

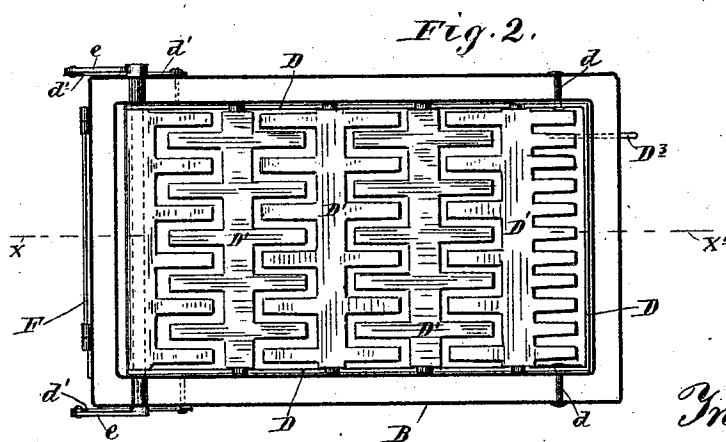
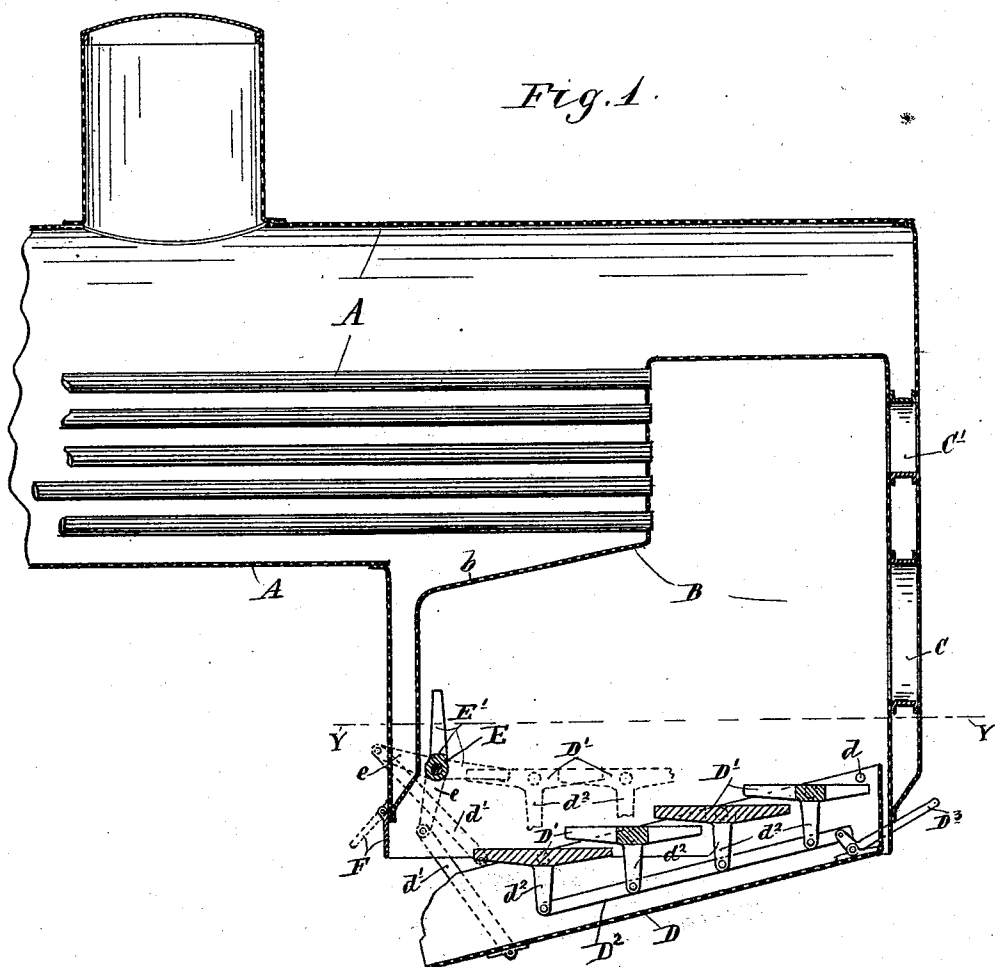
(No Model.)

2 Sheets—Sheet 1.

H. C. WIGGINS.
BOILER FURNACE GRATE.

No. 517,130.

Patented Mar. 27, 1894.



Witnesses.

E. F. Elmore

Frank D. Merchant,

Inventor.

