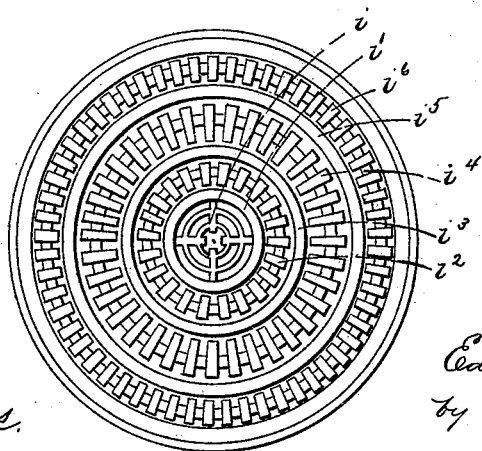
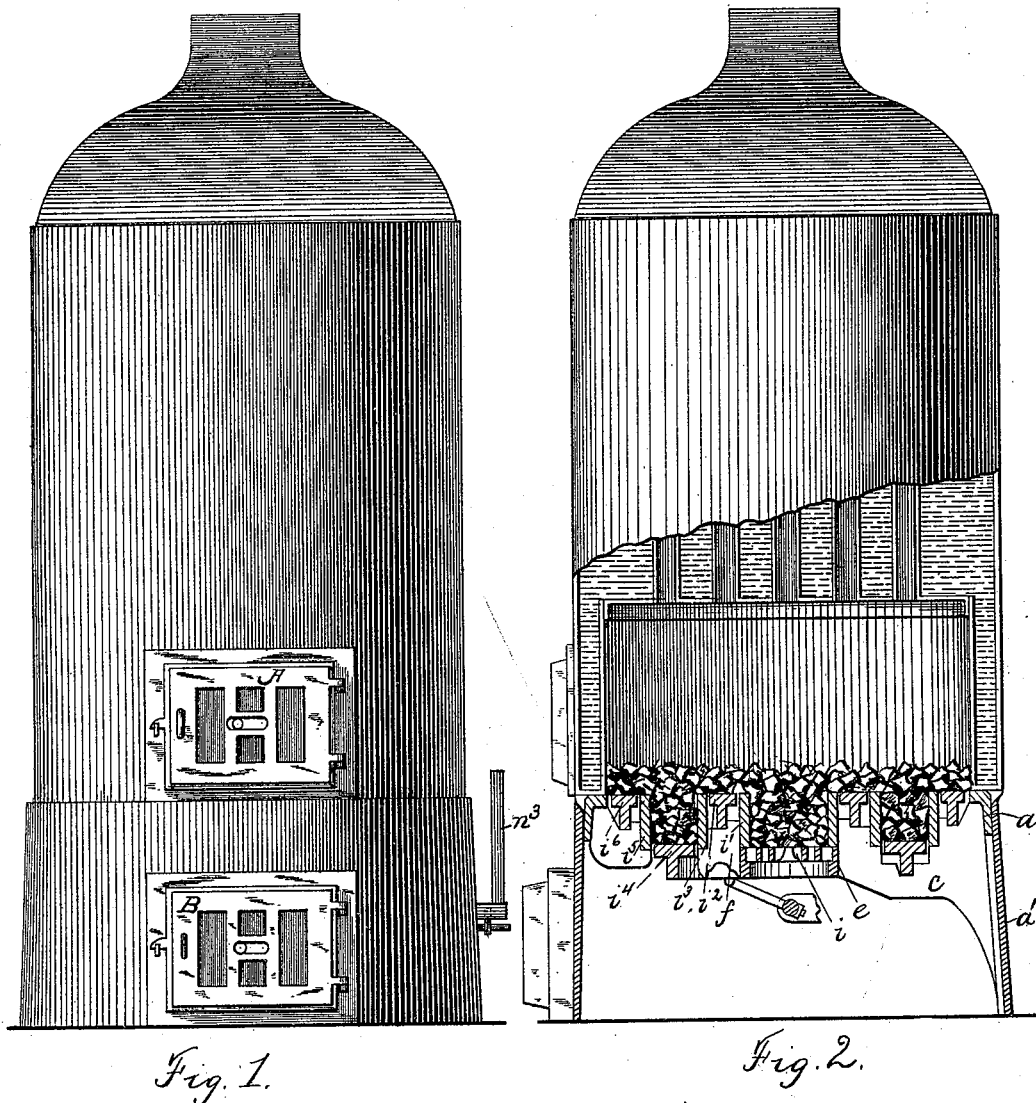


E. FALES.
GRATE.

No. 494,371.

