(No Model.)

# W. E. HAXTUN.

## FURNACE GRATE.

No. 262,589. Patented Aug. 15, 1882.

Fig. 1.

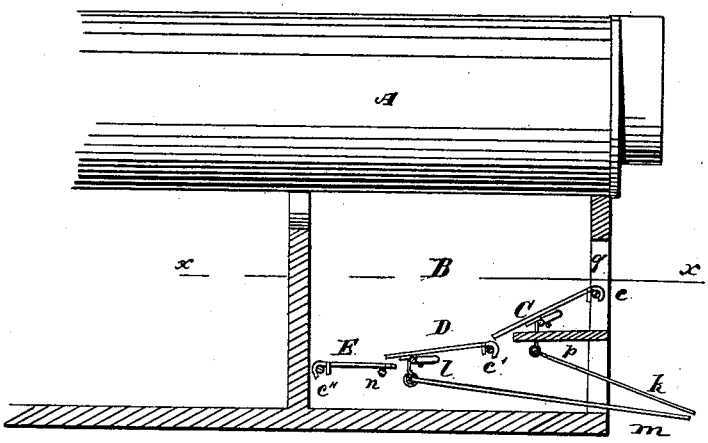



Fig. 2.

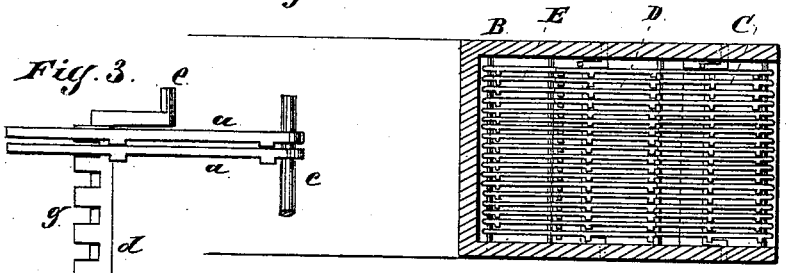
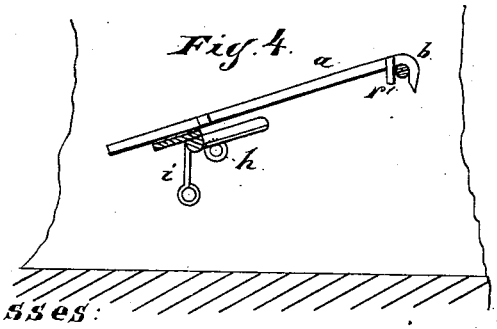



Fig. 3.




Fig. 4.

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# UNITED STATES PATENT OFFICE.

WILLIAM E. HAXTUN, OF KEWANEE, ILLINOIS.

## FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 262,589, dated August 15, 1882.

Application filed August 12, 1880. Renewed February 8, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. HAXTUN, residing at Kewanee, in the county of Henry and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Furnace-Grates, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a boiler-furnace, the boiler being in elevation. Fig. 2 is a horizontal section at line *x* of Fig. 1. Figs. 3 and 4 are enlarged details.

My improvements are primarily designed to be used in the furnaces of steam-boilers. The leading objects of the invention are to provide grates from which ashes and clinkers can be conveniently removed and which can be readily repaired, and by the use of which more perfect combustion and a more economical use of hard or soft coarse or fine coal will be secured; and it consists in making and arranging the grates in sections, in so constructing the separate sections that they can be moved or operated independently of each other, in constructing the several grate-bars so that they can be easily replaced, and in so constructing the grates that the several bars, or two or more bars, when coupled together, may be moved independently of the other bars, all as more fully hereinafter set forth.

In the drawings, A represents a steam-boiler.

B is the furnace.

C D E are three sections of a grate. The section C is located at the front of the furnace, and is considerably inclined. The section D is located near the center of the furnace, and is somewhat inclined. The section E is at the rear of the furnace-chamber, and is horizontal, or nearly so. The inner end of the section C projects a little over the front end of the section D, and the inner end of D projects over the front end of the section E. There is also a sufficient space between the ends of these two sections D and E, which are in juxtaposition to permit the insertion of a clinker-hook for the purpose of removing ashes and clinkers from the section E.