Henry C. Wiggins

By his Attorney.

Gas. F. Williamson

(No Model.)

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Fig. 3.

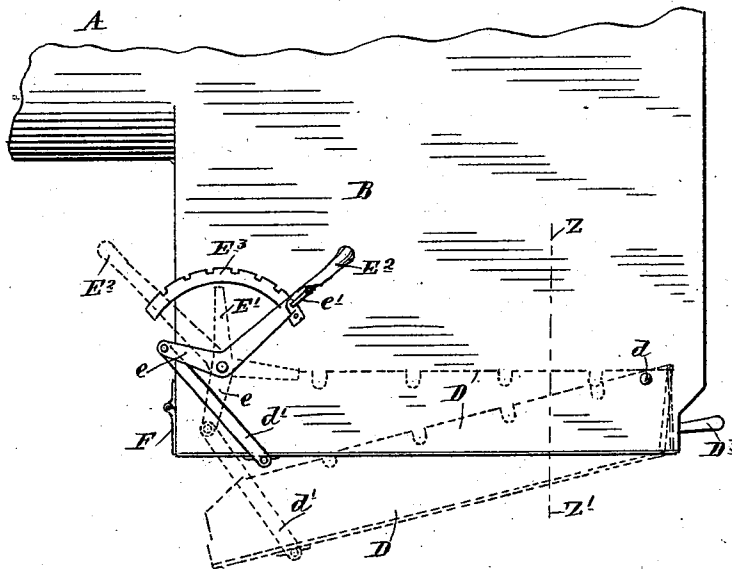
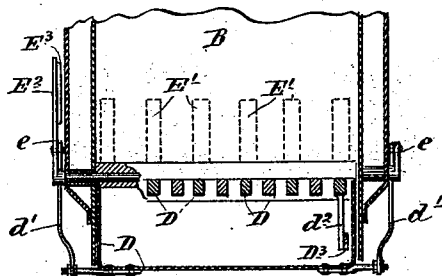


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

HENRY C. WIGGINS, OF MINNEAPOLIS, MINNESOTA.

BOILER-FURNACE GRATE.

SPECIFICATION forming part of Letters Patent No. 517,130, dated March 27, 1894.

Application filed January 9, 1893. Serial No. 457,806. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. WIGGINS, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Boiler - Furnace Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to furnace-grates.

The invention was especially designed for use on farm and traction engines, of the kind used for operating thrashing machines and similar purposes. In this class of engines, it is desirable to be able to use different kinds of fuel, such as straw, coal and wood. The fuel will also vary in conditions, both as to mixture with other foreign ingredients and as to the absence or presence of moisture. In the great northwestern grain fields, most of which are in a prairie country, straw is the fuel most generally used. The straw-burners must, however, be capable of burning wood or coal, in order to meet the conditions and demands of the trade. Many farmers prefer to save the straw and burn wood or coal for fuel. Again, in moving traction engines, which are the class now most generally employed, from one farm to another, or from one setting to another at any considerable distance, it is necessary, or very desirable, at least, to use wood or coal to keep up the steam.

A grate, which is suitable for burning wood or coal, as hitherto made, is not well adapted for use in burning straw. Straw requires much larger openings between the grate-bars, accumulates a much greater quantity of clinkers and waste on the top of the grate, requires a practically continuous feed, and needs a fire-box of larger capacity. It is now the custom, in order to meet these different conditions, to carry with the engine, two different sets of grate castings, one of which is adapted to coal or wood, and the other for use in burning straw. This requires a considerable extra weight or load, takes time to substitute one set of castings for the other, the parts are liable to be lost or misplaced,

and, worst of all, requires the fire to be drawn before the change can be made.

The object of my invention is to overcome all these limitations, and effect a large saving in time and money, by providing a convertible straw burning and wood and coal burning grate, which can be instantly adapted to any of the uses, without the removal or substitution of any extra casting or part, and without drawing the fire.

To these ends, the invention consists in the novel features and combinations, hereinafter fully described and defined in the claims.

My preferred construction is illustrated in the accompanying drawings, wherein, like letters referring to like parts throughout—

Figure 1 is a vertical longitudinal section, through the furnace and part of the boiler, equipped with my improvement. The section, so far as the grate-box and grate are concerned is taken on the line X X' of Fig. 2. Fig. 2 is a horizontal section, on the line Y Y' of Fig. 1. Fig. 3 is a left side elevation of the furnace and part of the boiler, some parts being broken away; and Fig. 4 is a vertical section, on the line Z Z' of Fig. 3, looking from the rear or feeding end of the furnace toward the front.

