

No. 649,528.

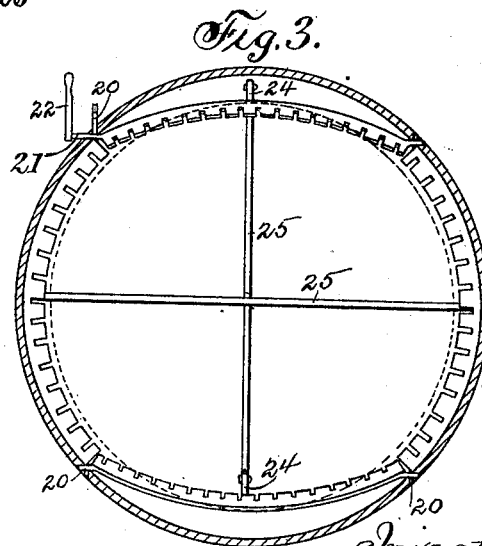
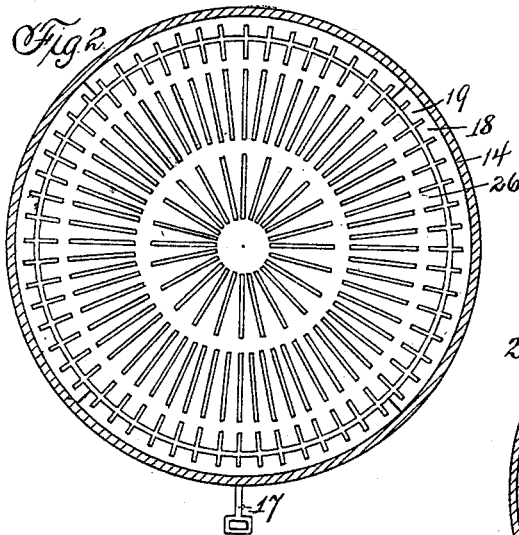
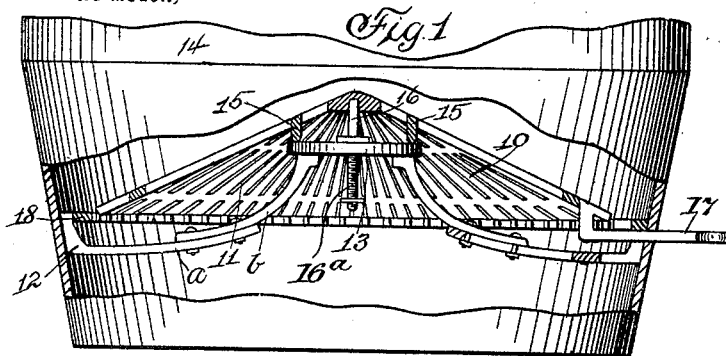
Patented May 15, 1900.

F. PIERCE.
FIRE GRATE.

(Application filed Dec. 11, 1891.)

(No Model.)

