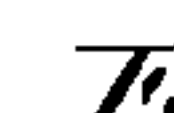


No. 148,426.

A. O. DENIO.
Locomotive and Other Boilers.

Patented March 10, 1874.

A



I



Thomas M^o Sloan

Horsen and Son

UNITED STATES PATENT OFFICE.

ASA O. DENIO, OF WILMINGTON, DELAWARE, ASSIGNOR TO HIMSELF,
EDWARD RUSHTON, AND STILLMAN A. HODGMAN, OF SAME PLACE.

IMPROVEMENT IN LOCOMOTIVE AND OTHER BOILERS.

Specification forming part of Letters Patent No. **148,426**, dated March 10, 1874; application filed
January 7, 1874.

To all whom it may concern:

Be it known that I, ASA OBER DENIO, of the city of Wilmington, county of New Castle, State of Delaware, have invented an Improvement in Locomotive and other like Boilers, of which the following is a specification:

The main object of my invention is to control the draft in a locomotive or other tubular boiler without interfering with the free exhaust of the engines; and this object I attain by means of a series of vanes placed in the smoke-box between the exhaust-pipe and the tube-sheet of the boiler, as shown in the longitudinal section, Figure 1, the sectional plan, Fig. 2, and the transverse vertical section, Fig. 3, of the accompanying drawing.

A represents part of the shell of a locomotive-boiler; B, the rear tube-plate; and E, the smoke-box, within which are secured two frames, D D, and to each frame are pivoted a series of vertical vanes, *a*, the vanes of one frame being connected together by a cross-bar, G, and those of the other frame by a cross-bar, G'. One of these bars is connected to one arm, and the other to the other arm, of a lever, H, which is hung to a pin connected to the frames. A third arm of the lever is connected by a rod, I, to an attachment, J, by which two horizontal vanes, *a'*, are connected together, the latter frames being pivoted to continuations *e e* of the two frames D D. A rod, K, extends from the upper arm of the lever H to an arm, M, on a vertical shaft, *m*, adapted to a bearing, N, attached to, and extending through, the shell of the boiler, on the outside of which the shaft has an arm, *n*, a rod connected to which extends to the opposite end of the boiler, so as to be within reach of the engineer, who is thus enabled to partially open, or entirely close, the vanes. The products of combustion from the tubes are prevented from passing below the frames D by a plate, *q*, which connects the lower edges of the said frames with the shell of the boiler.

Although the vanes *a* and *a'* are shown in the drawing, and have been described above as being movable, and although I prefer to so arrange the vanes that they will be under the immediate control of the attendant engineer, the objects of my invention may be partially attained by stationary vanes, providing they be arranged at about the angle shown in the

drawing, for such stationary vanes would serve the purpose of directing the products of combustion to a central point in the smoke-box, where they will be brought under the direct influence of the exhaust steam, and the stationary vanes would serve the additional purpose of retaining the heat in the tubes, and of so neutralizing the violent action of the exhaust as to prevent the usual masses of fuel from being drawn from the fire-box and through the tubes. I prefer, however, to make the vanes movable, so as to be readily controlled by the engineer, who, in some cases, may find it advisable to entirely close the vanes, thus preventing the products of combustion from escaping into the smoke-box, excepting through the slight vent presented by the opening between the two frames, which will insure sufficient draft to induce the fuel to burn slowly. In other cases the vanes may be opened to a very limited extent, and others to the extent illustrated in the drawing, but it will rarely be necessary to open the vanes to a greater extent than is there shown.

It will be seen that the engineer, by means of these vanes and their connections, has complete control of the draft, which is regulated at a point between the tube-sheet and exhaust-nozzles, so that there can be no necessity for restricting the free exhaust of the steam under any circumstances.

My invention, it will be evident, is applicable to vertical and other tubular boilers, as well as to locomotives.

I claim as my invention—

1. The vanes *a* and *a'*, arranged in the manner described, so as to direct the products of combustion to a central point in the smoke-box.

2. The combination of the frames D D and their vanes *a a*, cross-bars G G', the vanes *a'*, and lever H, and mechanism, substantially as described, for operating the vanes simultaneously through the said lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ASA OBER DENIO.

Witnesses:

H. S. TRUITT,
JNO. HENRY PUHL.