Patented Mar. 28, 1893.



WITNESSES
 Dwight H. Fay.
 Lucy F. Graves.

INVENTOR
Edmond Fales
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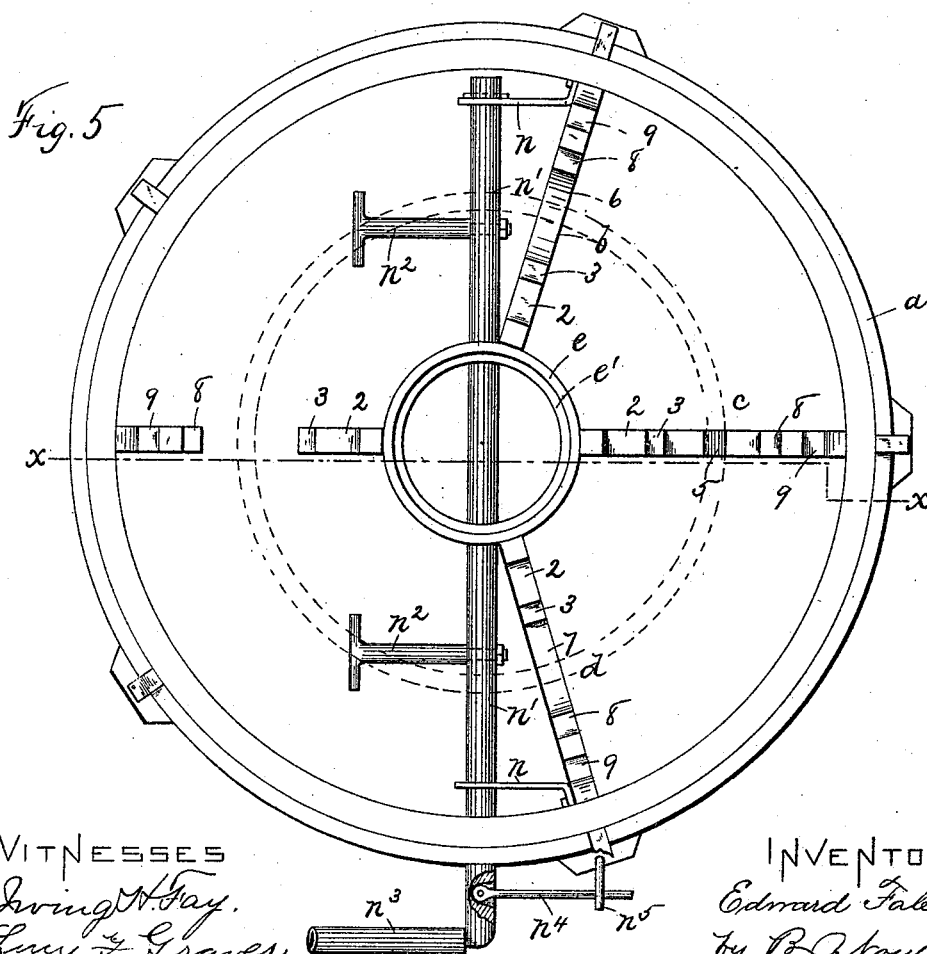
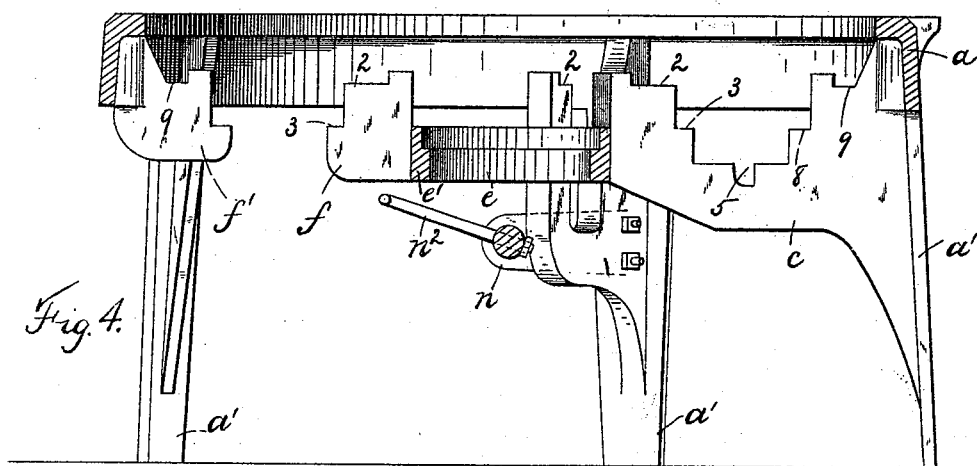
(No Model.)

