J. L. WINSLOW.

Locomotive and Fire-Box Boiler.

No. 201,214. Patented March 12, 1878

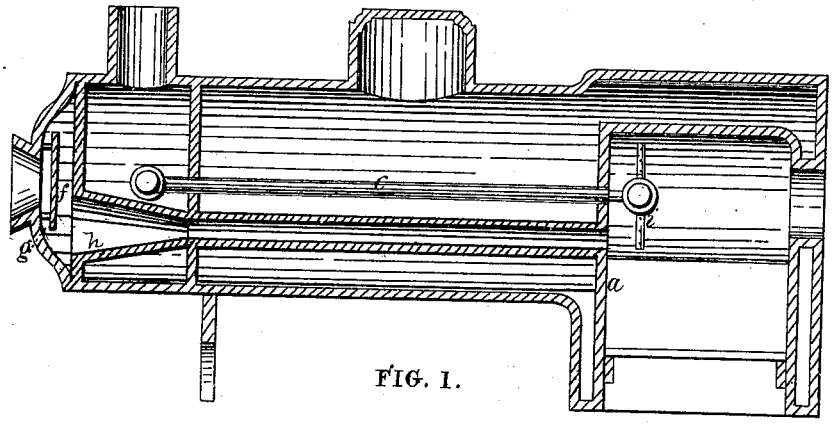

FIG. 1.

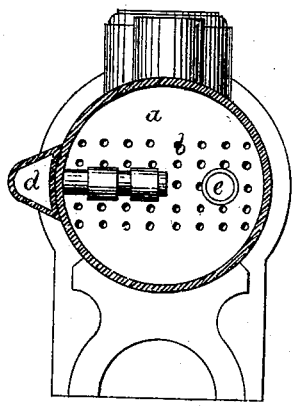

FIG. 2.

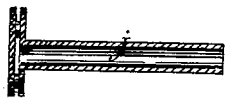

FIG. 4.

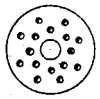

FIG. 5.

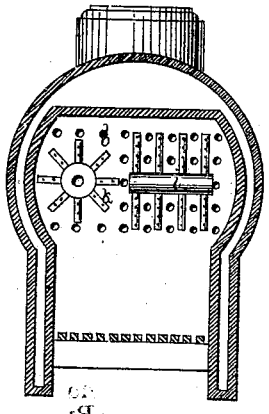

FIG. 3.

WITNESSES:

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JOSEPH L. WINSLOW, OF PORTLAND, MAINE.

IMPROVEMENT IN LOCOMOTIVE AND FIRE-BOX BOILERS.

Specification forming part of Letters Patent No. **201,214**, dated March 12, 1878; application filed September 18, 1877.

To all whom it may concern:

Be it known that I, JOSEPH L. WINSLOW, of Portland, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Locomotive and Fire-Box Boilers; 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 which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a section of an engine-boiler with parts of my improvement thereon. Fig. 2 is a front-end view of an engine-boiler, showing the means for introducing air. Fig. 3 is a view of the fire-box, showing tube-sheet and distributers. Figs. 4 and 5 are forms of distributing-surfaces.

Same letters show like parts.

The purpose of my invention is to promote a more nearly perfect or a higher degree of combustion in locomotive and fire-box boilers, and thus prevent the issuing of smoke and escape of sparks and cinders from the fire. To this end I inject, distribute, and intermingle with the smoke and gases produced by the combustion on the grate an amount of fresh air, which carries on the burning of such gases to a still higher degree. This principle is well understood; but my invention consists in the placing of the fresh-air supply at certain points where it will be most effectual, in introducing it in such form or manner as will best accomplish the desired result, and also in the devices employed for these purposes.

The drawings show a locomotive-boiler in part; but it is manifest that my improvements are applicable to other fire-boxes of the same character.

a is the tube-sheet. *b* are the flues. One or more of these flues—for example, *c*—is used to conduct fresh air back into the fire-box when the engine is in motion and the fire burning. This conducting-tube is not of itself new, for a similar arrangement at least is to be found in spark-arresters. This air-conductor has a flaring mouth, *d*, at the front of the engine, to facilitate the admission of air. Another method of introduction for the fresh air is seen in Fig. 1, where the aperture *e* is made in the front of the boiler, and an inner shield, *f*, over the inner head of the aperture, the air entering at *g*. The air is then received at *h*, and from there conducted to the fire. Being conducted by the flues or pipes (as *c*) to the fire-box, the air is then placed, disseminated, and injected into the products of the fire on the grate by certain devices which I will now describe.

