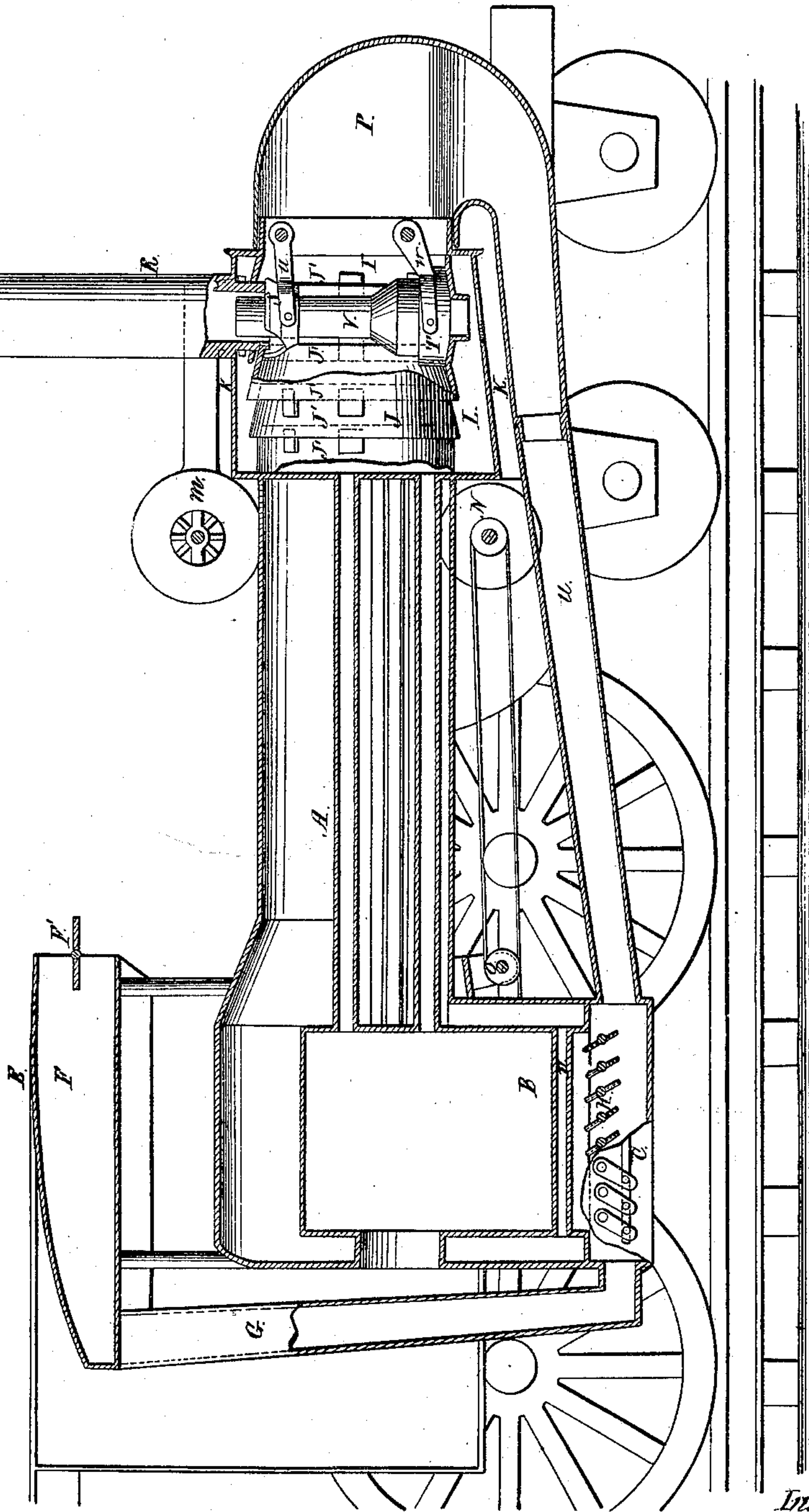


*J.S. Mullen.*

*Steam Generator.*

*N<sup>o</sup> 86,435.*

*Patented Feb. 2, 1869.*



*Witnesses:*  
*Chas. Becker*  
*Wm. A. Morgan*

*Inventor:*  
*J.S. Mullen*  
*Attorneys*



# United States Patent Office.

JOHN S. MULLIN, OF NEWARK, NEW JERSEY.

Letters Patent No. 86,435, dated February 2, 1869.

## IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, JOHN S. MULLIN, of Newark, in the county of Essex, and State of New Jersey, have invented a new and useful Improvement in Locomotive and other Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to new and useful improvements in steam-boilers for locomotive and other engines; and

It consists in providing means for consuming the sparks and gases generated during the combustion of the fuel, by forcing the products of combustion from the smoke-chamber or base of the chimney back to the fire-box in combination with atmospheric air.

It also consists in means provided for supplying the fire with air by other means, and in a perforated adjustable diaphragm beneath the grate-bars, and in an air-chamber around the smoke-chamber, supplied with air by a blower attached to the boiler, and also in dampers or valves, so arranged as to confine the heat and gases, all as hereinafter more fully described.

My object in this invention is to do away with not only the smoke and cinder nuisance, but to avoid all danger of fire from sparks, and to save fuel, by producing a perfect combustion of the smoke and gases.

The drawing represents a longitudinal vertical section of a boiler constructed according to my invention, the improvements being (as will be observed) attached to the boiler, and not relating to its internal formation.

A is the boiler.

B is the fire-box.

C is the ash-pit.

D represents the hollow grate-bars, connected with the water-legs or lower portion of the boiler.

The roof of the cab E is hollow, as seen at F, and provided with a valve, F'.

G represents one or more tubes, connected with F, and with the ash-pit C.

In the forward movement of the locomotive, air will enter the chamber F, and be discharged into the ash-pit under the adjustable perforated diaphragm H, formed and operating similarly to a Venetian blind.

I is the smoke-chamber, which contains an open cylinder, J, formed of a succession of conical rings, which are connected together by the plates J'.

The inner edges of the rings lap by, as indicated by the dotted lines.

Between the outer casing K and this open cylinder is an annular air-chamber, L, into which air is forced by one or more rotary blowers, m, which blowers are driven by belts from pulleys and shafts connected with the engine or wheels of the locomotive in any convenient manner.

N O represent pulleys for this purpose.

It will be seen that the air which is thus forced into the annular chamber L will take a direction toward the bonnet P, which covers the mouth of the open cylinder

J and smoke-chamber I, and conducts (when the chimney R is closed by the sliding valves or dampers S and T) not only the air thus driven in, but the products of combustion into the tube U, which discharges them into the ash-pit C, beneath the Venetian-blind diaphragm H.

The slats of this diaphragm are perforated with small holes, so that the air, smoke, and combustible gases will be discharged upward, and in contact with the fuel on the grate-bars in fine jets, so that the same will be consumed, while the cinders and ashes or other incombustible matter will be retained in the ash-pit, from which they may be removed as often as may be necessary.

The valves or dampers S and T are operated by means of rods attached to the arms u, by the engineer or fireman.

These valves or dampers close the apertures or cut off communication between the smoke-chamber I and the chimney, and it will be seen that they may be adjusted so that more or less of the air, gases, and smoke may be discharged directly into the chimney, or retained and forced into the fire-box through the channel U.

For retaining the heated gases in the boiler-tubes, fire-box, and smoke-chamber, a proper gate or damper may be arranged in the tube or channel U, or in any other desired position.

The direction given to the current of air from the blowers m, by the conical rings J, (or open cylinder J,) will cause sufficient vacuum in the smoke-chamber to produce all the draught required.

But the steam-exhaust, (which is discharged into the smoke-stack through the pipe V in the ordinary way,) may be used, when desired, for the purpose of increasing the draught, by opening the upper damper S.

It will be seen that the chimney proper is placed on the smoke-chamber, and that the pipe V is of less diameter, leaving an annular opening, which is closed or opened by the damper S.

As this pipe V passes up into the chimney some distance, the opening of the damper would produce the same effect as in ordinary cases.

I claim as new, and desire to secure by Letters Patent—

1. The construction of the cylinder J of conical rings, and its arrangement with reference to the blower m, pipe V, valves S and T, bonnet P, and channel U, substantially as set forth.

2. The air-chamber F, combined with the cab of the locomotive, with air-tubes G combined with the ash-pit, whereby a current of air is forced into the ash-pit by the forward motion of the locomotive, substantially as described.

3. In combination with the steam-generator fire-box, when devices are employed for forcing air or gases beneath the fire-grate, the adjustable perforated Venetian-blind diaphragm H, substantially as described.

J. S. MULLIN.

Witnesses:

FRANK BLOCKLEY,  
ALEX. F. ROBERTS.