

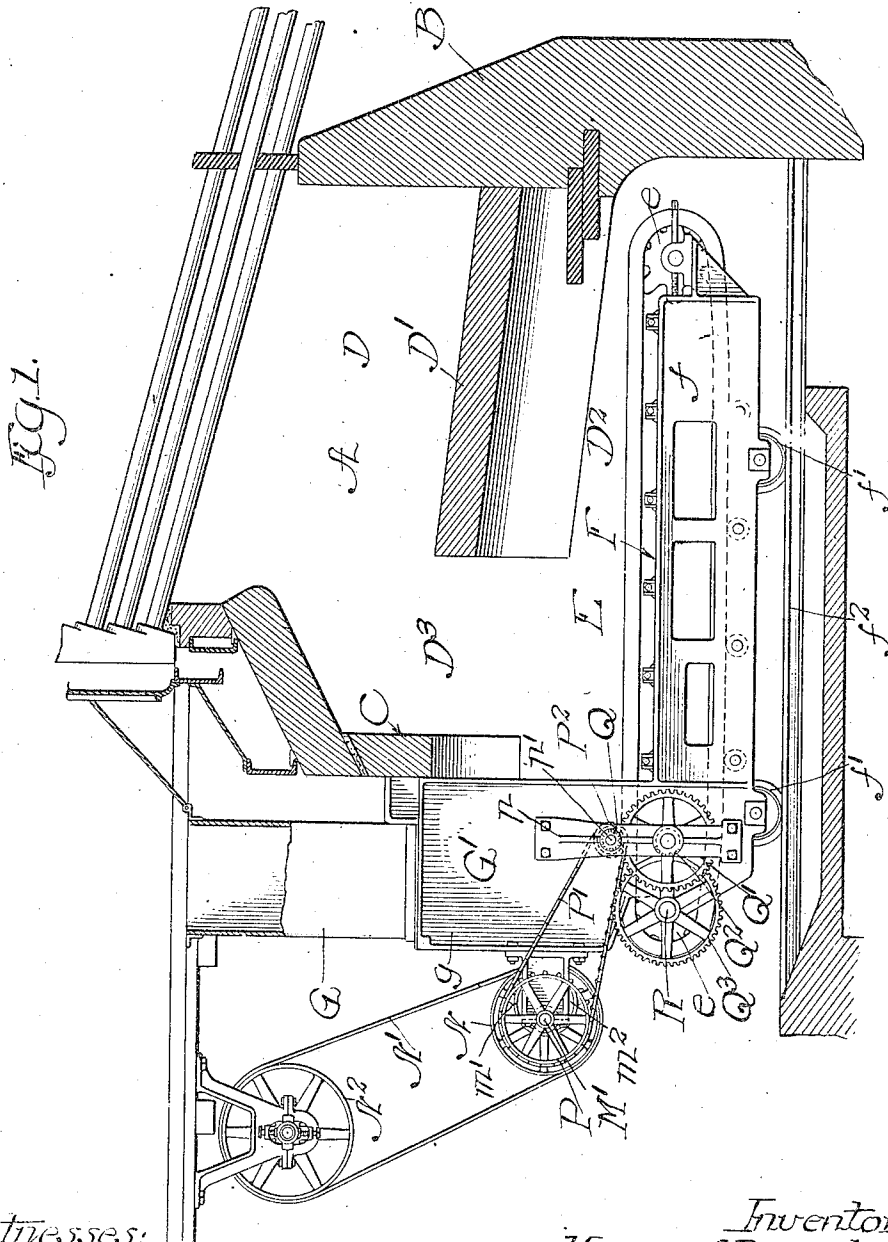
H. A. POPPENHUSEN & J. HARRINGTON.
FURNACE.

APPLICATION FILED DEC. 24, 1909.

987,911.

Patented Mar. 28, 1911.