An arrangement of surfaces like that shown at *i* receives the air from *c*, and through the punctures scatters it into and among the smoke and gases just before they enter the flues *b*, thus promoting a high degree of heat as the flames enter the flues. This arrangement has a comparatively large center pipe, from which project those of smaller diameter. These are arranged so as not to cover the mouths of the flues or interfere with the cleaning of the same. The ends of these pipes may be open or closed, or the open ends contracted in size, as desired, so as to increase the exit of air through the punctures. This device is set forward of the tube-sheet as far as desirable to accomplish its work, being connected to a tube, like *j*, which tube fits into the end of the flue used for an air-conductor, like *c*.

Through this device the air is drawn and projected into the smoke and gas above the flame produced by the fire on the grate. This current of air through the tube or tubes, and through the distributer into the flames, is due, first, to the vacuum formed in the fire-box by the exhaust of the engine, and, second, in some measure, to the forward movement of the engine.

In case the locomotive fire-box boiler be stationary, a forced blast may be applied to the conductors.

By the agency of the two forces above named, and principally the first, a strong current of entering air is produced, and this is mixed with the products of combustion on the grate in the form of jets or streams issuing through the punctures.

Another form of device is seen at *k*. In this form there is a hub or center with radiat-

ing perforated arms, either closed at their ends or with small holes, so as to force the air through the small perforations. The hub has a hole at the center, in front, if desired.

Figs. 4 and 5 show merely other forms of the same device. In Fig. 4 the air comes out between two disks, and is then carried backwardly by the draft, and, mingling with the smoke, thus aids in the combustion. In Fig. 5 the air is thrown out through the hole in the center of the disk, and a part passes over the edges of the same and part through the holes in the disk as it is carried backwardly by the draft. With Figs. 4 and 5 it is necessary that they be carried a little farther forward into the fire-box, inasmuch as the air for the most part from them is delivered not in fine jets or streams, but in sheets or strata. This manner of delivering the air only requires that it be made to dwell a little longer with and among the smoke and gases to accomplish the desired result.

In all these forms the surfaces to place and disseminate the air are placed in front of the tube-sheet, so as to well mingle with the smoke a little before it reaches the flues, and thus to produce flame by its commingling before it enters the flues.

These devices are so arranged as to be removable from the flues, and admit of placing the air at any desired point in the fire-box. They can be arranged to stand in vertical or horizontal planes, as may be found most efficient. This admission of the air in locomotive-engines over the consuming fuel on the grate serves another purpose besides that of inciting a new and additional combustion. It affords a relief from the vacuum and great draft in the fire-box. This is sometimes strong enough, when the fuel is compact on the grate, to lift the whole mass of the fuel from the grate, which, of course, disturbs the fire and chokes the flues.

Devices of the kind herein referred to are adapted to any kind of fuel—wood or coal. Such difference or change in form or position as might be required for wood instead of coal will readily occur to the mechanic, and can be easily made.

The draft, while it increases combustion to a certain extent, hastens the exit of unconsumed smoke and gases from the fire-box.

My invention introduces additional air in a direction contrary to the draft, and thus retards somewhat the passage of smoke and gases, and gives time to mingle them with the air and for their further consumption. In proportion as the air is let in in a divided or comminuted condition it heats up and acts with greater readiness.

It will be seen that my invention is operative to place positively, by tubes or inclosures, the air into the smoke and gases in such quantities, form, and manner as may be most efficient and desirable to promote combustion, increase the heat, improve steam-making power, and effect economy of fuel.

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

In combination with the flues, as set forth, the air-distributing devices shown in Figs. 3, 4, and 5, made, as described, with tubes to fit into the flues, and removable therefrom, and located just in front of the mouths of the flues, as set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JOS. L. WINSLOW.

Witnesses:
WILLIAM HENRY CLIFFORD,
CHARLES E. CLIFFORD.