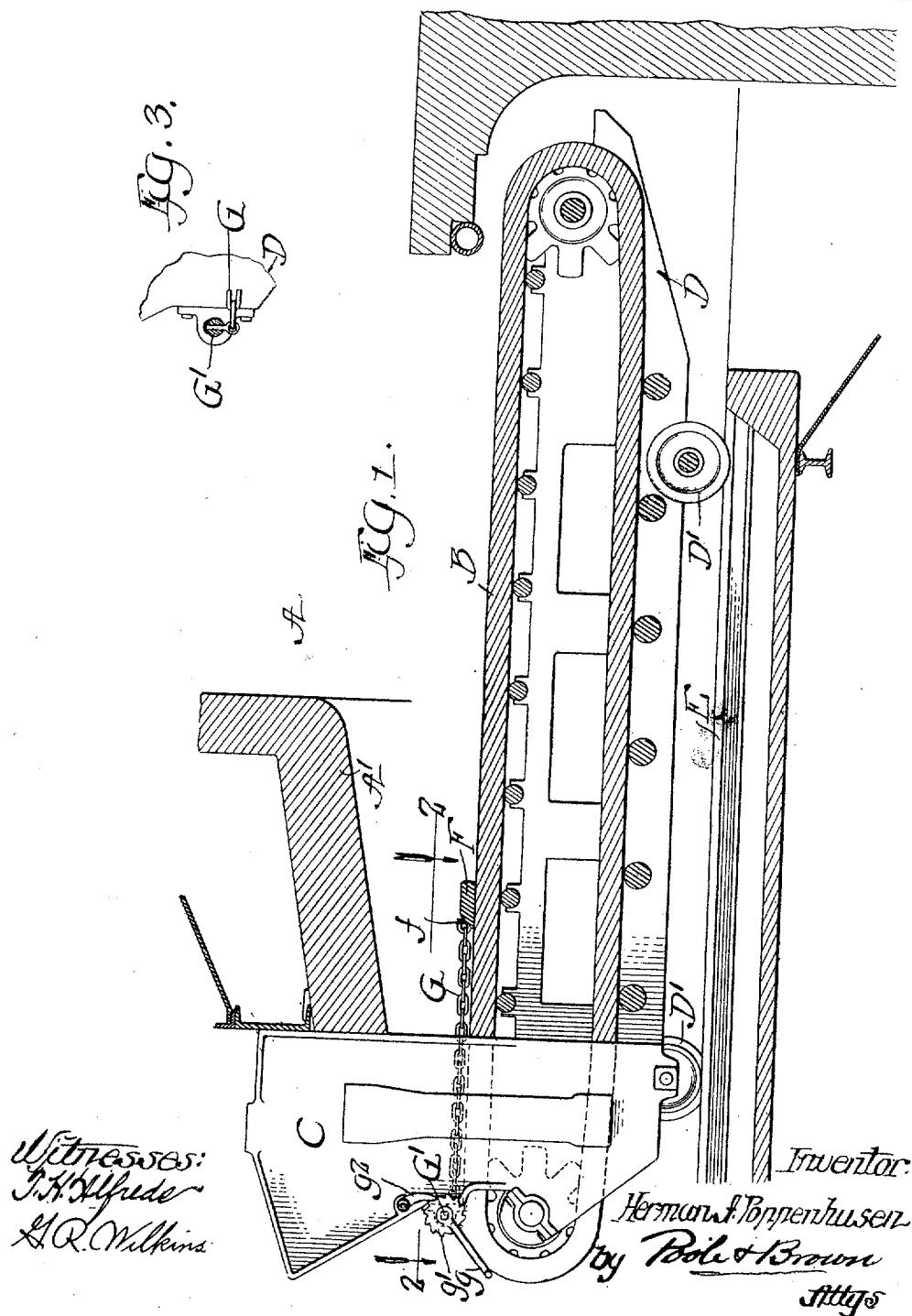


988,027.

Patented Mar. 28, 1911.
2 SHEETS—SHEET 1.



