J. E. WOOTTEN.

LOCOMOTIVE FURNACE.

No. 175,847. Patented April 11, 1876.

Fig. 1.

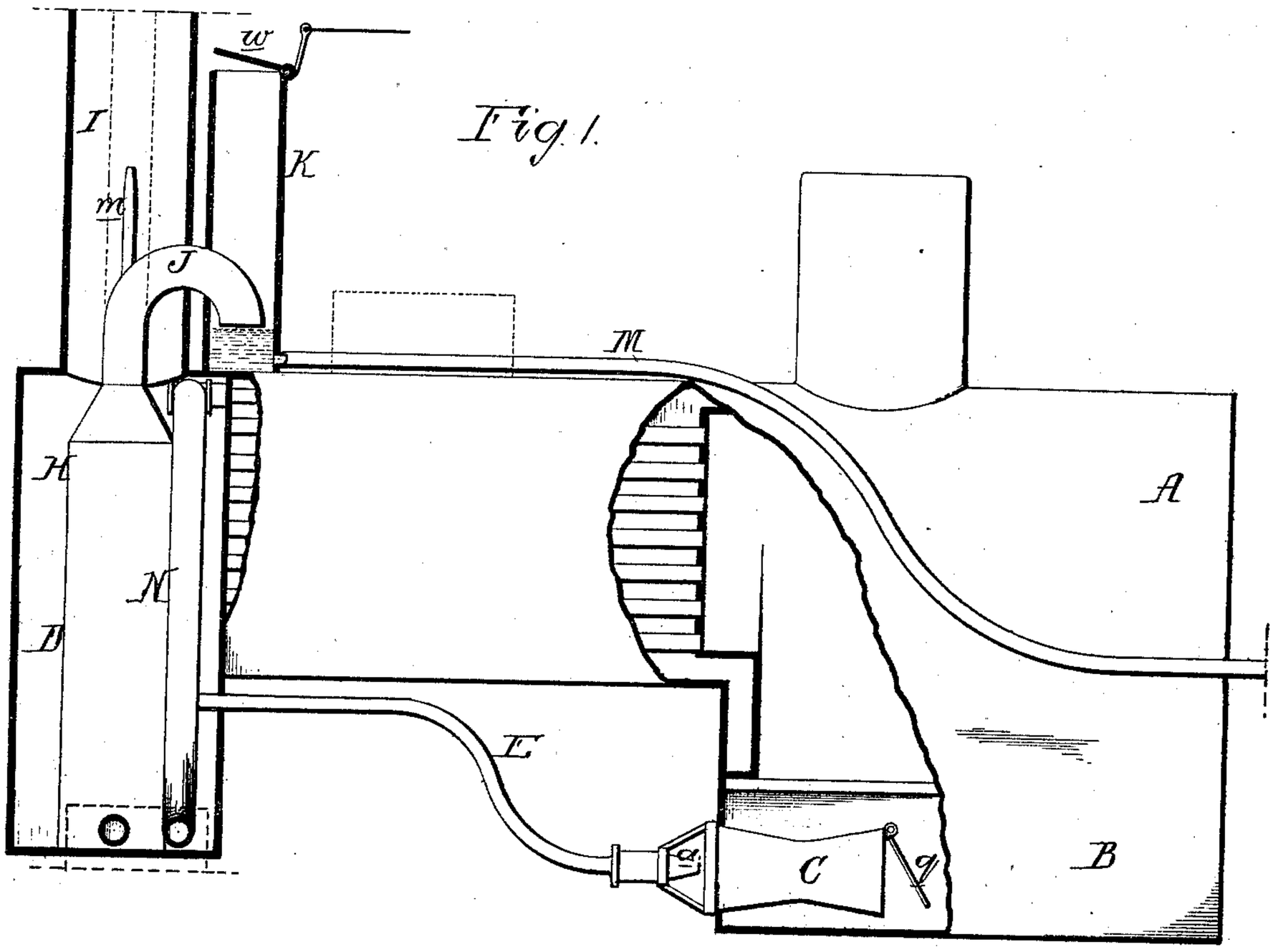
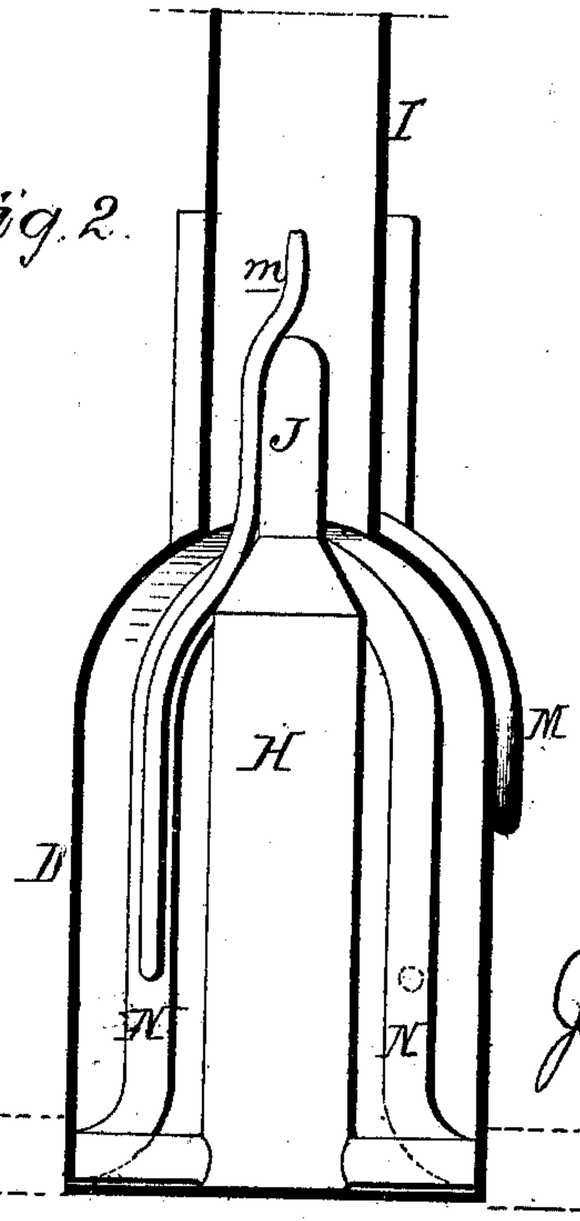


