

No. 643,800.

Patented Feb. 20, 1900.

K. MAREK.

SMOKE CONSUMING FURNACE FOR LOCOMOTIVE ENGINES.

(Application filed Aug. 25, 1897.)

(No Model.)

Fig. 1.

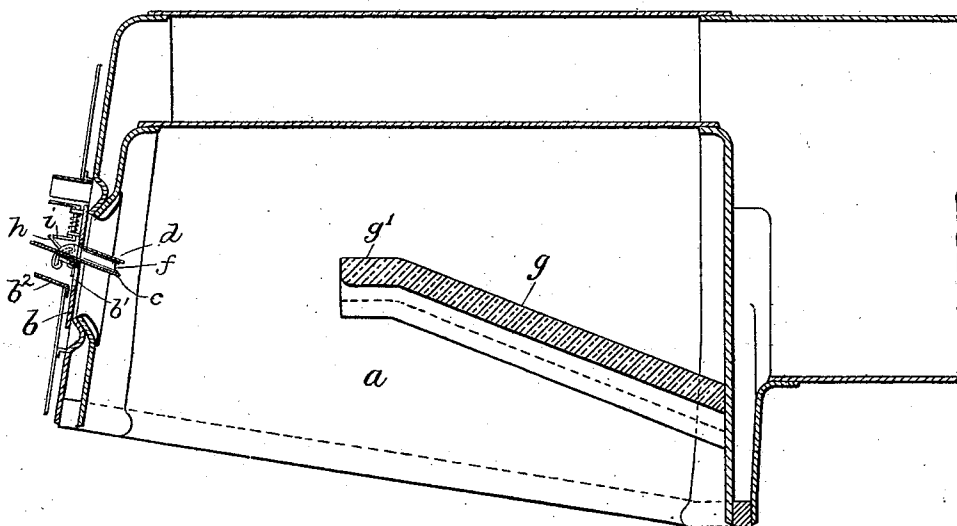


Fig. 2.

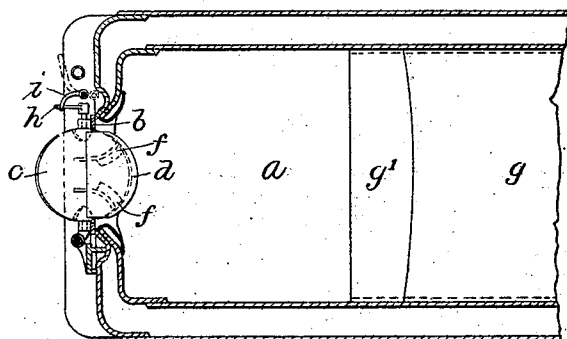
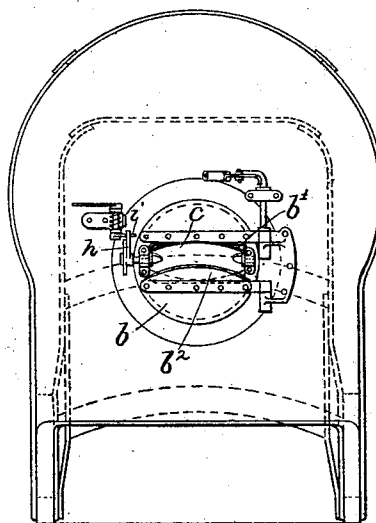


Fig. 3.



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KARL MAREK, OF VIENNA, AUSTRIA-HUNGARY.

SMOKE-CONSUMING FURNACE FOR LOCOMOTIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 643,800, dated February 20, 1900.

Application filed August 25, 1897. Serial No. 649,477. (No model.)

To all whom it may concern:

Be it known that I, KARL MAREK, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Smoke-Consuming Furnaces for Locomotive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

All smoke-consuming furnaces of present construction—such as those of Thierry, Langer, myself, and others—rely for their action upon the introduction of finely-divided steam-jets into the combustion-chamber for the purpose of preventing the formation of smoke by chemical and mechanical action or by mechanical action only. The arrangements of Thierry and Langer require a skilled treatment of the fire and in that case give a satisfactory result, assuming a limited grate action. My smoke-consuming furnace also acts with a forced draft. With all the above-mentioned arrangements the use of the said steam-jets causes a considerable additional consumption of steam or water, so that although by the employment of these apparatus a higher evaporation duty of the fuel is apparently obtained, yet an increased consumption of fuel (from five to ten percent.) results. A still greater inconvenience, however, is caused by the increased consumption of feed-water, as on account thereof the duration of a journey is considerably increased in consequence of stoppages (which are not otherwise necessary) if the smoke-consuming devices are to be in action during the entire journey.

The smoke-consuming furnace which forms the subject of my present invention effects the consumption of smoke in a perfect manner without the use of steam-jets and without the use of fire-brick shaft-like structures built into the combustion-chamber, such as are employed in the known "Marek" furnace. It is based upon the following observations:

First. The principal agent in effecting

smoke combustion is in all cases the fire-brick arch, which is built against the tube-plate of the boiler, because it forces the combustion gases and flames to pass through a restricted opening, in which an admixture therewith of a secondary or upper air-supply can be more easily effected than in the full area of the fire-box. Heretofore, however, the construction of such arches has been based on the view, which repeated experiments have proved erroneous, that the combustion gases and flames that are formed underneath the arch sweep in an extended curve around the end of the arch, while as a matter of fact, in consequence of the strong blast-pipe action, the flames and gases pass sharply around the said end of the arch, so that this part of the highly-heated combustion products only participates to a limited extent in the smoke consumption, according to the extent to which these combustion products come in contact with the secondary air-supply.