2 Sheets—Sheet 1



Witnesses
F. C. Tate.
Edgar S. Plain

Inventor
Frank Pierce
by Bulkeley & Sweet
his Attys

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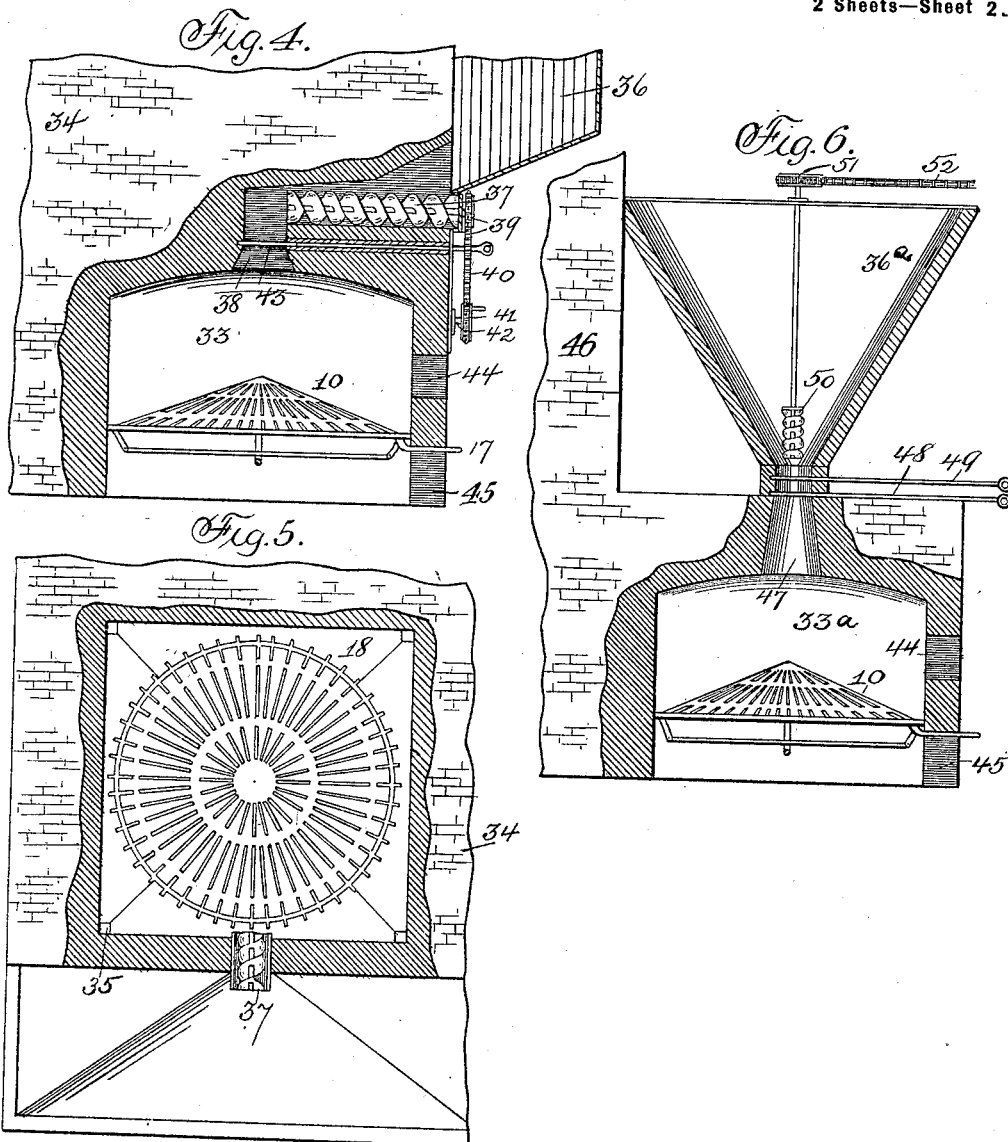
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Witnesses
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UNITED STATES PATENT OFFICE.

FRANK PIERCE, OF DES MOINES, IOWA, ASSIGNOR TO ROSE A. PIERCE,
OF SAME PLACE.

FIRE-GRATE.

SPECIFICATION forming part of Letters Patent No. 649,528, dated May 15, 1900.

Application filed December 11, 1891. Serial No. 414,763. (No model.)

To all whom it may concern:

Be it known that I, FRANK PIERCE, a citizen of the United States, and a resident of Des Moines, in the county of Polk and State of Iowa, have invented a new and useful Improvement in Fire-Grates, of which the following is a specification.

My invention relates to an improvement in fire-grates to be located within and applied to any stove, boiler-furnace, brick-kiln, or drying-oven of common pattern, and has for its object the provision of means whereby the fuel when deposited upon the grate and in process of consumption may fall along the grate to a point where when entirely consumed the ashes or clinkers thereof may be comminuted and deposited in the ash-pit, by this means maintaining the fire-grate clear of all ashes and clinkers, insuring steady and complete circulation of draft through the grate and providing entire combustion of the fuel, as well as the consumption of the products of combustion, no smoke, soot, or dangerous or offensive gases escaping through the draft-flue, which objects when properly carried out result in a great saving of fuel and insure maximum life and wear of the grate.

My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

Figure 1 is a vertical section of the grate mounted in a stove, which stove is shown partly in section. Fig. 2 is a horizontal sectional view through the fire-box of a stove above the grate. Fig. 3 is a plan of the dead-plate, showing the manner of mounting the same in sections and the dumping mechanism therefor. Fig. 4 is a vertical section showing my grate applied to a brick-kiln and fuel-magazine. Fig. 5 is a sectional plan of the devices shown in Fig. 4. Fig. 6 is a vertical section showing a modified arrangement of the grate and magazine relative to the fire-box.

