

H. A. POPPENHUSEN.
FURNACE.
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953,396.

Patented Mar. 29, 1910.

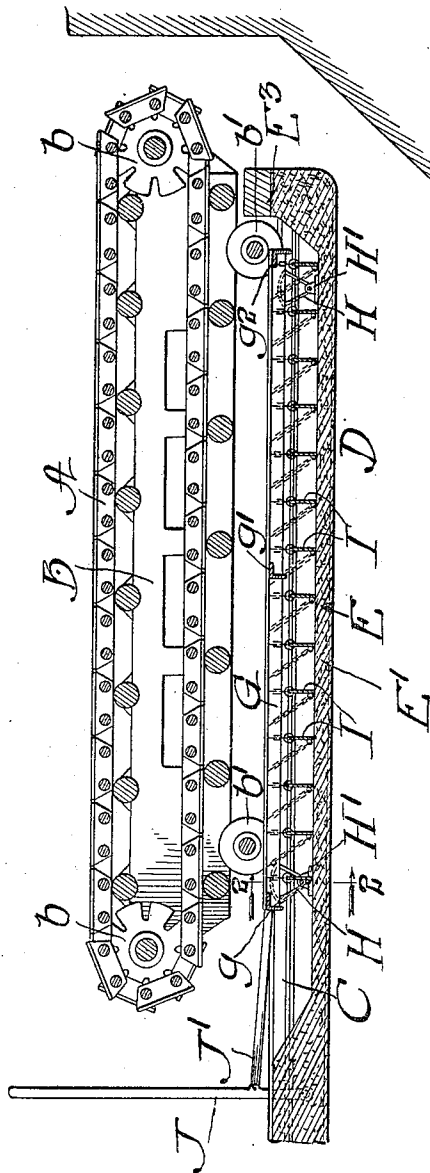


Fig. 1.

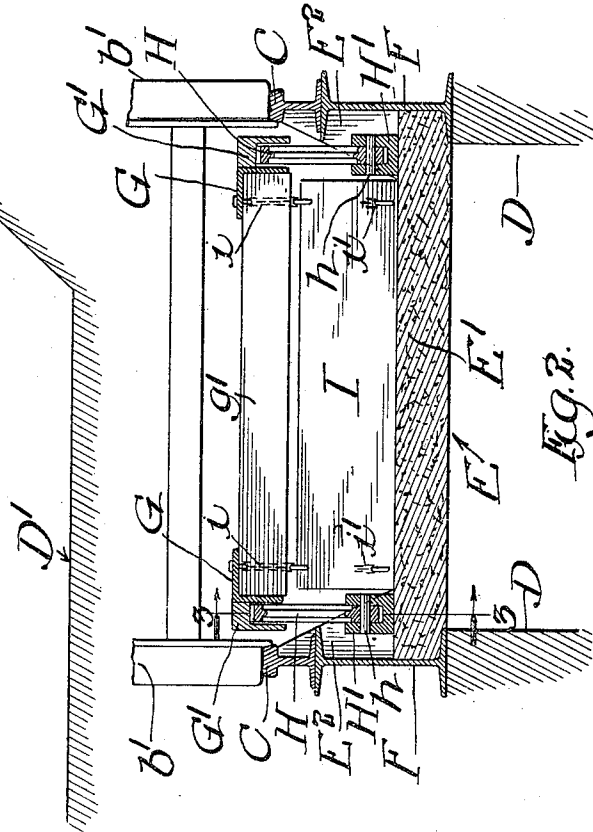


Fig. 2.

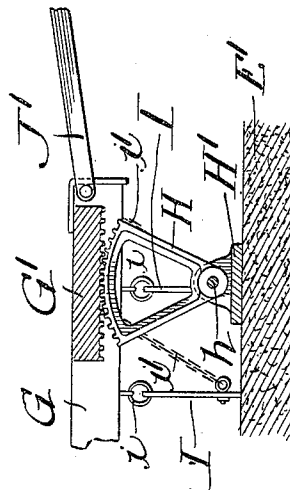


Fig. 3.

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FURNACE.

953,396.

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To all whom it may concern:

Be it known that I, HERMAN A. POPPENHUSEN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in steam boiler and other furnaces of that class in which the furnace is provided with an endless traveling grate on which the fuel is supported and by which it is carried inwardly through the furnace during the process of combustion, and more especially to means adapted for use in connection with said grates for keeping separate from the ashes which are discharged from the rear end of the grate particles of unburned coal which pass through the grate and removing the same from beneath the grate.

My invention may be more readily understood by reference to the accompanying drawing, in which my invention is shown in connection with a boiler furnace.

