

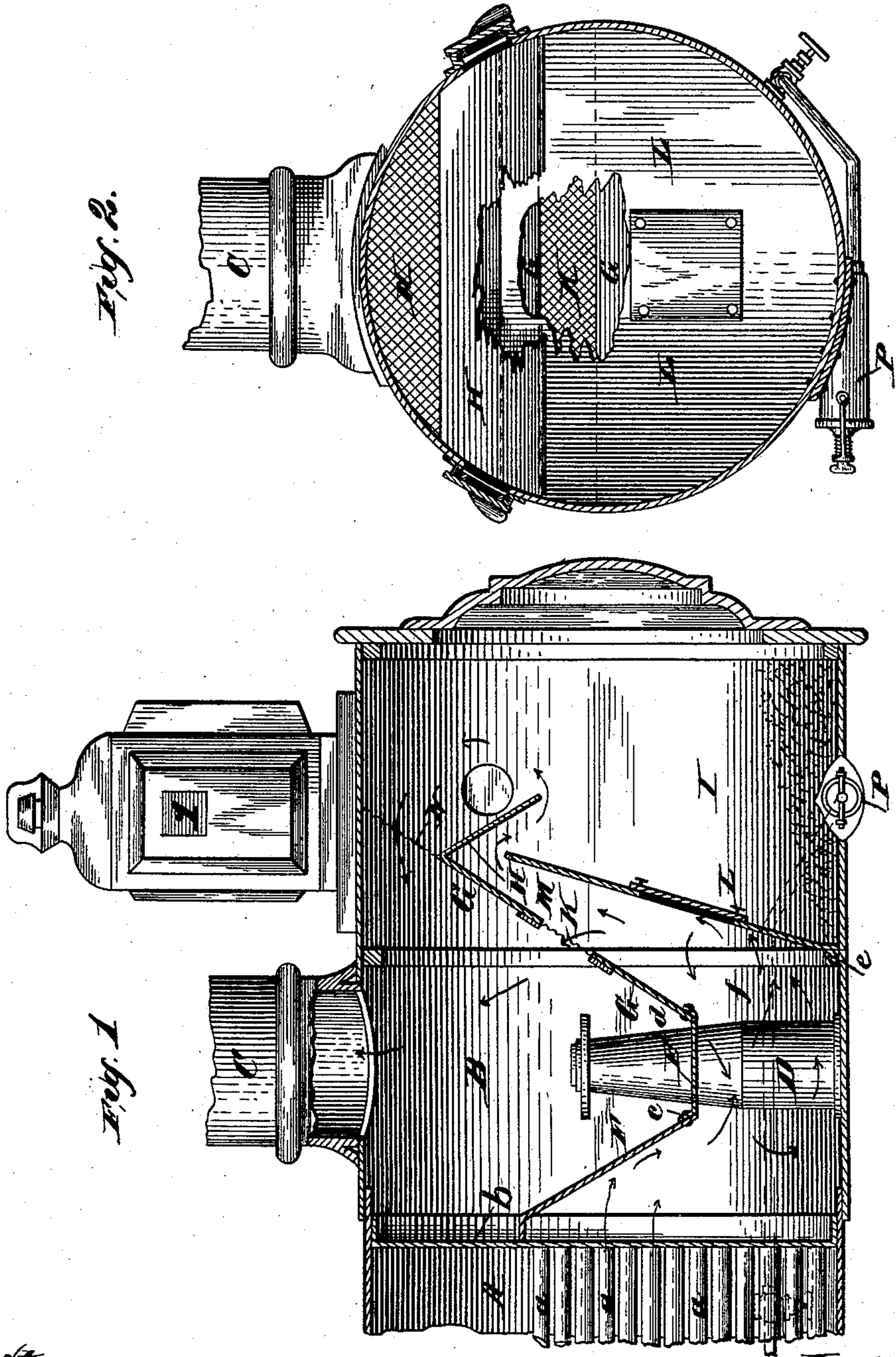
(No Model.)

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METHOD OF PROMOTING COMBUSTION AND EXTINGUISHING SPARKS.

No. 387,623.

Patented Aug. 14, 1888.



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UNITED STATES PATENT OFFICE.

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METHOD OF PROMOTING COMBUSTION AND EXTINGUISHING SPARKS.

SPECIFICATION forming part of Letters Patent No. 387,623, dated August 14, 1888.

Application filed May 10, 1888. Serial No. 273,384. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. COLEMAN, a citizen of the United States, residing at Cornwall, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Promoting Combustion and Extinguishing Sparks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a method of promoting combustion of fuel and extinguishing sparks in locomotive and other boiler furnaces, and has for its object a more thorough combustion of the gases in the fuel, which gives increased steaming capacity and admits of the use of larger exhaust-nozzles, which in turn effect economy of fuel, the reduction of back-pressure upon the piston of the engines, the extinguishment of sparks, and a reduction in the quantity and size of the cinders drawn from the furnace or fire-box and deposited in the uptake or smoke-box.

Under the ordinary construction of locomotive and other boiler furnaces the passage for the main draft is so short and the draft induced by the pulsation of the exhaust-nozzle so sharp that a large percentage of the combustible gases of the fuel escapes through the smoke-stack unconsumed and is wasted, and the fire is so violently agitated that lumps of coal are drawn into the flues in such quantities as to clog them and greatly impair their utility.