*a* are grate-bars, which are, as shown, separate from each other. Each bar has a hook, *b*, at one end, and suitable projections on one or both sides to keep the bars at a proper distance from each other.

*c c' c''* are transverse rods secured to the walls of the furnace, upon which the hooked ends of the bars *a* are placed.

*d* is a crank-bar, the ends *e* of which are pivoted in the side walls of the furnace. Upon this bar are flat projections *f*, with spaces *g* between them. These spaces and projections are so arranged that there will be a projection beneath the alternate grate-bars, and the crank bar is so arranged that it can be rotated a little without bringing the projections *f* into contact with the bars over them.

*h* is a stop on the inside of the furnace-wall, on which the crank part of the bar *d* rests. Such a stop is provided for each end of this bar *d*.

*i* is an arm extending down from the bar *d*, and *k* is a rod connected with this arm and extending to the outside of the furnace, by means of which the crank-bar *d* can be moved.

*l* is another crank-bar similar to *d*, and it is operated by the rod *m*.

*n* is a rod on which the forward ends of the grate-bars of the rear section, E, are supported.

*p* is a plate or shelf beneath the front section, C, of the grate.

All of the grate-bars are made in the same manner preferably, and when any one burns out it can be easily replaced. As shown, each bar has a projection, *r*, just in front of the hook, which aids to keep the bars in place on the transverse rods; but in practice this projection *r* may not be a necessity. The forward ends of the grate-bars of the sections C and D are hooked upon the rods *c c'*, respectively. The rear ends of the several grate-bars of the section C rest on the crank-bar *d*, and the rear ends of the bars of the section D rest on the crank-bar *l*. The rear ends of the bars of the section E are hooked upon the bar *c''*, and their front ends rest on the rod or bar *n*.

At *q* is a fuel-door, and suitable doors may be provided for the ash-pit.

As represented, each grate-bar is made entirely separate from the others, and I prefer this construction; but two or more of the bars might be connected together, the projections

*f* on the crank-bars and the spaces *g* being correspondingly enlarged without departing from my invention.

The operation is as follows: Fuel is to be fed as required upon the section C, and when well ignited it is to be pushed onto the grate-section D, and when partially consumed it is to be pushed onto the section E. The gases which escape from the fresh coal fed upon the grate-section C will pass to the rear of the furnace and over the highly-heated fuel on the grate-section E, and air being properly supplied to this part of the furnace the combustion will be very complete. All of the grate-bars of the section C can be raised a little by pushing with the rod *k*, thus raising the main portion of the crank-bar *d*, and by continuing the movement those grate-bars which are above the projecting parts *f* will be further elevated, carrying their inner portions above the remaining bars, which are in the spaces *g*.

The crank-bar *l* can be moved by means of the rod *m*, thereby giving to the section D the same movement which is given to the section C by means of the rod *k*.

The front end of each grate-bar of the section E can be raised independently of all the other bars of this section for the purpose of removing ashes. A suitable hoe or clinker-hook can be inserted in the space between the rear end of section D and the forward end of section E for the purpose of removing clinkers from section E.

The described movement of the section C is desirable to shake the same, and also to permit the insertion of a suitable instrument between the rear end of the section C and the front of section D for the purpose of pushing the fire from D to E. The described movements of section D are desirable for shaking the grate.

I have shown and described a grate consisting of three sections. In many cases two only need be used—one similar to C or D and the other similar to E.

The separate bars, constructed as described, are also well adapted for use where the grate is entire, instead of being made in sections.

The form of the hooks *b* is such that the grate-bars can be easily lifted from the transverse bar or rod with which the hooks engage.

The crank-bar *d* would be useful if the projections *f* were omitted; but these projections for raising the alternate bars constitute a desirable feature.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a furnace-grate, the combination of two or more grate-sections arranged in rear of each other, as described, and each section composed of a series of independent longitudinal grate-bars, those of each section being adapted to vibrate independently of the other, substantially as shown and described.

2. In a furnace-grate, the combination of two or more sections consisting of independent longitudinal grate-bars pivoted at one end, and having their free ends supported and adapted to rise and fall together, as described, the series of independent bars forming the rear grate-section being adapted to receive the coals from the forward section, and having their rising and falling ends arranged under the rising and falling ends of the forward section, substantially as described.

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