Fig. 2.



Witnesses,
Harry Howson. Jr
Harry Smith

John E. Wootten
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

JOHN E. WOOTTEN, OF READING, PENNSYLVANIA.

IMPROVEMENT IN LOCOMOTIVE-FURNACES.

Specification forming part of Letters Patent No. **175,847**, dated April 11, 1876; application filed February 1, 1876.

To all whom it may concern:

Be it known that I, JOHN E. WOOTTEN, of Reading, Pennsylvania, have invented certain Improvements in Locomotives, of which the following is a specification:

My invention is directed to the remedying of acknowledged defects in those features of a locomotive-engine which relate to the combustion of fuel and the disposal of the sparks. These defects are the constant disturbance and tearing up of the fuel, caused by the intermittent blasts of exhaust steam, and resulting not only in the waste of fuel but in injury to the tube sheets, and abrasion and rapid destruction of the tubes.

Heretofore the exhaust steam of locomotive-engines has been usually utilized by causing it to create a draft for supporting combustion and for clearing the tubes and disposing of the sparks, and, to a limited extent, for heating the feed-water, but the advantages thus gained have always been accompanied with the evils above referred to.

I have discovered and determined by practical tests that a much more uniform and economical burning of the fuel can be accomplished without the aid of the exhaust steam and by the simple use of an induced and continuous blast of air beneath the fire-grate, combined with a steady jet or jets of live steam in the chimney, which cause a draft of sufficient intensity to induce the entire products of combustion to pass through the flues, even should the furnace-doors be open.

The result of this combination is the uniform, economical, and quiescent combustion of the fuel and the prevention of violently-emitted sparks, which have such a detrimental effect on the tubes of ordinary locomotive-boilers.

In the accompanying drawing, Figure 1 is a side view, partly in section, of sufficient of a locomotive-boiler to illustrate my invention, and Fig. 2 a view of the smoke-box end of the boiler.

