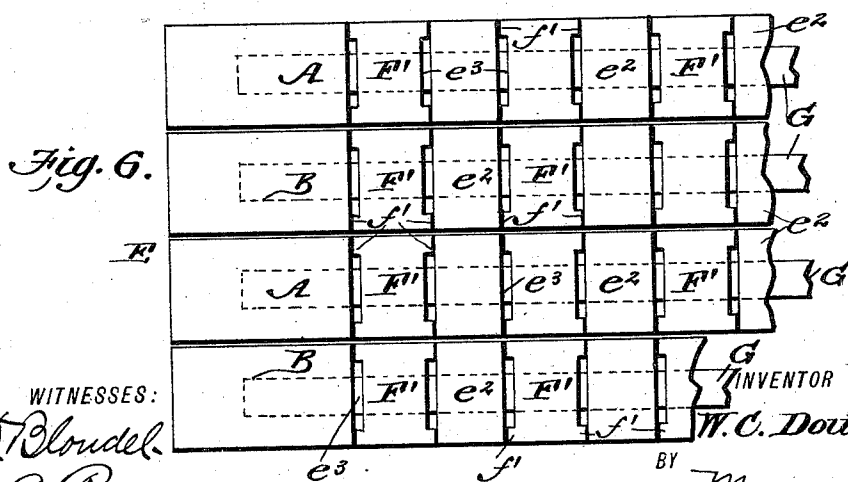
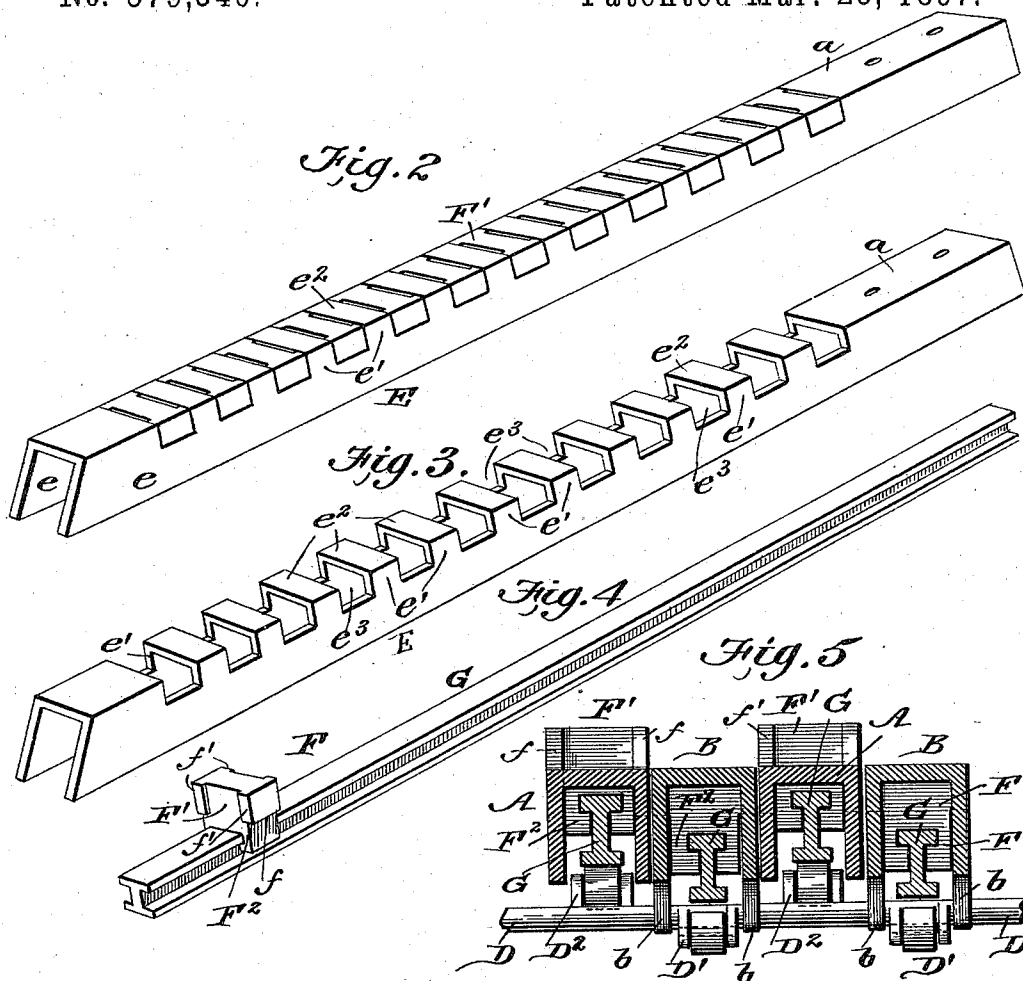
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STEAM BOILER FURNACE.

