

(No Model.)

E. FALES.
GRATE.

No. 485,684.

Patented Nov. 8, 1892.

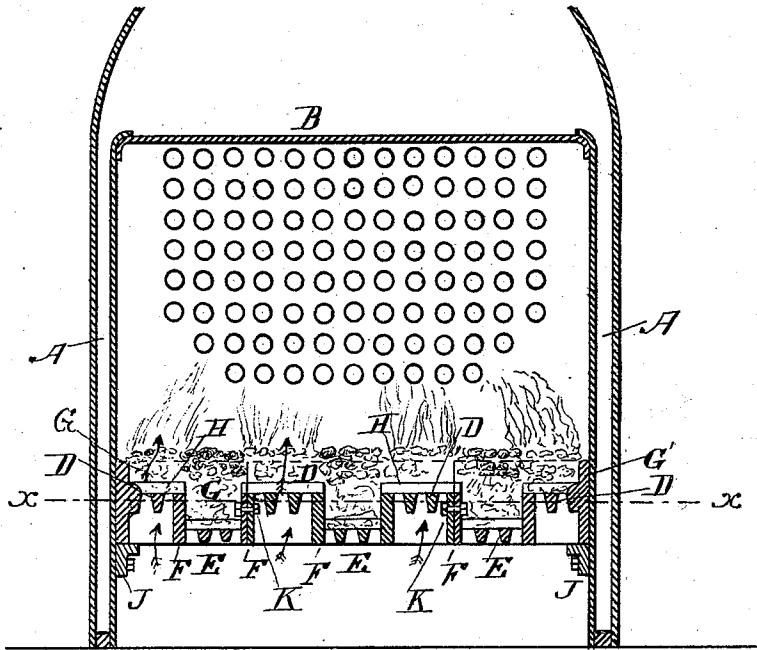


Fig. 1.

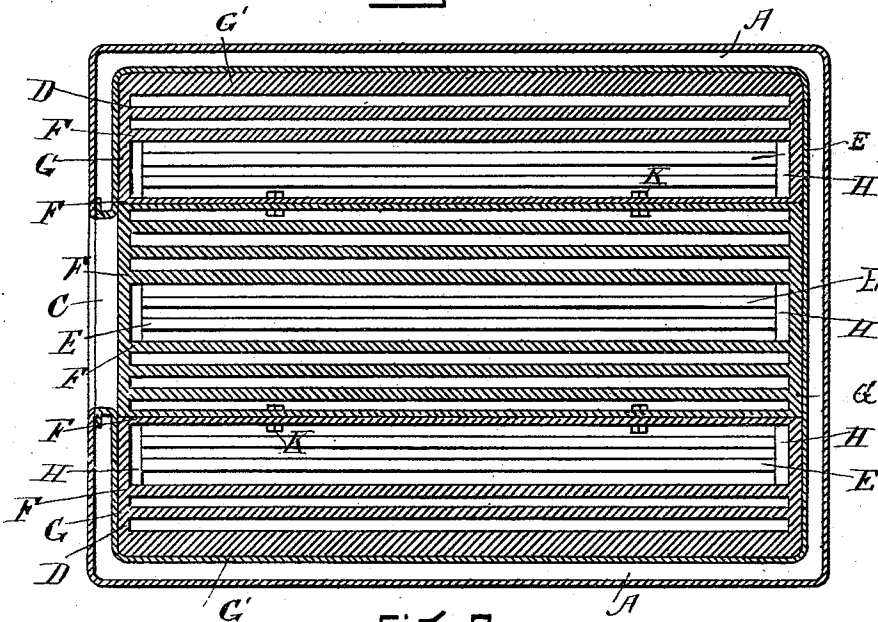


Fig. 2.

WITNESSES

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EDWARD FALES, OF BEACHMONT, MASSACHUSETTS.

GRATE.

SPECIFICATION forming part of Letters Patent No. 485,684, dated November 8, 1892.

Application filed November 27, 1891. Serial No. 413,200. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, of Beachmont, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Grates, of which
5 the following, taken in connection with the accompanying drawings, is a specification.

My invention is an improved grate for boiler-furnaces and for other purposes, the main
10 object being to secure a more complete combustion of the fuel and a more thorough utilization of the gases liberated therefrom than has been attained heretofore.