In said drawing:—Figure 1 is a view in central longitudinal section of a chain grate together with the ash-pit and parts of the furnace beneath said grate. Fig. 2 is a view in transverse vertical section on an enlarged scale, taken on line 2—2 of Fig. 1. Fig. 3 is a detail section, taken upon line 3—3 of Fig. 2.

As shown in said drawings, A (Fig. 1) indicates an endless traveling grate forming part of an automatic stoking device. Said endless traveling grate A is supported by sprocket wheels *b b* mounted in a frame B which is provided with supporting wheels *b¹ b¹*. Said wheels *b¹ b¹* rest and travel upon horizontal track rails C C which are located at the level of the furnace-room floor and extend along the furnace chamber from front or rear and outwardly through the front opening of the furnace, so as to permit the grate supporting frame and grate to be withdrawn from the furnace when desired. The grate and its support are arranged in the same manner as heretofore common in boiler furnaces.

D D indicate the side walls and D¹ the bottom wall or floor of the ash-pit. Said

bottom wall or floor is located considerably below the level of the rails C C and of the furnace room floor and is, in its main part, flat and horizontal, or approximately so. Between the chain grate and the floor D¹ of the ash-pit is a horizontal partition E separating the forward part of the furnace chamber from the part of the ash-pit below it and forming a wide, longitudinal passage through which ashes discharged from the rear end of the grate are removed to the front of the furnace. As illustrated in the drawings said partition E is sustained by means of longitudinal girders F F arranged at opposite sides of the furnace and which support the track rails C C. Said partition E, moreover, as shown consists of a body or slab of cement or concrete E¹ having a flat or horizontal top surface. Fillings E² E² of concrete are applied to the inner faces of the girders F F and the rails C C; the inner faces of said fillings being inclined downwardly and inwardly so as to deflect toward the center of the partition particles of fuel which fall from the grate. Said partition E terminates forward of the rear end of the chain grate, leaving at the rear of the furnace an open space through which ashes and burned out fuel discharged at the rear end of the grate may fall to the bottom of the ash-pit. At the rear end of said partition E is located a damper wall E³ which rises from the partition and terminates near the level of the bottom of the chain grate. The principal purpose or function of said partition E is to receive the particles of coal or unburned fuel which drop through or between the grate bars of the chain grate and to keep such unburned fuel separate from the ashes which are discharged from the rear of the chain grate and, falling to the bottom or floor of the ash-pit, are withdrawn through the longitudinal space or passage beneath said partition.

Now referring to the mechanism employed for removing from the top surface of the partition E beneath the chain grate particles of unburned fuel which are deposited thereon in the operation of the grate, the same is constructed as follows:

G G indicate two longitudinal frame-bars arranged horizontally at opposite sides of the space beneath the chain grate and which are connected by cross-bars *g g¹ g²* so as to form a rigid horizontal frame. Said frame is adapted for endwise horizontal movement

and may be supported in any manner permitting said movement. In the particular construction illustrated, said frame is supported by means of bearing segments H H arranged one at each end of the bars G G. Said segments are pivotally supported at their lower ends on the partition E and have at their upper ends curved bearing surfaces concentric with the pivotal axes thereof and upon which said bars G G rest. In the particular construction illustrated, said frame bars G G have attached to the outer faces thereof longitudinally arranged, horizontal rack-bars $G^1 G^1$ provided with downwardly facing gear teeth and the supporting or bearing segments H H are provided with upwardly facing gear teeth engaging said rack-bars; said segments being pivotally supported at their lower ends by means of transverse pivots $h h$, by which the same are pivotally connected with bearing supports $H^1 H^1$ which rest upon the partition E. Spaces are left in the concrete fillings E^2, E^2 at the points at which the bearing segments H, H are located, to give room for said segments, as shown in Fig. 2.

Connected with the bars G G, below the same, are a plurality of transversely arranged scraper plates I I which extend substantially the full width of the horizontal top surface of the partition E, between the inner, inclined faces of the fillings E^2 . Said plates are flexibly connected at their upper ends with said bars and are arranged at uniform distances apart along the bars, the rearmost of said plates I being located adjacent to the rear or inner end of the partition E. Said scraper plates I I are so connected with the bars G G that the plates will be held from swinging backwardly from the upright or vertical position thereof, while their lower edges are free to swing forwardly or upwardly. As shown in the drawings, said plates are connected at their upper margins with said bars G G by means of short chains $i i$; this construction affording a flexible or hinged connection between the upper edges of the plates and said bars. In the construction illustrated, moreover, the said scraper plates are held from swinging rearwardly from the vertical position thereof by means of diagonally arranged, flexible connecting members or chains $i^1 i^1$ which are attached at their lower ends to the plates near the bottom edges thereof and extend upwardly and forwardly from their points of attachment to the plates and are secured at their upper ends to the said bars G G at the points forward of the plate. Endwise reciprocatory motion in a horizontal plane may be given to the frame formed by the bars G G and the transverse connecting members $g g^1 g^2$ by any suitable means, operated either by hand or power. In the particular construction illustrated

the simple form of actuating means shown consists of a hand-lever J pivotally supported at its lower end on the partition E at a point forward and outside of the furnace and which is adapted to swing in a vertical plane. Said hand-lever J is connected with the horizontal supporting frame, formed by the bars G G and transverse connecting members, by means of a connecting rod J^1 .

