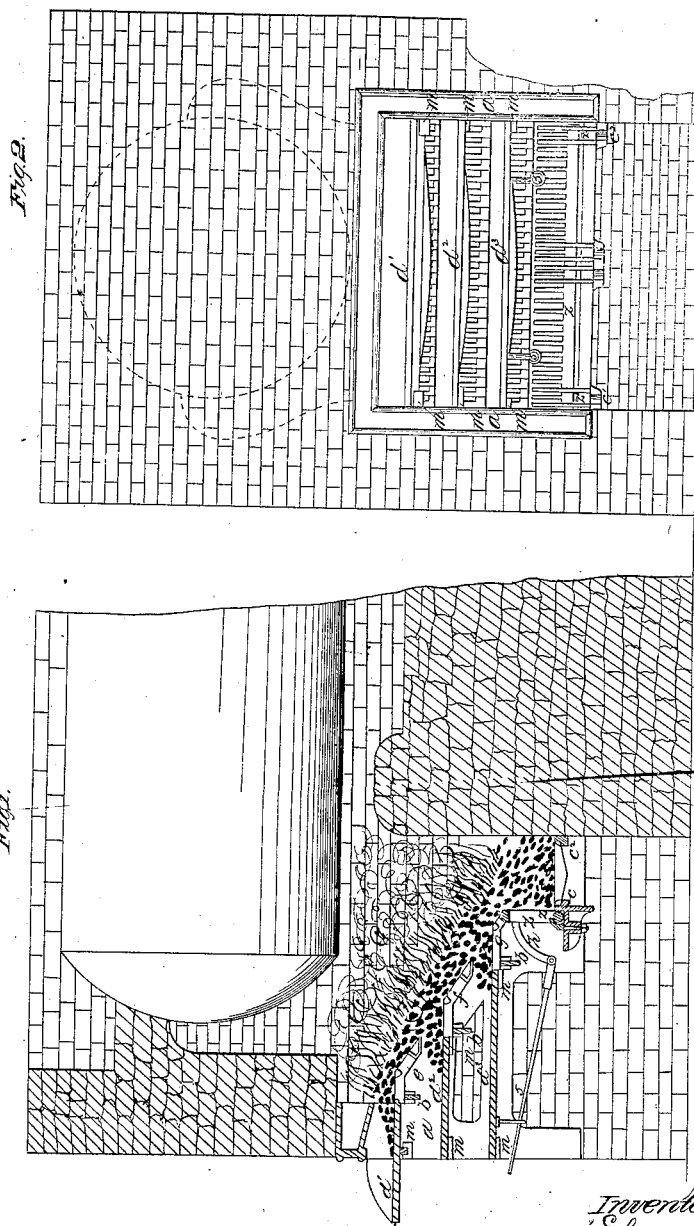


E. Langen,
Furnace Grate.

No 50,996.

Patented Nov. 14, 1865.



Witnesses:
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W. Dean Overell

Inventor:
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Att'y

UNITED STATES PATENT OFFICE.

EUGEN LANGEN, OF COLOGNE, PRUSSIA.

FURNACE-GRATE.

Specification forming part of Letters Patent No. 50,996, dated November 14, 1865.

To all whom it may concern:

Be it known that I, EUGEN LANGEN, of Cologne, Prussia, have invented a new and useful Improvement in Furnace-Grates, (for which Letters Patent were granted me in England, bearing date the 20th of January, 1860;) and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a longitudinal vertical section of this invention. Fig. 2 is a front elevation of the same.

Similar letters of reference indicate like parts.

Fire-grates generally are so constructed that the fresh fuel is thrown upon that which is already undergoing combustion. The effect thereof is as follows: Before the fresh fuel reaches the temperature requisite for combustion all water or moisture contained in the same must be evaporated; and in order to effect this object a portion of the heat created by the combustion of the incandescent fuel is consumed uselessly—that is, it acts on a place where it is not needed, and therefore the temperature of the fire is lowered. The atmospheric air, before it is allowed to reach the fresh fuel, is compelled to pass through the incandescent mass, where it is deprived of all, or nearly all, its oxygen, which reaches the fresh fuel in the form of hot carbonic acid, which takes up another atom of carbon and becomes carbonic oxide, thus consuming a quantity of fuel without producing a useful effect. Furthermore, another portion of the fuel (more or less, according to the nature of the fuel) is driven out in the form of vapor and of gases, which pass off unconsumed mixed with minute particles of coal, and commonly designated by the term of "smoke." These difficulties are obviated by the grate which forms the subject-matter of this present invention, and which is so constructed that the fuel is introduced from behind, or under the incandescent mass already upon the grate, and consequently all the gases arising from the fresh fuel cannot escape unconsumed, and the air requisite for the purpose of supporting combustion passes through the cold

fuel to the incandescent mass and no portion of the fuel is wasted.

My grate is composed of three (more or less) cast-iron plates, $d' d^2 d^3$, which are supported by lips or cleats, m , projecting from the inner sides of the side plates, a . From the inner ends of the plates $d' d^2 d^3$ extend the angular grate-bars $e f g$, which are provided at their under edges with notches that drop over the upper edges of cross-bars b , secured between the side plate of the furnace, and their tails extend under the plates $d' d^2 d^3$, whereby they are firmly held in position. The bars of the lowest grate are straight and rest upon cross-bars c' and c^2 .

Under the grate-bars g is situated a movable trap-grate, z , which may be made in two or more parts, and which turns on suitable pivots, z' , so that it can be turned down in a horizontal position, or that it can be brought in a vertical position, which it occupies in Fig. 1 of the drawings. Said grate is operated by means of two or more rods, s , which connect with arms h , extending from the movable grate or grates, so that by pushing said rods in the grates are turned down, and by pulling said rods out the grates are turned up to a vertical position.

The operation is as follows: Some coal is introduced upon each of the tiers $d' d^2 d^3$ and pushed out upon the inner ends of the grate-bars, and by placing a sufficient quantity of kindling-wood behind the coal on each plate and lighting said wood the fire can be started. After the coals are fully ignited some more are added behind until the spaces between the ends of the grate-bars of one tier and those of the next lower tier are closed up. A continuous inclined plane is thus formed by the incandescent coals from the upper tier to the lowest grate, and the coals descend automatically from one tier to the next as fast as fresh coals are introduced from behind and pushed forward with a poker until said coals completely fill the fire-box built around the lowest grate, where they are completely consumed. No ashes fall through the grates, since the same always collect in front and gradually descend with the burning coal to the lowest grate, whence they can be easily removed or raked out when the trap-grate is let down.

It is obvious that the defects pointed out

above are fully obviated by this arrangement. All the gases emitted by the fuel before the same is consumed and all particles of coal carried away by the draft, and also the vapor or steam rising from the fresh fuel as the same is gradually heated, must pass through the layer of incandescent coals, and are thereby consumed; and by many practical experiments made with my grates in different places a saving of fuel of from eighteen to twenty-eight per cent. has been effected.

This grate is applicable to boilers of any desired description, and can also be used in Cornish boilers with great advantage.

What I claim as my invention, and desire to secure by Letters Patent, is—

A grate composed of three or more tiers, in combination with a fire-box and trap-grate, constructed and operating substantially as and for the purpose set forth.

The above specification of my invention signed by me this 13th day of April, 1865.

EUGEN LANGEN.

Witnesses:

J. W. REHE,
O. REMY.