In the construction of the apparatus as shown the numeral 10 designates a grate having slots 11 therein. The grate 10 may be conoidal, pyramidal, or any of the various shapes having an apex approximately at its center, and its periphery may be circular or angular, as desired.

The numerals 12 designate brackets composed of arms *a b*, adjustably connected one to the other by means of bolts seated in one of the arms and traversing a slot in the other arm. The brackets 12 are connected at their inner ends to a bearing-plate 13, the outer ends of said brackets being extended to and secured in the wall of the furnace or stove 14 or in the dead-plate 18. The bearing-plate 13 preferably is circular, and a number of bearing-points 15, formed on the under side of the grate 10, equidistant from the apex thereof, rest upon the said bearing-plate and form a normal support for the grate.

An adjustable supporting-pin 16 is seated in a screw 16^a, centrally located and arranged for vertical travel within a screw-seat formed in the center of the bearing-plate 13, and said screw is provided with a hand-wheel or other means of actuation at its lower end, the upper end of the supporting-pin 16 extending above the bearing-plate and seated in a socket formed in the grate directly below the apex thereof.

A lever or handle 17 is fixed to one side of the grate 10 and extends through a slot in the wall of the stove 14, which lever is arranged to be actuated manually to shake or oscillate the grate upon the supporting-pin 16.

The numeral 18 designates a dead-plate mounted within the stove 14 in a horizontal plane and about the periphery of the grate 10. The dead-plate is serrated or notched at its axial margin, forming projections or teeth 19, as is shown in Fig. 2.

It will be seen by reference to Fig. 3 that the dead-plate is formed in four equal sections, each having pivots 20 formed on their ends. Each pivot 20 extends within a bearing formed in the wall of a stove 14, and the pivot 21 on one of the sections is extended through the wall of the furnace at right angles to the pivot 20 and is provided with a handle or lever 22.

I have made provision for means whereby the sections of dead-plate on opposite sides of the stove or furnace are connected and rendered capable of conjunctive operation, as follows: An arm 24, as is shown in Fig. 3, is formed on and extends downwardly from each of the sections of dead-plate, each of said arms having an eye formed in the ex-

tremity thereof. Connecting-rods 25 25 are extended transversely through the ash-pit of the stove or furnace and joined at either end to the eyes of the arms 24, and by this means
 5 when either of the sections of the dead-plate is tilted by means of the handles 22 in order to dump the ashes and clinkers accumulating at the lower side of the grate 10 when the combustion has ceased the opposite section of dead-plate, being secured by the rod
 10 25 thereto, as described, obviously will be tilted in conjunction therewith, one section being lowered while the opposite section is elevated, thus providing a cheap and convenient means of depositing the accumulated
 15 cold ashes and clinkers in the ash-pit. If so desired, the sections of dead-plate may be rigidly connected and immovable. To actuate the remaining sets of dead-plates, the handle 22 is attached to the pivot extension 20, as is shown in Fig. 3.

The periphery of the grate 10 is serrated or notched, forming teeth or projections 26, acting in conjunction with the teeth 19 on the
 25 dead-plate to comminute the clinkers and products of combustion before deposition in the ash-pit, the grate being rotated to effect this purpose while the clinkers are heated.

The grate need not in each case be slotted, as shown, but, if desired, may be perforated, its center, however, being in a horizontal plane above the plane of its periphery.

The operator by moving the lever 17 laterally rotates the grate upon its pivot at the
 35 apex, thereby causing the ashes and clinkers to fall through the openings in the grate and through the openings between the grate and dead-plates into the ash-pit, some of the clinkers remaining upon the dead-plates to be
 40 dumped therefrom, as heretofore described.

In Figs. 4 and 5 the grate 10 is shown positioned within a rectangular compartment or fire-box 33 in a boiler-furnace or brick-kiln 34 and is surrounded at its periphery by a
 45 dead-plate formed in four sections, which sections are pivotally mounted at their ends by suitable pivots, as has been described.

A fuel-magazine 36 is supported in the upper part of the compartment or fire-box 33 and extends outside of said compartment, the major portion of the fuel being held in reserve in the outer portion of said magazine, which outer portion of the magazine is removable and replaceable.

