

S. M. VAUCLAIN & G. R. HENDERSON.

DOWNDRAFT FIRE BOX.

APPLICATION FILED SEPT. 8, 1911.

1,028,642.

Patented June 4, 1912.

2 SHEETS—SHEET 1.

Fig. 2.

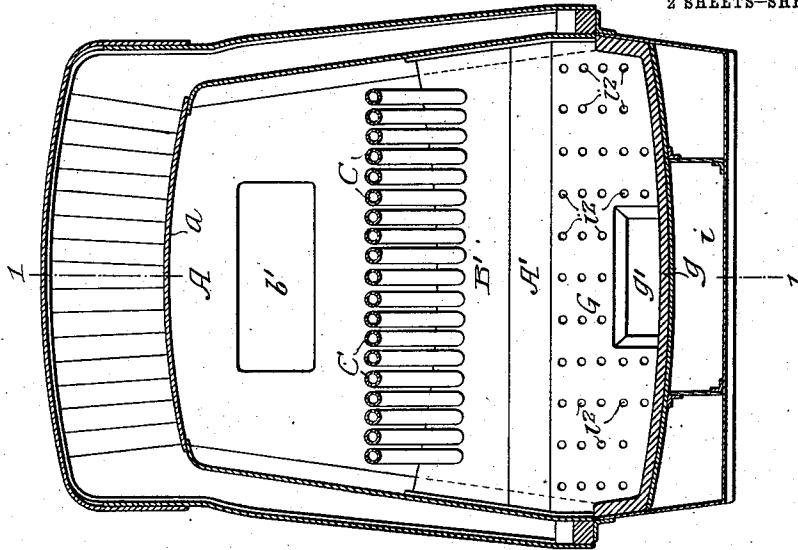
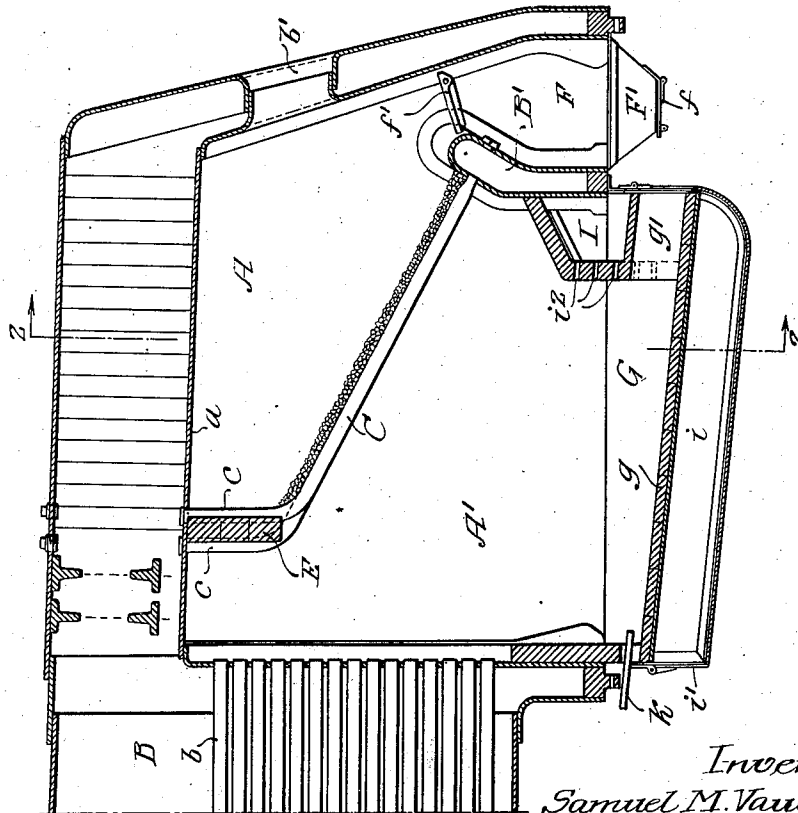


Fig. 1.



