J. ENRIGHT & J. L. HEALD.

Steam-Boiler Furnace.

No. 203,253. Patented May 7, 1878.

Fig. I.

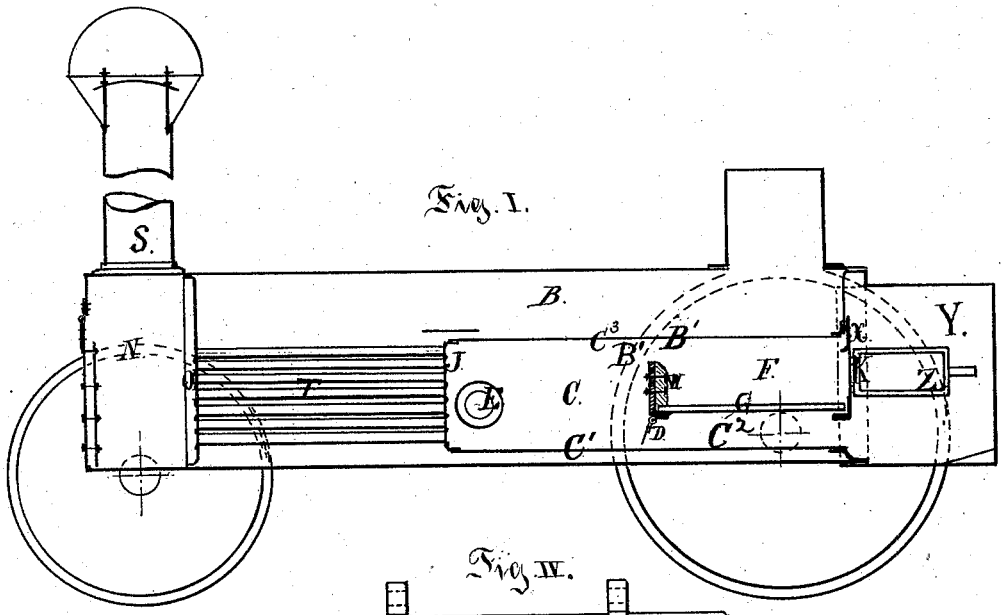


Fig. IV.

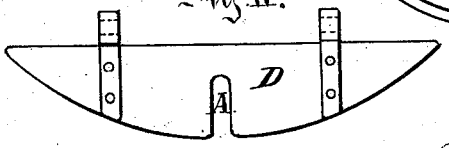


Fig. III.

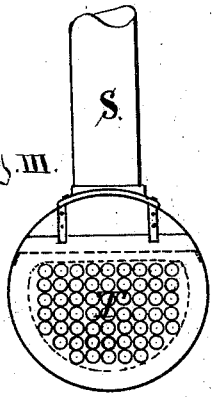
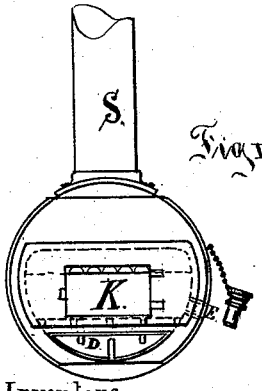


Fig. II.



Witnesses.
Chas. F. Wilcox.
John W. Ryland

Inventors.
Joseph Enright
John Loring Heald
R. S. & A. P. Lacey
Attys

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH ENRIGHT, OF SAN JOSÉ, AND JOHN L. HEALD, OF VALLEJO, CAL.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **203,253**, dated May 7, 1878; application filed March 11, 1878.

To all whom it may concern:

Be it known that we, JOSEPH ENRIGHT, of San José, Santa Clara county, State of California, and JOHN L. HEALD, of Vallejo, Solano county, State of California, have invented new and useful Improvements in Steam-Boilers and Furnaces; and we do hereby declare the following description and accompanying drawings sufficient to enable any person skilled in the art or science to which they most nearly appertain to make and use our said invention without further invention or experiment.

Our invention consists in the peculiar manner of arranging the grate and its bridge-wall within the combustion-chamber or fire-box of the boiler, and in an automatically-swinging door, which separates the combustion-chamber from the ash-box, as will be hereinafter fully set forth and described.

It will not do to drop the combustion-chamber below the line of the bottom of the furnace, as the clinkers could not be raked out, consequently could not be used for a straw-burner; nor would it do to have the bottom of the combustion-chamber above the grates, as the clinkers in that case could not be raked out without choking the grates and thereby impeding the draft, and making it useless as a straw-burner.