A is the fire-box of the boiler; B, the ash-pan, which should be closed excepting at the inducting-pipe C, through which air is caused to pass by a jet from a steam-nozzle, *a*, communicating through a pipe, E, with one of the steam-pipes N of the engine, at a point between the usual throttle-valve and the steam-chest, so that when the said throttle valve is closed the escape of steam at the nozzle *a*, and consequently the introduction of air under pressure to the ash-pan, ceases.

It should be here understood that although I have alluded and shall hereafter allude to but one induction-pipe, C, and one steam-nozzle, *a*, two, three, or more pipes and nozzles may be used. It should be also understood that each induction-pipe is furnished with a self closing valve, *q*, and also with regulating devices.

In the present instance I have shown in the smoke-box D of the boiler a feed-water heater, H, through which the exhaust steam passes, and which may be similar to those in common use, but, although I prefer to use this heater, it is not essential to my invention.

The exhaust steam, instead of being discharged into the chimney I, as usual, passes through a pipe, J, into a stand-pipe, K, which is, by preference, furnished at the top with a suitable valve, *w*, under the control of the engineer.

The pipe J is bent downward within the pipe K, or is otherwise so arranged as to prevent the direct upward escape of the steam. The water of condensation is thus projected downward while the vapor escapes through the top of the pipe when its valve is open. This water of condensation passes through a pipe, M, into the tender, and by closing the valve *w* the vapor, which would otherwise escape into the atmosphere, will also be forced through the pipe M into the tank of the tender.

The length of time during which the valve may remain closed will depend upon the condition of the water in the tender as regards temperature.

The pipe *m* for injecting live steam into the chimney may be connected to one of the steam-pipes N N, as shown in Fig. 2, the connection being, by preference, at a point between the throttle-valve of the engine and the steam-chest, so that on closing the said throttle-valve the discharge of the live steam into the chimney will cease.

As before remarked, I prefer the use of a feed-water heater in the smoke-box, as the

greatest heat will be there imparted to it. An additional heater may however be placed on the boiler, as indicated by dotted lines, and through this heater the steam and water can circulate after passing from the waste-pipe K, and before it reaches the tank of the tender. It is preferable that the heater or heaters should be interposed between the force-pump of the engine and check-valve of the boiler.

I may state, in conclusion, that even if the exhaust steam be discharged into the atmosphere in such a manner that it cannot influence the draft—for instance, if it is caused to pass directly through and above the chimney, as shown by dotted lines in Fig. 1—the introduction of air under pressure into the closed ash-pan, in connection with the draft induced by the continuous jet of live steam into the chimney in place of the intermittent blasts of exhaust steam, will result in the economizing of fuel, for the products of combustion, instead of rushing through the tubes with intermitent impulses, as usual, will take such a steady and comparatively slow course through the said tubes that their heat will be effectually absorbed.

A further economy of fuel is, however, insured in utilizing the exhaust steam thus relieved from its usual function of promoting the draft, by using it as a medium for heating the feed-water and causing it, by condensation, to contribute to the supply of heated feed-water.

I wish it to be understood that I do not desire to claim, broadly, either separately or in combination, the introduction of air under pressure into a closed ash-pan, or the introduction of a jet of live steam into the chimney; but

I claim as my invention—

1. The mode herein described of burning fuel in and preventing the emission of sparks from locomotive-boilers—that is to say, by forcing, by means of a jet or jets of live steam, a continuous blast of atmospheric air into a closed ash-pan, and by introducing into the chimney a continuous jet or jets of live steam sufficient in force or volume to prevent the escape of the products of combustion through the door of the furnace when open, but insufficient to cause the emission of sparks from the chimney, all as set forth.

2. The combination of the closed ash-pan and air-pipe C with a nozzle, *a*, communicating with a steam-pipe of the engine at a point between the steam-chest and throttle-valve so that the introduction of air under pressure into the ash-pan shall cease simultaneously with the cutting off of steam from the engine, as specified.

3. The combination of the chimney with a pipe communicating at one end with a main steam-pipe of the engine, at a point between the throttle-valve and steam-chest, and terminating at the upper end in a nozzle, nozzles, or other devices for discharging a jet or jets of live steam into the said chimney when the throttle-valve is open.

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

JOHN E. WOOTTEN.

Witnesses:

HARRY HOWSON, Jr.,

HARRY SMITH.