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GRATE.

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WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD FALES, OF BOSTON, MASSACHUSETTS.

GRATE.

SPECIFICATION forming part of Letters Patent No. 494,371, dated March 28, 1893.

Application filed March 7, 1892. Serial No. 423,976. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Grates, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to grates for steam boilers, and other heating apparatuses.

In accordance with this invention the grate is so formed that some portions of it lie in a different horizontal plane from other portions of it, so that the bed of coal placed on the grate, and presenting a substantially level upper surface, will vary materially in depth. With such a bed of coal I have found that the columns of heated air rising from it at different points, so materially vary in temperature that coming in contact with each other cause explosions, which occur so rapidly, that they resemble a loud but slightly vibrating noise. These innumerable explosions, occurring as they do, greatly assist in raising the temperature of the columns of heated air rising from the thinner portions of the bed of coal. To obtain all the advantages possible which may be derived from this principle, I make the grate circular, it comprising a central circular pocket with a grated bottom, and an imperforate or solid side wall; a circular grate bar or grated ring, surrounding or arranged concentrically with relation to the said central pocket, but lying in a plane substantially flush with the top of said imperforate or solid side wall; and another circular pocket surrounding or arranged concentrically to said grated ring having a grated bottom, and imperforate or solid side walls, the said grated bottom lying in the same plane with the grated bottom of the central pocket, and the said imperforate or solid side walls extending up to a point substantially flush with the top of the imperforate or solid side wall of said central pocket, thereby lying substantially flush with the said concentrically arranged grated ring; and another grated ring surrounding or arranged concentrically to said concentrically arranged pocket, and lying in the same plane with the aforesaid concentrically arranged grated ring. This grate is supported on a novel frame espe-

cially provided for it. The concentric grated ring which lies in a plane with the grated bottom of the central pocket, is arranged to be tilted, by suitable mechanism provided for the purpose, so that the bed of coal may be broken, or shaken, or dumped.

Figure 1, shows in front elevation a steam boiler provided with a grate embodying this invention. Fig. 2, a vertical section of the grate. Fig. 3, a plan view of the grate, with the supporting frame removed. Fig. 4, a vertical section of the supporting frame with the grate removed, taken on a larger scale. Fig. 5, a plan view of the supporting frame shown in Fig. 4.