55 A screw conveyer 37 is mounted within the inner portion of the magazine 36 in a horizontal position, the inner end of said conveyer being extended to the discharge-opening 38 of the magazine.

60 A sprocket-wheel 39 is mounted on the outer end of the conveyer-shaft and is connected by means of a sprocket-chain 40 with the sprocket crank-wheel 41, the latter being mounted on a counter-shaft 42.

65 A slide-valve 43 is seated in a horizontal position above the compartment or fire-box 33 in such a manner as to intersect the dis-

charge-opening 38 and cut off the flow of fuel through said discharge-opening. The slide-valve is located below the end of the conveyer 70 37, thereby providing a dead-air space between the valve and conveyer, preventing the direct contact of flame and heat with the coal within the magazine.

A door 44 is formed in the front wall of the 75 compartment or fire-box 33, through which access is had to the grate 10.

An ash-door 45 is formed in the lower portion of the front wall of the fire-box or compartment 33. 80

In Fig. 6 I show the compartment or fire-box 33^a built outside of the vertical wall of the brick-kiln 46 and the fuel-magazine 36^a, located directly over the grate and above the center of the fire-box, the discharge-opening 85 47 from the magazine to the fire-box being directly over the apex of the grate. Slide-valves 48 49 are located above the compartment 33 and extend across the discharge-opening 47 of the magazine in such a manner that 90 a dead-air space is formed between said valves, preventing direct contact of flame and heat with the coal within the magazine. It is now apparent from the position of the fire-box 33 in front of the heating apparatus that 95 the disadvantages arising from the constant and repeated opening of the fuel-door are avoided, providing more perfect combustion and dispensing with smoking intervals. It also will be observed that with my form of 100 grate and fire-box I am enabled to employ a top feed and obtain a more perfect combustion, as well as an automatic supply of fuel, which may be fine in character, since when the fuel passes through the flared opening 47 105 instead of falling upon a level surface of fire or live coal, and thus causing smothering and imperfect circulation, it is directed upon the center or apex of a conoidal grate and falls along the inclined sides thereof, and in the 110 preliminary stages of combustion the gases and smoke emitted from the fresh fuel so fed are consumed by the heat rising from a previously-formed bed of coked fuel about the outer edge of the grate. The draft necessary 115 to produce combustion of the fuel is supplied through the ash-door and the heat or gas escapes through the loosely-piled brick in the kiln 46 and is disseminated through and about said brick in any desired manner. 120

A screw conveyer 50 is mounted vertically within the magazine 36^a, as shown in Fig. 6, and is operated by means of a sprocket-wheel 51 and sprocket-chain 52 connected to other mechanism. (Not shown.) 125

It is apparent that if the fuel be dry and loose within the magazine 36^a the screw conveyer 50 may be dispensed with, as in such case the fuel would fall of its own gravity to and upon the apex of the grate in any desired quantity, under the control of the valves 130 only, said valves being manually actuated.

I claim as my invention—

1. The combination with a cone-shaped

grate, of a pin, supporting said grate, an adjusting-screw carrying said pin, a bearing-plate carrying said screw, and supporting-brackets carrying said bearing-plate, the upper end of said pin being seated in a socket in the grate immediately below the apex thereof.

2. The combination with a conoidal grate, of a supporting-plate, adjustably-jointed brackets carrying said plate, said grate resting upon said plate, and an adjustably-supported pin within said plate and extending to the apex of said grate.

3. The combination with a support and a conoidal grate having a serrated or notched periphery mounted on said support, of a dead-plate formed in pivotally-mounted sections about the periphery of said grate, the edge of said dead-plate adjacent to said grate being serrated or notched, and means for oscillating the sections of dead-plate.

4. The combination with a conoidal grate, of a sectional dead-plate arranged about the periphery of said grate, each of said sections being pivotally secured to the wall of a furnace, and means whereby said sections are turned upon their pivots.

5. The combination with a furnace having a central-emptying fuel-intake opening, of a supporting-bracket, a pin adjustably held within said bracket, a cone-shaped grate movably supported upon said pin, below said intake-opening, and a plurality of movably-supported dead-plates surrounding said grate.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

FRANK PIERCE.

Witnesses:

WM. M. WILCOXEN,
J. C. SWEET.