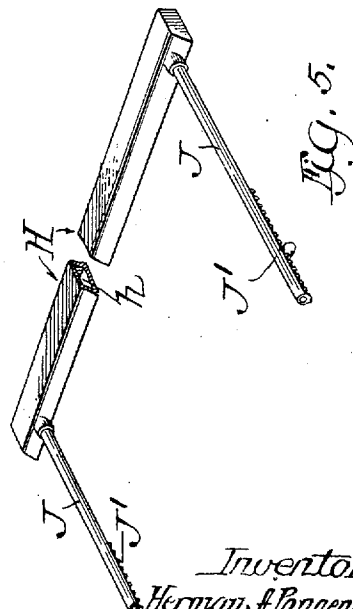
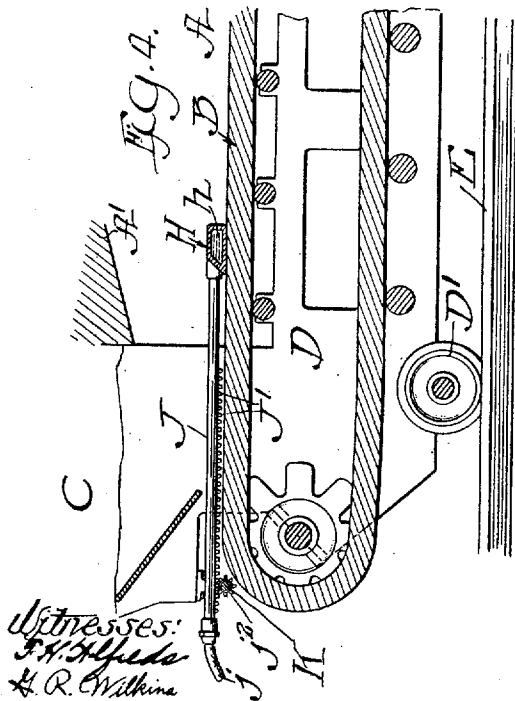
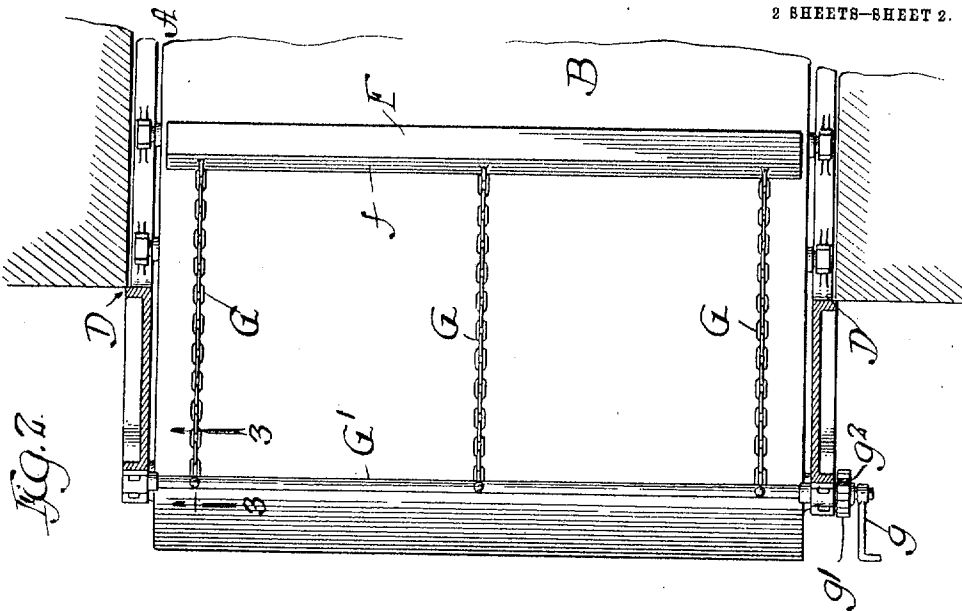
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988,027.

Patented Mar. 28, 1911.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

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FURNACE.

988,027.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed May 7, 1910. Serial No. 559,989.

To all whom it may concern:

Be it known that I, HERMAN A. POPPENHUSEN, a citizen of the United States, and a resident of Evanston, 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 a furnace provided with an endless traveling grate by means of which the fuel fed to the furnace is continually advanced or moved rearwardly in a horizontally disposed layer along or through the furnace during the progress of combustion. In a furnace of this kind, as is readily understood, ignition of the fuel is effected by the radiation from the coking breast of the heat developed by the combustion of the fuel and of the gases driven therefrom. As the fuel enters the furnace, the radiated heat attacks the layer of fuel superficially, thereby liberating a part of the volatile constituents of the fuel and leaving the top of the layer of fuel coked owing to distillation, and the rest of the fuel more or less coked and covered by fused and tarry products caused by the coking process which tends to cake the remaining fuel and to prevent a supply of air reaching such fuel to effect proper combustion. This condition is most apt to occur near the forward part of the grate, but it may occur at any portion of its length.

The object of the present invention is to provide means interposed in the path of the fuel on its rearward travel with the grate which will break up the caked mass of fuel to permit the passage and ready access of oxygen to the mass, so as to effect proper combustion. To this end, in the preferred form of my invention, I provide a transverse member which rests upon the top of the grate and which may be held in any position with reference to the length of the said grate, over which member the fuel must necessarily travel in its rearward path with the traveling grate. As the fuel passes over this member the caked mass is broken, permitting air to pass through in order to effect combustion.

In the drawings:—Figure 1 is a longitudinal section through a furnace provided

with my improved agitating member. Fig. 2 is a partial horizontal section through Fig. 1 on the line 2—2 thereof. Fig. 3 is a detail section through Fig. 2 on the line 3—3 thereof. Fig. 4 is a partial longitudinal section through the furnace similar to Fig. 1 showing a modified form of the device. Fig. 5 is a perspective view of the modified form illustrated in Fig. 4.