2 SHEETS—SHEET 1.



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L. R. Wilkins

Inventors:
Herman A. Poppenhusen
Joseph Harrington
by Cooke & Brown Attys

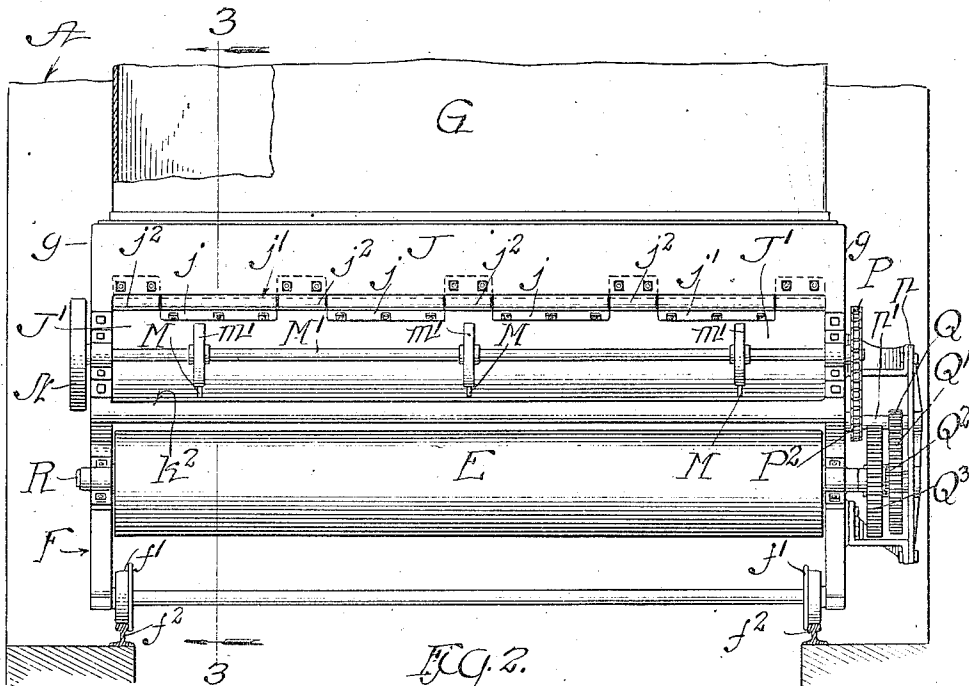
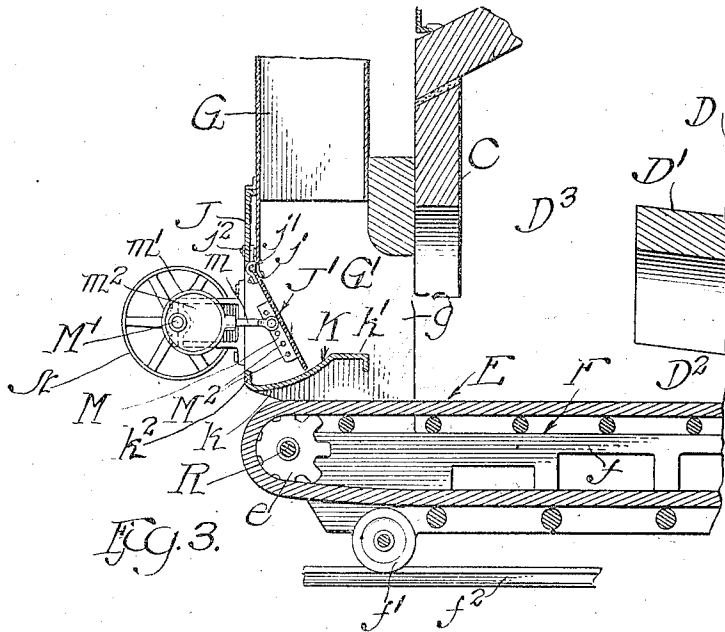
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UNITED STATES PATENT OFFICE.

HERMAN A. POPPENHUSEN, OF EVANSTON, AND JOSEPH HARRINGTON, OF RIVERSIDE,
ILLINOIS.