The supporting frame consists of the outer ring or circular frame *a*, supported on legs *a'*, and having within it three radially extended arms *b*, *c*, *d*, each made substantially alike, and provided upon their upper sides with steps or shoulders, as will be described. These radially extended arms *b*, *c*, *d*, are connected to a small central ring *e*, shouldered interiorly at *e'*. On that side of the ring *e*, opposite the arm *c*, a short portion *f*, of an arm is secured, and at the inside of the outer ring *a*, opposite said portion *f*, another short portion *f'*, of an arm is secured, which portions *f*, *f'*, substantially correspond in shape with the arms *b*, *c*, and *d*, with the exception that the middle portion is removed. A circular grated bottom plate *i*, is placed within the ring *e*, resting on the shoulder *e'*, thereof, and a cylinder *i'*, is placed on the top of said ring *e*, resting upon that portion of it just outside of the shoulder *e'*, and thereby occupying a position within the ends of the arms *b*, *c*, *d*, *f*, which latter serve to hold it in place. The cylinder *i'*, and grated bottom plate *i*, form a pocket, with an imperforate side wall. A circular grated bar or ring *i²*, surrounds or is arranged concentrically with relation to the circular pocket *i*, *i'*, resting on the steps or shoulders 2, of the arms *b*, *c*, *d*, *f*, so that the upper surface of said grated ring *i²*, will lie flush with the top of the cylinder or side wall *i'*, of the central pocket. An imperforate or solid ring *i³*, is placed on the steps or shoulders 3, of the arms *b*, *c*, *d*, *f*, surrounding the grated ring *i²*, the top of said ring *i³*, lying flush with the upper surface of the grated ring *i²*. A grated ring *i⁴*, made similar to, but considerably

wider than the grated ring i^3 , has a rim on its under side which enters a notch 5, in the arm, c , and is hence supported by said arm, and said grated ring enters the spaces 6, 7, of the arms b, d , but does not touch said arms in its normal position, and said ring also enters the space between the short arms f, f' . It will therefore be seen that this grated ring i^4 , is normally supported only at one point, so far as the supporting frame is concerned, and lies in the same plane with the grated bottom of the central pocket i, i' . An imperforate, or solid ring i^5 , surrounds the grated ring i^4 , resting upon the steps or shoulders 8, of the arms b, c, d, f' , the top of said solid ring lying flush with the top of the solid ring i^3 , so that said grated ring i^4 , and the imperforate or solid rings i^3, i^5 , constitute a circular pocket similar to the central pocket i, i' . Another grated ring i^6 , made similar to, but larger in diameter than the grated ring i^2 , rests upon the steps or shoulders 9, of the arms b, c, d, f' , and lying in the same plane with the grated ring i^2 , and also in the same plane with the main supporting ring a , or substantially so.

Projecting from the arms b , and d , are brackets n, n , which afford bearings for a rock shaft n' , to which two short parallel arms n^2, n^2 , are connected. These arms n^2, n^2 , are adapted to bear against the under side of the rim of the grated ring i^4 , and with the arm c , co-operate to form a support for the said ring, holding it in its normal position. At one end of this rock shaft n' , a hand lever n^3 , is secured, by means of which it may be rocked when desired, to thereby raise and lower the grated ring i^4 . A latch n^4 , is pivotally connected to said rock shaft n' , which engages an obstruction n^5 , on the supporting frame, the purpose of said latch being to keep the rock shaft in its normal position. This particular construction of dumping or shaking mechanism for the grate is very simple, will not get out of order, can be easily operated when desired, and forms a valuable adjunct to my grate.

The supporting frame, made as above described, is likewise simple, and is so made as to provide for ample expansion of all the parts of the grate.

This grate with its supporting frame, will be inclosed in a galvanized iron inclosing case, as represented in Fig. 1, wherein A, represents a door through which the fuel is passed, and B, the ash pit door.

Suppose a bed of coal is placed on the grate substantially as shown in Fig. 2, the upper surface being level, or nearly so, it will be seen that, that portion of the bed above the grated rings i^2, i^5 , will be much thinner than that portion above the grated portions i, i^4 , so that the columns of heated air rising from these separate portions of the grate will be of a materially different temperature, and by coming in contact with each other loud explosions occur, in exceedingly rapid succession, which I find in practice greatly increases

the intensity of the heated columns of air rising from the thinner portions of the beds. I also find that the smoke and the gases formed in the lower portions of the pockets, instead of passing directly up through the bed of coal, pass down, and then up through the bed of coal at the thinner portions, owing to there being less resistance at said thinner portions, and such being the case these gases, already heated, materially augment the quantity, as well as the intensity of the heat, rising from said thinner portions of the bed, and furthermore, I find that this smoke is quite well consumed.