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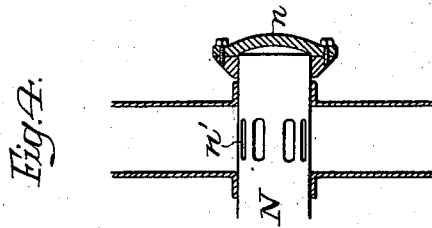
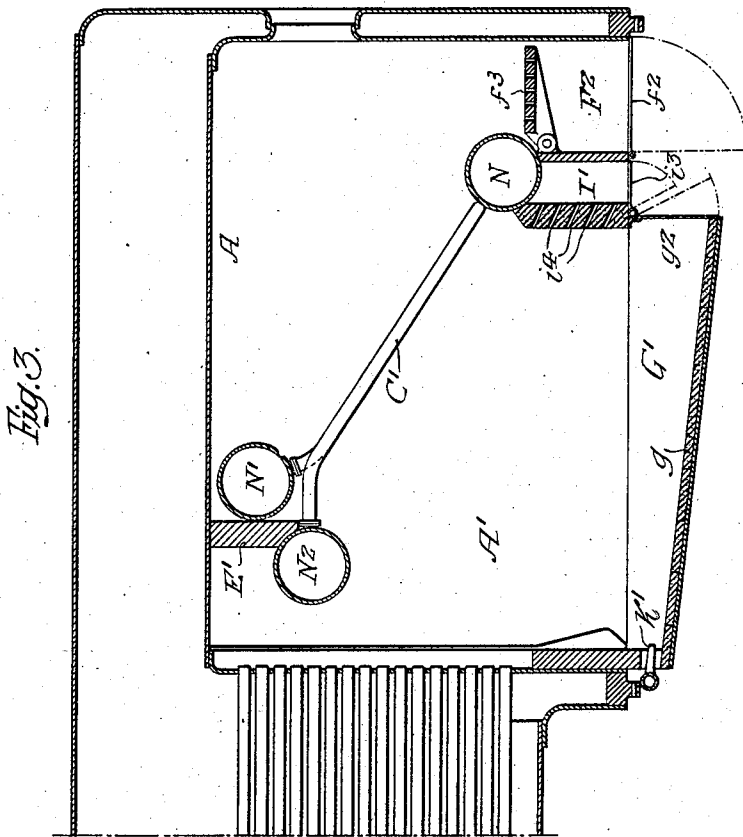
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

SAMUEL M. VAUCLAIN AND GEORGE R. HENDERSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE BALDWIN LOCOMOTIVE WORKS, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DOWNDRAFT FIRE-BOX.

1,028,642.

Specification of Letters Patent.

Patented June 4, 1912.

Application filed September 8, 1911. Serial No. 648,329.

To all whom it may concern:

Be it known that we, SAMUEL M. VAUCLAIN and GEORGE R. HENDERSON, citizens of the United States, residing in Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain Improvements in Downdraft Fire-Boxes, of which the following is a specification.

The object of this invention is to secure the combustion of bituminous coal without the usual generation and expulsion of smoke from the stack.

The construction is particularly adapted for use in locomotive boilers.

In the accompanying drawing—Figure 1, is a longitudinal sectional view of a locomotive boiler illustrating our invention, on the line 1—1 Fig. 2; Fig. 2, is a transverse sectional view on the line 2—2, Fig. 1; looking toward the rear of the fire box; Fig. 3, is a longitudinal sectional view illustrating a modification of the invention; and Fig. 4, is a sectional view of a detail of the construction illustrated in Fig. 3.

A is a fire box which may be of any of the ordinary constructions.

B is the body of the boiler, in which are the tubes *b*.

In place of the grate which is usually located at the bottom of the fire box of locomotives of the coal burning type, the grate is formed by a series of water tubes *C* arranged preferably at the incline shown, and these tubes are set and expanded into the crown sheet *a* of the fire box and into the walls of a water partition *B'* at the bottom of the fire box near the rear end. This water partition communicates with the side water space between the fire box and the casing of the boiler. The upper ends *c* of the grate tubes *C* are preferably bent so as to assume a vertical position some distance below the crown sheet *a* and they are preferably staggered as shown so as to receive and properly hold the deflector *E*, which is made of a series of fire bricks. These bricks are for the purpose of preventing the products of combustion from passing over the top of the coal.

b' is a fire door through which the coal is shoveled onto the water tube grate *C*.

There is a space *F* formed between the partition *B'* and the rear wall of the fire box, and the lower portion of this space or

compartment is closed by a hopper *F'* having a door *f*. At the upper end of this space or compartment is a trap door *f'* hinged as shown. On lowering the trap door any clinkers or large portions of burned coal may be readily removed from the surface of the grate and discharged into the compartment *F* without permitting air to enter at this portion of the fire box.