FURNACE.

987,911.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed December 24, 1909. Serial No. 534,869.

To all whom it may concern:

Be it known that we, HERMAN A. POPPENHUSEN and JOSEPH HARRINGTON, citizens of the United States, and residents, respectively, of Evanston and Riverside, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces; and we 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 an improvement in steam boiler and other furnaces and more particularly to a furnace 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.

One of the objects of the invention is to provide an improved construction of hopper by means of which refuse fuel, such, for example, as the refuse of saw mills or box factories which comprises sawdust, short pieces of board, and sticks of wood, or any other refuse material, may be fed to the traveling grate in such a way as to burn efficiently. Great difficulty is encountered in burning such fuel in connection with a traveling grate, for the reason that with the use of the ordinary hopper, such fuel when dumped upon the grate is usually compressed together in a compacted mass through which the air can not pass freely, with the result that it is almost impossible to burn it.

The improved hopper described herein is provided with a delivering member arranged to distribute fuel of the kind described upon the forward end of the traveling grate in a loose condition, as distinguished from a compactly, compressed mass, so that air spaces are formed between the particles of the aggregate. By the use of such a hopper, refuse of the kind described may be readily and efficiently burned.

The hopper herein described is preferably used in connection with a furnace having a deflecting arch or partition, which projects forwardly from the bridge wall above the

rear end of the traveling grate and which serves to deflect the products of combustion from the fuel burning at the rear end of the grate toward the front of the furnace and to divide the combustion space into upper and lower chambers connected with each other at the forward part of the furnace.

In the drawings:—Figure 1 is a side elevation, partially in section, of a boiler furnace provided with our improved hopper. Fig. 2 is a partial front elevation of the same. Fig. 3 is a partial vertical section through Fig. 2 on the line 3—3 thereof.

In the drawings, A represents a boiler furnace having a bridge wall B and front wall C. Said furnace is preferably provided with a deflecting arch D¹.

E indicates an endless traveling grate supported on sets of sprocket wheels *e, e*, carried on a frame F having side plates *f, f* mounted on the usual carrying wheels *f¹, f¹* which roll on the tracks *f²*. The deflecting arch D¹ projects forwardly from the bridge wall B over the traveling grate E and divides the combustion space into upper and lower compartments D and D² connected together at the front of the furnace by a passage D³ left between the front end of the deflecting arch and the front wall C of the furnace.

G indicates an inclosed chute which may lead from the floor above that on which the furnace is located. Said chute is of the width of the traveling grate and discharges into a hopper G¹. Said hopper has end walls *g, g* which are preferably formed integrally with the side plates of the grate frame. The front wall of the hopper comprises a fixed member J which is rigidly attached to the end walls *g, g* and a hinged member J¹ which extends the entire width of the hopper with its ends engaging within said end walls. This hinged member of the front wall acts as a distributing member, as will presently appear, to loosely deliver the refuse material onto the forward end of the traveling grate in a loose condition ready for efficient burning. Said hinged member J¹ may be hinged to the fixed portion of the rear wall in any convenient manner. As illustrated in the draw-

ings, the upper edge of said hinged member J^1 is provided with a series of ears j through which is inserted a rod or shaft j^1 , said rod being supported in a series of ears j^2 bolted or in any other manner attached to the fixed member J of the front wall.

K indicates the bottom wall of the hopper. Said bottom wall extends the width of the hopper and is curved in cross-section in the arc of the circle described by the lower end of the hinged member J^1 , as indicated at k . At its rear edge is formed a horizontal ledge k^1 which is located a short distance above the traveling grate E . Its forward edge is turned up to form a flange k^2 .

To the rear of the swinging member J^1 are secured a series of ribs M to which are pivotally connected a series of rods m which are attached to straps m^1 embracing eccentrics m^2 . Said eccentrics are mounted on a horizontal shaft M^1 . The ribs M are provided with a number of holes or openings M^2 so that the rods m may be connected to said ribs M at different points of their length in order to vary the throw of the swinging member J^1 . It is apparent that the rotation of the shaft M^1 will produce a reciprocating, swinging movement of the distributing member J^1 .