My improvement is embodied in a box-grate
15 having in cross-section a zigzag bottom of grate-bars arranged in distinct series parallel to each other, but in different horizontal planes alternating with each other, so that
20 with the fuel at a substantially-uniform level above the grate there will be lines of least resistance to the draft through the coal on the higher parts of the grate alternating with
25 lines of greater resistance where the much thicker bed of coal rests upon the several series of grate-bars located in the lower plane. By this construction a supply of oxygen is
30 admitted at intervals through the thin lines of fuel to consume the gases rising at each side thereof from the alternate thicker parts of the body of fuel, such admission insuring
35 the combustion and utilization of said gases before they can escape from the combustion-chamber. Parallel unperforated partitions are interposed between the several higher
40 and lower series of bars and are cast integral with such bars and rigidly united to the end walls. By making all the grate-bars of the upper and lower series parallel with said partitions and with each other I facilitate raking
45 out the fire or removal of ashes therefrom. I form my improved grate in sections, separately insertible and removable, so that it may be readily introduced into fire-pots which
50 it could not enter as a whole and so that any part required may be replaced when necessary. At each end of the several series of grate-bars I place against the end walls of the grate beveled transverse strips or offsets, serving to prevent cold air rising between
50 said walls and the mass of coal upon the grate. With this construction and under my method

of burning coal in alternate deep and shallow lines a peculiar action of the draft will be observed. The grate is filled with coal until all parts are covered and the upper surface of the
55 fuel is about level. The fire is then lighted by kindlings placed upon the top of the coal. The air rises with comparative readiness through the shallow body of coal over the elevated parts of the grate, but enters with some difficulty and passes much less freely through
60 the thick masses of fuel on the lower series of bars. From this it results that the coal and gases are first ignited along the lines of least resistance to the entrance of oxygen and
65 the fire burns at all times with the greatest intensity along said lines, the excess of draft on these lines exhausting the limited amount of air which penetrates the thick bodies of coal alternating with said shallow portions,
70 consuming the gases evolved and causing an infinitude of slight explosions where the inflammable gases mix with the heated air-currents. This explosive action is heard when
75 the draft is open as a roaring sound, and is felt in a strong continuous vibration, while its effects are seen in flames escaping from the deep pockets through the lower grates, passing
80 beneath the lower edges of the solid partitions, and rising through the upper grates and the fuel thereon, producing a heat so intense as to consume asbestos and melt the
85 most refractory metals in a few minutes. These results are due not alone to the zigzag bottom of the grate, but to the combination therewith of the solid partitions which separate the upper and lower grate-bars and cause
the peculiar action of the draft herein described.

In the drawings, Figure 1 is a vertical section through the fire-box of a horizontal boiler and transversely through one of my improved
90 grates therein. Fig. 2 is a horizontal section of the same on the line *xx* of Fig. 1.

A A are water-legs forming the side walls
95 of the fire-box shown, and B is the crown-sheet thereof.

C, Fig. 2, represents the feed-door or an opening through the wall giving access to the grate. The grate is composed of a succession of raised grate-bars D and of depressed
100 or lowered bars E, parallel to each other, the

bars of each group or series D being in a materially-higher plane than those of the several groups E, which alternate with them.

F F represent a series of parallel upright plates or unperforated partitions interposed between the several groups of bars D and E and dividing the grate into a succession of deep and shallow coal-pockets. The sides F F of these deep pockets being solid, there is no lateral entrance of air nor escape of gases through them, and after attaining the remarkable results as to intense heat hereinbefore referred to I am able to maintain a fire without replenishing it with fuel for a period of forty or fifty hours with the draft properly closed. These results flow from the peculiar construction stated, the partitions F F being essential thereto.

The ends of the grate-bars D and E and of the partitions F are cast in one with the end wall G, which, with the side wall G', surrounds the whole grate. The grate may be cast entire; but I prefer to make it in detachable sections, which may meet in the vertical plane of the partitions F and be joined laterally to each other by bolts K or be otherwise held in place beside each other. Suitable ledges J, of angle-iron or other material, will be provided for support of the grate. The grate may be readily raked or shaken to dislodge the ashes. Along the angles where the grate-bars D E connect with the end walls G, I introduce beveled transverse strips or offsets H, which prevent the cold air from rising between the walls G and the coal upon the grate. Similar deflecting-offsets may be located along the side walls G', if desired.

I claim as my invention—

1. A box-grate having its bars parallel to each other, but arranged in several adjacent series alternately elevated above and depressed below a mean level, and a series of parallel unperforated partitions interposed between and cast integral with the successive series of bars and subdividing the grate into deep and shallow longitudinal pockets, substantially as set forth.

2. A box-grate made in detachable sections and having a bottom zigzag in cross-section formed of grate-bars arranged in parallel series, two or more bars D and E, alternating with each other in different horizontal planes, and interposed unperforated partitions F between adjacent series, in combination with end walls G, integral with such bars and partitions, substantially as and for the purpose set forth.

3. A box-grate having marginal walls G G' and a bottom zigzag in cross-section formed of bars arranged in series D E at different heights, with interposed unperforated partitions F, rigidly united to the grate bars and walls, in combination with beveled offset strips H at the junction of said bars and wall, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 24th day of November, A. D. 1891.

EDWARD FALES.

Witnesses:

A. H. SPENCER,
FRANK T. BENNER.