The ash pan *G* has a floor *g* preferably lined with fire brick, and at the rear end of the ash pan is a compartment *g'* into which the small ashes or cinders can be blown by means of the jet pipe *h* which extends through an opening in the forward end of the ash pan, as clearly shown in Fig. 1.

Below the floor *g* of the ash pan is a passage *i* which communicates with the chamber *I* through passages at each side of the compartment *g'*. At the forward end of the passage *i* is a damper *i'* suitably pivoted, and in the front wall of the chamber *I* is a series of openings *i²* for the escape of air into the combustion chamber under the grate *C*. By regulating the opening of the damper *i'* more or less air will flow through the chamber *I* and under the fire brick lining and will be heated to a certain extent by contact with the under surface of the fire brick or the partition, and will escape eventually through the passages *i²* into the combustion chamber and mingle with the gases that are distilled from the hot under bed of the coal, and thus form complete combustion in the chamber *A'* before passing to the tubes of the boiler.

We may in some instances use the construction illustrated in Fig. 3, in which the grate *C'* is composed of tubes connected to transverse drums *N*, *N'*, *N²*. The transverse drum *N* may rest upon the structure at the rear of the fire box in such position as to separate the compartment *F²* from the combustion chamber of the fire box, and the two transverse drums *N'* and *N²* may be so located as to properly support the fire brick deflector *E'* as clearly illustrated in Fig. 3. These drums preferably extend through both walls of the fire box as indicated in Fig. 4, and are provided with suitable caps *n* and they are perforated at *n'* so as to communicate with the connecting space between the walls of the fire box and the casing of the boiler so that when it is desired to clean

these drums all that is necessary is to remove the cap n and suitable cleaning instruments can be introduced into the drums. In this figure we have dispensed with the use of the hopper, showing a simple door f^2 and have used a perforated locked door f^3 . The chamber I' directly under the drum N is closed by a damper i^3 and there are inclined openings i^4 in the front wall which communicate with the combustion chamber A' . There is also a hinged door g^2 at the rear of the ash pan G' so that in opening this door the small ashes or cinders can be readily blown from the surface of the fire brick bottom g of the ash pan by means of the steam discharged through the nozzle k' .

By this invention the usual method of firing a locomotive is not departed from, as the fire door is practically in the same position as in the ordinary locomotive and the grate instead of being at the base of the fire box is raised a sufficient distance, and is at such an incline, that it will properly hold the body of coal and the fireman can quickly see the condition of his fire at all times, and can regulate the drafts accordingly.

We claim:

1. The combination in a locomotive of a fire box; a series of tubes communicating with the fire box; a water partition extending across the lower end of the fire box some distance from the rear end thereof, forming a chamber, with series of inclined tubes extending from the water partition to the crown sheet of the fire box.

2. The combination in a boiler of a fire box; a transverse water partition at the lower end of the fire box some distance from the rear end thereof; a series of tubular grate bars connected to the said partition and to the crown sheet of the boiler, said tubes communicating with the water space of the boiler; and a transverse partition at the upper end of the grate to prevent products of combustion from passing over the grate into the combustion chamber.

3. The combination in a boiler of a fire box; a transverse water partition at the lower end of the fire box located some distance from the end thereof; a series of water tubes forming a grate, said water tubes communicating at the lower end with the water partition and having vertical portions coupled to the crown sheet of the fire box and communicating with the water space of the boiler, the vertical portions of said tubes being staggered, with fire brick sections held in place by the tubes and forming a partition preventing the passage of the products of combustion over the forward end of the grate.

4. The combination in a boiler, of a fire box; a transverse water partition in the lower portion of the fire box some distance from the rear end thereof and forming a clean out space; a series of inclined water tubes forming a grate and connected to said partition and with the crown sheet of the fire box; a hopper at the lower end of the clean out space having a door; and a trap door at the upper end of said space, so that when the trap door is opened the clinkers and large portions of burned coal may be removed from the surface of the grate and discharged into the hopper.

5. The combination of a locomotive fire box having a crown sheet above the tubes of the boiler; with a series of inclined tubular grates located within the fire box, one end of said tubes being bent up and attached to the crown sheet of the boiler and the other end attached to the boiler at the rear end of the fire box.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

SAMUEL M. VAUCLAIN.
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Witnesses:

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