No. 579,340.

Patented Mar. 23, 1897.



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UNITED STATES PATENT OFFICE.

WILLIAM C. DOUTHETT, OF PITTSBURG, PENNSYLVANIA.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 579,340, dated March 23, 1897.

Application filed February 15, 1896. Serial No. 579,420. (No model.)

To all whom it may concern.

Be it known that I, WILLIAM C. DOUTHETT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boiler Furnaces, of which the following is a specification.

This invention is an improvement in steam-boiler furnaces; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a vertical longitudinal section of a furnace constructed according to my invention. Fig. 2 is a detail view of one of the grate-bars. Fig. 3 is a detail view of the main section of the grate-bar. Fig. 4 is a detail view of the agitating-section of the grate-bar. Fig. 5 is a cross-sectional view of a series of grate-bars on about line 55, Fig. 1; and Fig. 6 is a partial top plan view of the grate.

The grate is composed of a series of grate-bars A and a series of grate-bars B, the bars A and B alternating and the bars A being connected with the cross connection C and being movable longitudinally therewith, while the bars B are held from longitudinal movement by the stirrups b thereon fitting over the supporting-shafts D, as shown in Fig. 1. In general construction the bars A and B are alike, but I prefer to form the bars A with the comparatively long coking-plates a at their upper ends. Each of the grate-bars is composed of a main section E and an agitating-section F, the section F having blocks which are movable up and down in such main section, and the specific construction of the sections E and F being as shown and as I will now describe. The main section E is formed with the side plates e, having at their upper edges upwardly-projecting lugs e', connected by cross-plates e², forming heads at the upper side of the main section, which heads alternate with intervening spaces e³, in which spaces the blocks of the agitating-section operate. These blocks are movable up and down and when lowered rest at their upper edges flush with the tops of the heads of the main section and when raised project above the said main section and form raking attachments, as will be

readily understood from the drawings. These blocks F' of the agitating-section are provided with downwardly-facing shoulders f, which limit the downward movement of the blocks, and I also provide these blocks with facing-strips f', which hold them apart from the heads of the main section to form air-spaces. Shanks F² depend from the heads F' and are provided with guides extending in the direction of length of the grate-bars and adapted for engagement by the bar G, which connects the several blocks of the agitating-sections, so such blocks may be moved up and down together, the bar G also forming a bearing for engagement by the arms of the rocker presently described.

The hollow connection or cross-head C is made fast to the several bars A and has its outer end open from side to side to receive air and is provided at its inner end with a series of perforations C', extending from side to side and adapted to feed air into the furnace at the upper end of the grate. This cross-head is connected by a link C² with an arm C³ on the main shaft H, so that the rocking of such shaft will tend to reciprocate the series of bars A. This shaft H has an arm H', which is connected by suitable links with the piston-rod of a water-motor I, by the slow operation of which the shaft H will be rocked and the series of bars A slowly reciprocated. A link h connects with the arm H' and also with a pawl-carrying arm h', by which to operate the revolving feeder h² in the manner which will be readily understood from Fig. 1. Adjacent to this feeder h² I provide the sliding door h³, which is counterbalanced by a weight h⁴ and may be readily raised to afford free access to the upper end of the furnace at any time desired. I also provide the arm H' with a depending arm H², which is provided with bearings H³ and H⁴ for the purpose presently described. An arm J depends from the main shaft H and is provided with a bearing j, the purpose of which will be described hereinafter.

The shafts D support the grate-bars and also form parts of the rockers. These shafts are provided with arms D² and D', the former being arranged to engage the bars G of the grate-bars A and the latter being arranged

to engage the bars G of the grate-bars B. By this construction as the shafts D are rocked in one direction they will tilt the blocks of the grate-bars A upward and in the other direction will tilt upward the blocks of the grate-bars B. To rock these shafts D, I provide them with depending arms D³, which are connected by a link D⁴, and the arm D³ of the upper shaft D is provided with an operating-pitman K and a detent-pitman L, both of which are jointed to the arm D³, as shown in Fig. 1. The pitman K has a notch K' to receive the bearing or projection j and is extended above the bearing H⁴ on the part H². The pitman or rod L has a notch L' to receive a pin L² on the framing of the furnace, and this rod L is extended above the bearing H³ on the part H². Now in operation if the pin j be seated in the notch K' and the main shaft H be operated the shafts D will be rocked, and when such rocking has operated to bring the arms D' to their uppermost position the notch L' will drop over the pin L², and at the same instant the bearing H⁴ will lift the pitman K out of engagement with the projection j, and the rocking of shafts D will cease until the pitman or rod L is released. This will not be accomplished until the grate-bars A have been given their full downward stroke, when the bearing H³ will engage under the rod L and lift its notch L' out of engagement with the pin L², and the weight of the grate-bars and the coal thereon will readjust the shafts D to position, with the grate-bars A resting upon the arms D² and the grate-bars B resting upon the arms D'. Then on the reverse movement of the main shaft H the pin j will at the proper time engage in the notch K' and cause the arms D³ to lift the agitating-blocks of the grate-bars D.