A represents the boiler proper, and B the body of the fire-box.

C represents the fuel inlet passage, and C' a hand-hole to the top portion of the fire-box.

D represents the adjustable grate-box, which as shown is pivoted at its rear end by trunnions d , to the vertical walls of the fire-box, and is suspended at its front end, by hangers d' , carried by crank-arms e , of a bridge grate-bar E, pivoted at the front end of the fire-box above the lower edge of the same.

D' are the grate-bars, all of which are journaled in the sides of the grate-box D, flush with the top of the same, and are provided with downwardly projecting crank-arms d^2 , which are connected to a common rock-bar D², under the control, as shown, of a bell-crank hand-lever D³ pivoted to the grate box.

F is a pivoted flap, at the lower end of the front wall of the fire-box.

Each of the grate-bars is composed of a central body and laterally projecting fingers. The fingers of adjacent grate-bars are in al-

ternate arrangement with respect to each other, as clearly shown in Fig. 2.

The grate-box D and the grate carried thereby constitute the bottom of the fire-box.

5 The operation or use of the device is as follows: The parts, as shown in full lines, in Fig. 1, are in position for use in burning straw. It will be seen, that, when in this position, the grate-bars are opened up and stand at different
10 levels, in respect to each other, so as to give increased openings to the grate, and bring the grate as an entirety on an incline, with the grate-bars in a stepped relation to each other. The front end of the grate-box and grate, when in
15 this position for burning straw, is suspended below the vertical walls of the fire-box body, thus leaving the front end of the grate exposed, and with a considerable passage or opening above the top of the grate. This gives a large
20 draft and affords a suitable discharge passage, for the outward movement of the accumulating clinkers and waste from the top of the grate. This exposed front end and discharge front end opening above the grate-top is a very im-
25 portant feature of the invention. In burning straw, there is a great quantity of waste which accumulates on top of the grate, which cannot be shaken down between the grate-bars into the ash-pan space. The clinkers,
30 for example, which accumulate from burning straw, are much more difficult to handle than the clinkers from coal. They are equally as hard as the clinkers from coal and much larger, spreading out in large lava-like bodies,
35 over the top of the grate, thereby clogging the same, shutting out the draft and rendering the combustion imperfect. In virtue of the front end opening above the grate, and the inclined position of the grate-box and
40 grate, assumed when burning straw, the clinkers can be readily forced out, over the front end of the grate, and the grate be thus kept comparatively clean. In fact, in virtue of the inclined position of the grate-box and
45 grate, and the front end passage, the infeed of the straw will force most, if not all, of the waste, downward and outward at the front end, thus always keeping the grate clean. The large openings afforded between the grate
50 bars and this self-clearing action of the grate, renders the same extremely efficient as a straw-burner. The front end of the grate-box D, is open, so that any ashes, which may drop through the grate bars will also pass
55 out at the front end of the grate-box, thereby avoiding the necessity of an ash-pan or the removal of the ashes by hand. If it is necessary at any time, to shake the grate-bars, it may readily be done through the rock-bar
60 D² and the hand-lever D³. When it is desired to use wood or coal, the grate-box and grate are adjusted into a horizontal position, so as to be closed entirely within the walls of the fire-box body. As shown, this is done by
65 rocking downward, the bridge-grate E', by means of the hand-lever E², thereby raising upward the hangers d', and the front end of

the grate-box into the dotted line position, shown in Fig. 1. The hand-lever E² is provided with a spring-pawl e', which engages 70 with the notches of a lock-plate or segment E³, to hold the lever E² and the parts connected therewith, in whatever position they may be set. When the bridge-grate bar E is turned
75 down, as above described, into its horizontal position, and the grate-box and grate are drawn up thereby, into their horizontal position, the said grate-bar E' will form an extension of the grate proper, so as to extend the top surface of the grate over to the vertical
80 wall of the front end of the fire-box. When the grate-box and grate are thrown up into their horizontal position, the journals of the grate-bars will all come into the same horizontal level and cause the fingers of the grate
85 bars to become intercurrent with each other. By then adjusting the grate-bars, if necessary, through the rock-bar D² and hand-lever D³, the grate-bars may be all brought into horizontal position, at a common level, there-
90 by closing up the openings and adapting the grate to the use of coal or wood. When changing back from the horizontal to the inclined position of the grate-box and grate, to adapt the same to the use of straw, it is only neces-
95 sary to release the hand-lever E² and rock the same forward until the front end of the grate-box and grate have been lowered to the desired point. The hand-lever may be secured to the lock-plate E³, and the grate-box and
100 grate will be held in the position set. The grate bars D' will then be rocked through the bar D² and hand-lever D³, so that each separate bar will stand in or approximately in the horizontal position, and the whole set would
105 bear the stepped relation to each other as shown in Fig. 1. In this position of the parts, the bridge-grate-bar E, stands at an upright position, adjacent to the front wall of the fire-box, where it is out of the road. 110