By so constructing the grate that the thick and thin portions of the bed of coal are circular, the columns of heated air rising therefrom, will be cylindrical in form, thereby exposing large surfaces for contact with each other. I also find that the fire keeps longer in the pockets than on ordinary grates with the same depth of coal, while that portion over the grated rings i^2, i^6 , is ever ready for metallurgical and other purposes, in instances where the grate is placed in connection with a suitable metallurgical apparatus.

While I have herein shown two circular pockets, and two grated rings, which latter lie in a plane above the grated bottoms of the pockets, it is obvious that for a large grate I may provide a larger number of pockets, and also a larger number of grated rings.

It is obvious that the grated and other rings may be made in sections if desired, instead of each in a single piece as herein shown.

I claim—

1. The grate herein described comprising the central grated bottom, two or more concentrically arranged imperforate cylinders surrounding said central bottom and two or more perforated rings located between the imperforate cylinders, the alternate rings being located at the top and bottom respectively of said cylinders,

2. The grate herein described comprising the circular grated bottom i , imperforate cylinder i' , grated ring i^2 located in a horizontal plane above the grated bottom i , and the concentrically arranged imperforate rings i^3, i^5 , and the grated ring i^4 , between said rings i^3, i^5 , arranged in a horizontal plane below the grated ring i^2 , and the grated ring i^6 , outside of said ring i^5 , lying in a horizontal plane above the grated ring i^4 , and the supporting frame for said parts, substantially as described.

3. The grated ring herein described comprising the circular grated bottom i , imperforate cylinder i' , rising above said grated bottom, the grated ring i^2 , lying in a plane substantially flush with the top of said cylinder i , the concentrically arranged imperforate rings i^3, i^5 , the upper ends of which terminate substantially flush with the plane of said grated ring i^2 , the grated ring i^4 , located at or near the bottoms of said rings i^3, i^5 , and the grated ring i^6 lying in a plane substantially

flush with the upper ends of said rings i^3 , i^5 , combined with the supporting frame for said parts consisting of the outer ring a , and inner ring e and radially arranged stepped or shouldered arms b , c , d , f , f' , all substantially as described.

4. The grate herein described comprising the outer grated ring i^6 , the concentrically arranged imperforate rings i^5 , i^3 , the upper ends of which terminate substantially flush with the plane of the grated ring i^6 , and the grated ring i^4 , located at or near the bottoms of said rings i^3 , i^5 , combined with the supporting frame for said parts consisting of the outer ring a , and radially arranged stepped or shouldered arms connected to it, the stepped portions of said arms lying in different planes to accommodate the parts supported by them, substantially as described.

5. The grate herein described composed of the circular grated bottom i imperforate cylinder i' rising above it, the grated ring i^2 , lying substantially flush with the upper end of said cylinder, the imperforate rings i^3 , i^5 , the upper ends of which terminate substantially flush with the plane of said grated ring i^2 , the tilting grated ring i^4 , located at or near

the bottom of said rings i^3 , i^5 , and the grated ring i^6 lying substantially flush with the upper ends of said rings i^3 , i^5 , and supporting frame comprising the outer ring a , inner ring e , radially connected arm c , stepped or shouldered to receive and support the several parts of the grate in the relative positions specified, and notched to receive and support said tilting member and the radially connected arms b , d , also stepped or shouldered to receive and support the said several parts of the grate in the relative positions specified, and provided with spaces 6, 7, which permit movement of said tilting member and the short radial arms f , f' , also stepped or shouldered to receive and support the said several parts of the grate in the relative positions specified, and having an open space between them, to allow free and unobstructed passage of said tilting member, substantially as described.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD FALES.

Witnesses:

BERNICE J. NOYES,
C. R. McMANIS.