The shaft M^1 is provided at one end with a pulley N which is connected by a belt N^1 to a driving pulley N^2 supported from the upper floor. At the opposite end of the shaft M^1 is secured a sprocket wheel P which is connected by a sprocket chain P^1 to a sprocket wheel P^2 keyed to a short shaft p^1 which is journaled in a bracket p secured to the end wall of the hopper. To said shaft p^1 is keyed a spur-gear Q which, through a train of gears Q^1 Q^2 Q^3 , drives the shaft R to which the sprocket wheels e carrying the forward end of the traveling grate are keyed.

The operation of the device is as follows:—The rotation of the shaft M^1 from the pulley N^2 drives the chain grate in the usual manner so as to feed it rearwardly into the furnace chamber. At the same time, at periodical intervals, the swinging member J^1 is caused to move rearward pushing with it as it does so the refuse material which fills the chute and the hopper. As it swings rearward and thus pushes the material, it raises said material or at least that portion of it which may be affected by its upward pressure and at the same time pushes rearward that part of the material which rests on the ledge k^1 so as to cause the same to drop off the ledge onto the rearwardly traveling grate. The function of the distributing member in this action is two-fold, that is to say, it crowds the material lying above the bottom of the hopper upward so as to relieve the material on the ledge k^1 from the pressure of the material above it, and at the same time pushes the material off the

ledge, from which it falls to the grate below. The result of this two-fold action is to feed the refuse material to the grate in a loosely scattered condition through which the air may readily pass to produce an efficient combustion of the material when it passes into the furnace. The forward movement of the swinging member releases the material from above and permits another supply to drop down onto the bottom of the hopper in position to be acted upon by the swinging member in its next movement rearward.

In a furnace such as shown, provided with a traveling grate upon the front end of which the refuse material is delivered, as above described, and which carries the fuel in a rearward direction in the furnace, the burning gases arising from the fuel burning at the rear end of said grate are deflected by the arched partition D^1 forwardly, so that they pass under the said arch contributing heat thereto, as well as passing over or through the incoming fresh fuel, subjecting the latter to both the radiation from the deflecting arch and to the flow of said gases, thereby providing both heat for drying the incoming fuel and a draft for carrying off such evaporations as are necessary for drying the incoming fuel to a degree that it, on reaching the rear end of the grate, will enter into combustion at once.

It will be apparent that the several details of mechanical construction shown and described herein may be variously modified without departing from the spirit of our invention and we do not wish to be limited to them except as pointed out in the appended claims.

We claim as our invention:—

1. In a furnace, in combination with a substantially horizontal, traveling, fuel-supporting grate, the front end of which projects outside of the furnace, a hopper located above the front end of said grate, said hopper having end walls and a front wall and an opening at the rear above said grate, a swinging member hinged to said front wall, and a bottom wall curved rearwardly and upwardly from said front wall and terminating in a ledge located at a distance above the grate whereby the fuel is caused to fall upon said grate in a loosely scattered condition.

2. In a furnace, in combination with a substantially horizontal, traveling, fuel-supporting grate, the front end of which projects outside of the furnace, a chute located above the front end of said grate, a hopper located below said chute, said hopper having end walls and a front wall and an opening at the rear above said grate, a swinging member hinged to said front wall and forming the lower part thereof, and a bottom wall curved rearwardly and upwardly from said front wall substantially in the arc of the

circle described by the free end of said swinging member and terminating in a horizontal ledge located at a distance above the grate, whereby the fuel is caused to fall upon said grate in a loosely scattered condition.

In testimony, that we claim the foregoing as our invention we affix our signatures in

the presence of two witnesses, this 16th day of December A. D. 1909.

HERMAN A. POPPENHUSEN.
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Witnesses:

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