In the drawings, A indicates the furnace; A¹, the coking breast; B, the endless traveling grate; C, the hopper which is adapted to deliver the fuel to the front of the grate; D, the truck and D¹ the truck wheels, by means of which said truck is supported; and E, the track which supports the truck wheels. These parts may be of any usual or convenient construction and require no further description.

Referring first particularly to that embodiment of the invention illustrated in Figs. 1 to 3, inclusive,—F is a transverse member, in this case a bar, which is of a length equal to the width of the grate and which rests upon top of said grate. Said bar is preferably beveled on its forward edge, as indicated at *f*, so that the layer of fuel will more readily climb over the bar in passing rearwardly with the grate. To the bar are connected chains G which are secured at their forward ends to a shaft G¹ rotatably supported on the side members or plates of the truck D and provided at one end with a crank arm *g* by means of which it may be rotated. By rotating said crank arm the chains may be wound or unwound from the shaft G¹ to determine the position of the bar F with reference to the front end of the grate. To bring the bar toward the forward end of the grate the chains are wound upon the shaft G¹, and to move the bar away from the forward end of the grate the chains are permitted to be unwound from the shaft as the bar is carried rearwardly by the grate. A ratchet *g*¹ is keyed to the shaft and a retaining pawl *g*² is pivotally hung on the end wall of the hopper C in position to engage said ratchet. By this construction the shaft is locked against rotation so as to prevent the rearward movement of the grate from carrying the transverse bar F with it.

In Figs. 4 and 5 I have shown a modified construction by means of which the transverse bar may be water-cooled. In said figures, H represents the bar which, in this case, is hollow and provided with a longi-

tudinal chamber $\frac{1}{2}$ to contain cooling water. Instead of the chains for holding the bar in position, as in the former case, hollow rods or tubes J are secured to the ends of the bar

5 II,—said hollow tubes connecting with the interior chamber $\frac{1}{2}$ of said bar. The forward ends of said hollow rods or pipes are connected by means of flexible tubes j with a source of water supply and a place of discharge. The undersides of the rods J are provided with racks J¹ which are engaged by pinions j² keyed to a transverse shaft K which is rotatably mounted as before.

I claim as my invention:—

15 1. In a furnace, in combination with a traveling grate for advancing fuel through the furnace in a layer, a member interposed in the path of said layer between the front and rear ends of the grate, adapted for the passage of the layer thereover to break said layer for the entrance of air, said member resting on said grate, and means for adjusting the position of said member with reference to the front of said grate, said means including a locking device adapted to hold said member in a predetermined position against the rearward drag of said grate and fuel.

2. In a furnace, in combination with a traveling grate for advancing fuel fed to its front end, through the furnace in a layer, a transverse member resting on said grate in the path of said layer between the front and rear ends of the grate, adapted for the passage of the layer thereover, means for moving said transverse member in a direction from front to rear of said grate, and means for locking said transverse member in a predetermined position with reference to the front of said grate against the rearward drag of said grate and fuel.

3. In a furnace, in combination with a traveling grate for advancing the fuel in a layer, a transverse member extending over the grate between its front and rear ends, adapted for the passage of the fuel thereover, said member being provided with a water chamber, and means for shifting said member forwardly or rearwardly and holding it in its shifted position embracing two longitudinal members attached to the ends of the said member and extending longitudinally of the furnace to the exterior of the same, said longitudinal members consisting of tubes adapted to supply and discharge

cooling water to and from said transverse member.

4. In a furnace, in combination with a traveling grate for advancing fuel, fed to its front end, through the furnace in a layer, a transverse member adapted to rest on said grate in the path of said layer, a transverse shaft located at the front end of said grate, longitudinal members operatively connecting said transverse member with said shaft adapted to move said transverse member in the direction of the length of said grate, and means for locking said shaft to hold said transverse member in a predetermined position.

5. In a furnace, in combination with a traveling grate for advancing fuel, fed to its front end, through the furnace in a layer, a transverse member adapted to rest on said grate in the path of said layer, a transverse shaft located at the front end of said grate, longitudinal members operatively connecting said transverse member with said shaft adapted to move said transverse member in the direction of the length of said grate, means for locking said shaft to hold said transverse member in a predetermined position, and means for water-cooling said transverse member.

6. In a furnace, in combination with a traveling grate for advancing fuel, fed to its front end, through the furnace in a layer, a transverse member adapted to rest on said grate in the path of said layer, said transverse member being provided with a water chamber, a transverse shaft located at the front end of said grate, longitudinal members operatively connecting said transverse member with said shaft adapted to move said transverse member in the direction of the length of said grate, said longitudinal members consisting of hollow tubes adapted to supply and discharge cooling water to and from the water chamber of said transverse member, and means for locking said shaft to hold said transverse member in a predetermined position.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of May, A. D. 1910.

HERMAN A. POPPENHUSEN.

Witnesses:

GEORGE R. WILKINS,
T. H. ALFREDS.