The ash-discharge includes a gate M, pivoted at M' and having its other end provided with a handle-rod extending to the front end of the machine and provided with a notch-block M², engaging a catch M³ and operating to hold the gate M normally in position and yet permitting the ready dumping thereof when desired. The dump also has a rotary discharger N, whose ratchet-teeth are engaged by a pawl on a swinging carrier N', connected by a pitman N² with the arm D³ of the lower shaft D.

I have shown the grate as inclined. It will be understood that this is desirable in self-stokers; but for hand use the grate may be arranged horizontally without departing from some of the principles of my invention. Over the upper end of the grate I arrange the front arch O, having a transverse air-flue O' and an outlet O² onto the grate. Side flues P connect with the flue O' and extend back and connect with the transverse air-flue P' in the intermediate arch P², air being supplied to the flue P' in any suitable manner and becoming thoroughly heated before it is discharged at O² onto the upper end of the grate.

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

1. A furnace-grate bar composed of a main section having in its top alternating heads and spaces and the agitating-sections provided with blocks operating in the said spaces and having lateral shoulders by which to engage the main section and limit the downward movement of the said blocks substantially as set forth.

2. A furnace-grate bar composed of the main section having in its top spaces at intervals the agitating-blocks operating in said spaces and provided with inwardly-projecting shanks and the bar connected with said shanks and uniting the several blocks, substantially as shown and described.

3. A furnace-grate bar composed of the main section having heads, the agitating-sections having blocks alternating with the heads of the main sections and provided with undercut recesses opening in the line of the grate-bar and the connecting-bar fitting in said recesses, substantially as set forth.

4. The grate-bar herein described composed of the main section having side plates having at their upper edges upwardly-projecting lugs supporting cross-plates and forming heads, the agitating-section having blocks fitting between said lugs and provided with downwardly-facing stop-shoulders and with edge ribs and having the shanks projected into the main section and provided with undercut recesses and the connecting-bar engaging in said recesses substantially as set forth.

5. A furnace-grate composed of a series of longitudinally-movable bars, an air-inlet tube connecting said bars at one end, a series of grate-bars arranged alternately with said longitudinally-movable bars, and agitating-sections substantially as shown and described.

6. The combination with the longitudinally-movable grate-bars, the grate-bars held from such movement and the operating devices, of the rockers, means for operating the same and a detent connected with the rockers and adapted to hold the same in a given position, substantially as set forth.

7. The combination with the grate-bars having the vertically-moving portions and the rockers by which to lift said portions, of mechanism by which to move said grate-bars longitudinally, connections between said mechanism, and the rockers, devices for releasing said connections and a detent for holding the rockers when said connections are released substantially as set forth.

8. The combination with the grate-bars and the rockers, of the main shaft having a projecting arm, a pitman connected with the rocker and detachably engaged with the arm of the main shaft, a detent-pitman connected with the rocker and detachably engaged with the frame, a releasing device having portions

moving into engagement with the rocking and detent pitmen and a swinging carrier for said releasing device, substantially as set forth.

9. A grate-bar composed of a main section 5 and an agitating-section movable longitudinally with, and up and down independently of said main section, substantially as shown and described.

10. A grate-bar comprising a main section 10 and an agitating-section movable longitudinally with and up and down independently of said main section, combined with means by which to reciprocate the grate-bar and devices independent of said reciprocating 15 means for lifting the agitating-section, substantially as shown and described.

11. A grate-bar composed of a hollow longitudinally-extended main section having its interior chamber or space extended approximately from end to end of the said section 20 and unbroken or unobstructed from end to end, and the agitating-section fitting and extending longitudinally within said main section substantially as shown and described.

25 12. A grate-bar composed of a hollow longitudinally-extended main section, an agit-

ing-section composed of a connecting-bar extending longitudinally approximately from end to end of the main section, and agitating-blocks carried by said connecting-bar and 30 operated thereby up and down within said main section substantially as shown and described.

13. The grate-bar herein described composed of the main section formed with side 35 plates having at their upper edges upwardly-projecting lugs supporting cross-plates and forming heads, and the agitating-section having blocks fitting and operating between said lugs substantially as shown and described. 40

14. The improved grate-bar herein described consisting of the main section composed of side plates connected at their upper ends by cross-plates spaced apart, and an agitating-section extending longitudinally in 45 said main section and provided with blocks fitting and operating between the said cross-plates substantially as shown and described.

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Witnesses:

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