Second. The quantities of smoke that are formed in the inner corners of the fire-box do not enter into combustion, or only to a small extent, because they cannot be brought into contact with the upper air-supply.

According to the present invention these defects are obviated, first, by constructing the fire-brick arch, which is built into the fire-box in the usual manner, of an angularly downwardly bent form in the longitudinal direction, whereby the flames and gases are caused to pass in a considerable curve around the edge of the arch; secondly, the secondary air-supply is introduced through the fire-door in such manner as to flow in divided currents both against the end of the arch and underneath the same, as also into the inner corners of the fire-box.

The accompanying drawings show the construction of a smoke-consuming locomotive fire-box constructed according to my above-described invention.

Figure 1 shows a vertical longitudinal section; Fig. 2, a horizontal longitudinal section, and Fig. 3 a rear end elevation with the fire-door closed.

The fire-brick arch *g* extends beyond the middle of the fire-box *a* to about two-thirds of its length, the last portion *g'* thereof being made horizontal, so that it appears bent down-

ward at an angle in the longitudinal direction. By thus extending the length of the arch the area for the passage of the gases and flames is reduced, while in consequence of the bent form of the arch the combustion products, which are heated by contact with the white-hot surface of the arch, are directed away therefrom in an extended curve, so that in the passage-opening the combustion of one part of the smoky combustion products rising in a backward direction will be effected by contact with the heated smokeless portion of the products. The current of the combustion products still containing smoke will have its sectional area reduced to such an extent that already the air-current drawn in by the blast-pipe (or by the auxiliary blast when the engine is standing) will be sufficient to effect a perfect mixture with the combustion products for producing complete combustion of the smoke. The introduction of this air is effected through an opening b' , formed in the fire-door b , in which opening is provided a rotatable flap c , turning on horizontal pivots, and on that part of the flap which projects into the fire-box is fixed a plate d by means of two curved connecting-pieces f . The latter might also be formed with an angular bend, and they might be fixed to the fire-door, in which case the plate d would be connected directly to the latter. On the outer side of the door b is also fixed a plate b^2 , directed slightly upward. When the flap is open, as at Fig. 1, the flap c and the plates d and b^2 form between them two air-channels, of which the upper one, by means of the guides f , directs the air not only against the end g' of the arch g , but also into the inner corners of the fire-box, as will be seen from Fig. 2, while the lower channel, formed between the flap c and the plate b^2 , directs the secondary air underneath the arch.

In order that the flap c may not be in the way of the fireman when stoking, the parts are advantageously so arranged that on opening the fire-door the flap is automatically closed down and on closing the door it opens automatically. This can, for instance, be effected by providing on the axis of the flap c a finger h , which on closing the fire-door strikes against a lever i , arranged with spring action on the fire-box front. By the resistance offered by this lever the flap c is turned into the open position. On opening the door the finger h moves away from the lever i and the flap turns downward by gravity.

I claim—

1. In a fire-box an upwardly and forwardly inclined fire-bridge extending over about two-thirds of the length of said box and having a comparatively small portion of its forward end substantially horizontal and in line with air-inlets in the front wall of the fire-box, for the purpose set forth.

2. In a fire-box, a fire-bridge whose forward end is adapted to change the direction given to the products of combustion by the body of

the bridge, in combination with means for feeding air into the forward corners of the fire-box, substantially as described.

3. In a fire-box, a fire-bridge whose forward end is substantially horizontal and adapted to change the direction given to the products of combustion by the body of the fire-bridge, in combination with a fire-door, means therein for directing air into the forward corners of the fire-box and under the bridge, substantially as set forth.

4. The combination with a furnace-door, of a draft device journaled centrally in an opening in said door and provided with a draft-passage having diverging lateral deflecting-walls, said device constructed to close or practically close the opening when swung into a vertical position on its journals, and a directing-plate b^2 projecting outwardly from the lower edge of said door-opening, for the purpose set forth.

5. The combination with a furnace-door, of a draft device journaled centrally in an opening in said door and provided with a draft-passage having diverging lateral deflecting-walls, said device constructed to close or practically close the opening when swung into a vertical position on its journals, and means operating automatically to tilt said regulator into its closed position when the door is opened, for the purpose set forth.

6. The combination with a furnace-door, of the circular gravitating draft device $c d$, journaled in an opening in said door and provided with the lateral deflecting-walls f , the directing-plate b^2 projecting outwardly from the lower edge of the door-opening, and means operating automatically to tilt the device in a substantially vertical position when the furnace-door is opened, substantially as set forth.

7. The combination with a combustion-chamber provided with the inclined bridge g having its forward end g' at an angle to its inclined surface, and a door closing an opening in the wall of said chamber facing the said end g' of the bridge; of the discoidal gravitating draft device $c d$, journaled eccentrically in an opening in said door and provided with the lateral deflecting-walls f , and the directing-plate b^2 projecting outwardly from the lower edge of the door-opening, substantially as and for the purpose set forth.

8. In a fire-box, a straight inclined fire-bridge whose forward end makes an angle therewith, in combination with air-passages in the forward part of said fire-box adapted to direct air under the flames curving around the end of said bridge, and auxiliary passages directing air laterally in front of said flames, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

KARL MAREK.

Witnesses:

HARRY BELMONT,
DAVID ALLINS.