It will be seen from the foregoing description, and from an inspection of the drawings, that when the grate-box and grate are in position for burning coal, they are closed within the fire-box, and reduce the fire-box space; 115 and, on the other hand, when set for burning straw, the lower end of the grate-box and grate drops below the fire-box body into an exposed position, and thereby considerably increases the fire-box space. This is a very important
120 and desirable result. Straw requires more fire-box space than coal or wood. I further increase this variation in the size of the fire-box, and at the same time gain an increased efficiency, by extending the front wall b of the
125 fire-box forward to a considerable distance under the flues. The lower part of my fire-box is therefore considerably larger than the fire-box in ordinary use, and the fire is most intense, at a point directly under the flues, 130 where it will do the most good. The grate-box and grate forming, as they do, the bottom of the fire-box, and shifting in position, as hereinbefore described, make a large varia-

tion in the fire-box space, as is desirable for the different kinds of fuel.

It is obvious from the foregoing description, that the change for adapting the grate to the different kinds or conditions of fuel, may be instantly made, without the removal or substitution of any parts. It should be further noted, as a very important point, that the change can be made without drawing the fire. The straw can be fed right in over and after the coal, or the coal can be supplied directly over or after the burning-straw and the shift or adjustment at the front end be made gradual, if necessary. Hence, the steam may be always kept up and there is no delay, or need be no delay, on account of the change in fuel.

The particular construction and arrangement of the different parts, as shown in the drawings, I deem to be the best, but I do not desire to limit myself to the exact construction shown. It is obvious, for example, that the front end opening above the grate, for clearing the grate surface of clinkers and other waste matter, when burning straw, is an important improvement in itself, independent of the particular character or adjustment of the grate-bars. It is equally obvious that the grate-box might telescope within the fire-box, to effect its vertical adjustment, either for changing the fire-box space or shifting the front end of the grate-box and grate from a closed to an exposed position. Other kinds of grate-bars might be substituted, or if the same kind be employed, other means be provided for adjusting the same into different levels or varying the openings between the same. It would be a good thing for example, to have the adjustable grate-box, even if the grate-bars were longitudinal, as the front end exposure and front end opening would enable the straw to be burned to much greater advantage than at present.

It has not been deemed necessary, for the purpose of this case, to show the straw-feeding attachment. These are, of course, well understood and would be applied in the usual way.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a furnace, the combination with the

vertical walls of the fire-box, of a grate and grate-box or pan, constituting the bottom of the fire-box, secured together and mounted at one end of said fire-box, for a common pivotal movement, whereby, by a downward pivotal movement of said grate and grate-box, the fire-box space may be downwardly extended, substantially as described.

2. In a furnace, the combination with the vertical walls of a fire-box, of a grate and grate-box secured together pivotally mounted near one end of the fire-box, and having their forward ends suspended with freedom for a common pivotal movement, said grate and grate-box constituting the bottom of the fire-box, and said grate-box having side flanges telescoping with the side walls of said fire-box, and adapted, when lowered, to form a downward extension of said fire-box, substantially as described.

3. In a boiler furnace, the combination with a fire-box body, of the adjustable grate-box and grate, constituting the bottom of the fire-box, and a bridge or extension grate-bar at the front end of the fire-box body, adapted to cooperate with the grate-bars carried by the grate-box to form an extension of the grate, when using the same for burning coal or wood.

4. In a boiler furnace, the combination with the fire-box body, of the grate-box and grate, constituting the bottom of the fire-box, pivoted to the fire-box body at its rear end, the bridge or extension grate-bar journaled in the front end of the fire-box and the hanger suspending the front end of the grate-box and operated by said bridge grate-bar, substantially as described.

5. The combination with the fire-box body, of the pivoted grate-box D, the hangers *d'*, the bridge grate-bar E, having the crank-arms *e* connected to the hanger-arms *D'*, and a hand-lever as *E²*, for operating said grate-bar and hangers, substantially as described.

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

HENRY C. WIGGINS.

Witnesses:

JAS. F. WILLIAMSON,
FRANK D. MERCHANT.