By a series of practical experiments I have demonstrated that the present defects enumerated may be remedied by detaining the gases in the fire-box and flues until the combustible matter in the gases has been consumed. This I have accomplished by cushioning the gases as they are emitted from the flues upon a body of gases in motion, forming eddies in the smoke-box, and creating counter-currents in the ends of the flues adjacent to the smoke-box, which react and back up the heat and gases in the fire-box and flues until a thorough combustion of the gases has been effected. I have also extended the passage for the main draft, whereby the refuse gases and solids form circumflex currents, are detained within the

smoke-box longer and the sparks extinguished, and increased the size of the exhaust-nozzle, whereby back-pressure of the engines is greatly diminished.

The invention will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, which form part of this specification, I have represented a construction capable of carrying out my improved method, and in which—

Figure 1 represents a vertical longitudinal section, and Fig. 2 is an end view with the cover of the smoke-box removed.

Reference being had to the drawings and the letters marked thereon, A indicates the boiler, which is provided with the usual fire tubes or flues, *a*, which are secured at their outer ends in the tube-sheet *b* in any approved manner.

B is the smoke-box, which is provided with a stack, C, and D indicates a nozzle for the exhaust of the engines, or two nozzles may be used, if desired.

E is a horizontal nozzle-plate through which the exhaust nozzle or nozzles project and crosses the smoke-box. On each side of the plate are formed flanges *c d*, to which a deflecting-plate and a channel-plate are secured respectively.

F is a deflecting-plate secured to the tube-sheet above the upper flues, projects forward and downward, crosses the smoke-box, and is secured at its lower edge to the flange *c* of the plate E.

G is a channel-plate located in front of the exhaust-nozzle, crosses the smoke-box, and extends upward and forward at an angle to the bottom of the smoke-box, and is secured at its lower end to the flange *d* of the plate E. The upper end of the channel-plate is bent forward and downward and forms a baffle-plate, H, for arresting any solid matter drawn from the fire-box and directing it down into the cinder-pit I. The angle-plate is provided with a perforated section, K, made of wire-gauze or perforated sheet metal, and affords a means of egress for a portion of the waste gases.

L is a dead-plate secured to the ring *e*, projects forward and upward, and, in conjunction with the angle-plate, forms an extended passage, M, for the refuse gases and solid matter

emitted from the flues. The space between the apex of the channel-plate and the crown of the smoke-box is filled with a section, N, of wire-gauze or perforated sheet metal.

5 The angles and relative positions of the several parts of the construction shown may be varied without affecting the spirit of my invention; but while such variations may affect one part of the operation favorably they may
10 not act as favorably upon other parts. For example, the dead-plate may set nearer vertical. This will increase the propensity of the gases impinging upon it to form eddies and back up the heat and the gases in the fire-box
15 and the tubes longer; but it will render it more difficult for the circumflex current of gases to carry the refuse solid matter over the dead-plate into the cinder-pit I.

20 The cinder or solid refuse matter is removed from the cinder-pit by means of an ejector, P, or by any other suitable device.

The operation is as follows: Refuse gases and solid matter emitted from the flues *a* are deflected downward by plate F, pass forward
25 and strike against the dead-plate L with sufficient force to break the solid matter into very small particles, and form eddies of the gases, as indicated by the arrows *f*, and upon these gases in circular motion the gases continually
30 issuing from the flues are cushioned, which causes them to react and form counter-currents in the outer ends of the flues, which retards the gases and backs them up in the fire-box and flues until the combustible matter is thor-
35 oughly consumed. The draft created by the stack and the exhaust-steam causes the refuse gases and solid matter to rise in the passage M and form a circumflex current as they pass under the baffle-plate H, and as the gases pass
40 on out through the wire-gauze section N this current carries the solid matter over the dead-plate into the cinder-pit I, while a portion of the gases makes its exit through section K of the channel-plate to the stack.

45 Practical operation of my invention on engines running on heavy grades has demonstrated the fact that the fires are not torn or agitated, no large pieces of coal are carried into the flues, a large percentage of fuel is

50 saved, and water is economized, while the exhaust-nozzles have been enlarged, resulting in diminishing the back-pressure upon the engines, and the solid refuse matter from the fuel has been so disintegrated and carried so long a distance before it could escape that very few
55 particles escape in a state of ignition, and those which do escape are so fine that all fire is extinguished and they are entirely harmless before they reach the ground, and the cinders usually carried forward into the smoke-box
60 on the same engines have been very largely and materially reduced.

The construction shown in the drawings is claimed in my application filed herewith, Serial No. 273,385.

65 Having thus fully described my invention, what I claim is—

1. The method of effecting thorough combustion in furnaces, which consists in discharging the waste products of combustion
70 from a furnace upon or into other like products between the furnace and the stack in motion, and forming eddies and reactionary currents backing up or retarding the heat and gases in the furnace and flues, then conducting
75 the refuse matter to a suitable receptacle and separating the gases from the solids, substantially as described.

2. The method of effecting thorough combustion in furnaces, which consists in discharging the waste products of combustion
80 from a furnace upon or into other like products between the furnace and the stack in motion, and forming eddies and reactionary currents backing up or retarding the heat and
85 gases in the furnace and flues, disintegrating the solid matter, then conducting the waste to a suitable receptacle, and separating a portion of the gases from the solids in their passage, and finally depositing the solid matter and
90 conducting the remaining gases to the atmosphere, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBT. H. COLEMAN.

Witnesses:

A. HESS,

LEWIS REHR.