We are aware that combustion-chambers have been used in some locomotives, which, being above the grate-bars, would not do for the purpose of burning straw as fuel for the above reasons.

By our experiments we have demonstrated the fact that by making a large combustion-chamber between the bridge-wall of furnace and the tube-sheet of the boiler, having an area about equal to the furnace proper of the boiler, we are enabled to cause almost perfect combustion when using straw as a fuel.

Under the bridge-wall, in rear of the furnace, we place a swinging door, to prevent too much air entering the combustion-chamber under the bridge-wall, which swings in and out freely, it having a slot in the center. The object of this slot is to allow the scraper-handle to pass in and out freely without catching the door while removing the cinders and clinkers from the combustion-chamber, which accumulate while running when using straw as a fuel to supply steam to a portable thrashing-engine in the harvest-field.

Heretofore the difficulty encountered with ordinary fire-box boilers has been that they have had short fire-boxes and no combustion-chambers; consequently it was impossible to cause perfect combustion before the straw matted against the tubes, choking them up to such an extent that it was not possible to keep up steam continuously with sufficient power to drive a thrashing-machine successfully in the harvest-field.

We make, for convenience, one or more apertures, E, through the boiler into the combustion-chamber near the tube-sheet, through which can be inserted a small scraper or brush at intervals, to clean the tube-sheet, which entirely remedies one of the difficulties heretofore existing in keeping up steam in ordinary fire-box boilers with straw as a fuel.

Another of the difficulties heretofore existing in burning straw in common fire-box boilers has been that sufficient air could not be admitted through the doors without causing the straw being carried unburned against the tube-sheet, thus causing the choking of the tubes in consequence of not having a combustion-chamber in which a sufficient amount of air could be introduced to cause combustion before reaching the tube.

We attached to our cylindrical combustion-chamber a safety-apron, enabling us to fire with an open door, by which means we admit a large volume of air through the furnace and over the bridge-wall into the combustion-chamber, where it mixes with the gases, and causes almost perfect combustion. The products of combustion then pass from the combustion-chamber, through the small direct tubes, to the smoke-box in front, thence to the smoke-stack, in which we use a spark-breaker and over which we use a spark-catcher.

Many efforts have been made to invent a steam-boiler and furnace to burn straw as a fuel, so that it would generate steam to run a portable engine to its full capacity while thrashing grain in the harvest-field; but it has been found it could not be done without opening the door to clean out the unburned straw while running, which is dangerous, on account of setting fire to the stubbles, and is

also detrimental to the boiler, on account of causing the tubes to leak by the cold air coming in contact with them. The removing of the unburned straw caused by incomplete combustion has been done heretofore by stopping the engine, which is a great loss of time.

Heretofore it has not been found possible to generate steam in sufficient quantity to run a portable thrashing-engine to its full capacity while using straw as a fuel in the harvest-field without occasionally stopping down the engine to clean out, or by opening the doors to clean out the unburned straw while running, which has been found objectionable.

By our construction of a cylindrical combustion-chamber steam-boiler having a semicircular furnace, as heretofore described, we have demonstrated the fact by actual experiments that it can generate sufficient steam to run a portable engine to its full capacity, and continuously, without stopping the engine from any defect caused by incomplete combustion while using straw as a fuel; and we are also enabled by our construction to remove any clinkers and cinders which may collect in the combustion-chamber and furnace and on the face of the tube-sheet while running without stopping the engine or causing any injurious effect to the boiler whatever, which is a great saving of time and expense.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a steam-boiler and furnace for burning straw as fuel, the grate G, supported centrally in the chamber B′, so as to form the furnace F and ash-box C^2, bridge-wall W, arranged at the rear end of the grate, door D, hinged to the under edge of the bridge-wall, so that it will swing freely inward or outward, and extended combustion-chamber C, all arranged substantially as and for the purposes set forth.

2. The door D, provided with the slot A, and hinged to the under edge of the bridge-wall W, adapted to have a free automatic swinging movement in either direction, and arranged to separate the combustion-chamber C from the ash-box C^2, substantially as set forth.

JOSEPH ENRIGHT.
JOHN LORING HEALD.

Witnesses:
CHAS. F. WILCOX,
JOHN W. RYLAND.