By operating the hand-lever J the supporting bars G G together with the scraper plates I I hung thereon as hereinbefore described, will be given horizontal, reciprocatory motion in a direction horizontally along or over the top surface of the partition E. As a result of the hinged connection of said scraper plates I I with the bars F F and the employment of means limiting the backward swing of said plates from the vertical position thereof said plates in the backward movement of said bars will swing forwardly or rise and pass over any particles of fuel resting on the top of the partition E, but will resume their upright positions and scrape or carry forward along the top of said partition, the fuel engaged by the lower sides thereof in the forward movement of said bars. The bodily backward and forward movement of said scraper plates will, therefore, have the effect of scraping forward all of the fuel resting on said partition; the portion of the fuel carried forward by any one of the plates in its advance movement being caught and carried forward by the plate next in advance thereof in the subsequent advanced movement of the latter, so that finally all of the fuel resting on the partition will be delivered to the forward end thereof, or at a point adjacent to or forward of the front end of the chain grate. The fuel accumulated at this point by the action of the mechanism described may be deposited directly in the feeding device by which the chain grate is supplied with fuel or otherwise disposed of.

In order to effect the main or principal object of my invention, to wit,—the separation of the particles of unburned fuel which pass through the grate from the ashes which are discharged from the rear end of the grate, and the removal of said particles of unburned fuel from beneath the grate, it is not essential that the furnace should have the longitudinal passage illustrated, through which to remove the ashes discharged from the rear end of the grate to the forward end of the furnace, the principal or essential feature of the invention being embraced in a construction in which the furnace has a vertical space or passage through which the ashes descend from the rear end of the grate to the ash-pit, a supporting surface to receive particles of unburned fuel which drop through the grate, said surface being located forward of the said vertical passage, or for-

ward of the rear end of the grate, and conveying means located beneath the grate and above said supporting surface, adapted to remove from beneath the grate the particles of unburned fuel which fall and rest upon the said surface. The particular construction illustrated in the drawings, in which the furnace is provided with a horizontal partition, the top of which forms said supporting surface, is however, in itself, novel and is herein claimed as part of my invention as is also features of construction in the conveying mechanism by which the same is particularly adapted for location and operation in the space between the grate and said supporting surface.

I claim as my invention:—

1. A furnace comprising an endless traveling grate and an ash pit, said furnace having a passage at the rear end of the grate for the descent of ashes from the said rear end of the grate into the ash pit, a horizontal partition located beneath said grate and extending from its forward to its rear end for receiving particles of unburned fuel which drops through the grate, said partition forming a longitudinal passage above the ash pit floor for the removal of ashes deposited upon the latter from the rear end of said grate, and conveying means located beneath the grate and above said partition and adapted to act on the top surface of the partition to scrape or carry forwardly thereon from beneath the grate such particles of unburned fuel.

2. A furnace comprising an ash-pit, an endless traveling grate, said furnace having a passage at the rear end of the grate for the

descent of ashes from the said rear end of the grate to the ash-pit, a horizontal partition located beneath the grate and extending from the forward to the rear end of said grate above the bottom of the ash-pit, and conveying means located between the grate and said partition, and embracing longitudinally movable supporting bars and transversely arranged scraper plates adapted to act on said supporting surface, said plates being flexibly connected with and having limited swinging movement on said supporting bars.

3. In a furnace the combination with an ash pit, a chain grate, a wheeled frame for said grate, track rails for supporting said frame, longitudinal girders supporting said rails having top and bottom inwardly extending flanges, a horizontal partition located beneath the grate and supported at its side margins on the lower flanges of said longitudinal girders, said partition consisting of a body or mass of concrete, fillings of concrete applied against the inner faces of said girders and having inwardly and downwardly inclined inner faces, and conveying mechanism located above said partition embracing scraper plates adapted to act on the upper surface of said partition between said inclined filling.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 28th day of August A. D. 1907.

HERMAN A. POPPENHUSEN.

Witnesses:

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A. M. BUNN.