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PATENTED MAR. 6, 1906.

F. A. LEWIS.  
APPARATUS FOR PREVENTING SMOKE.

APPLICATION FILED MAR. 22, 1905.

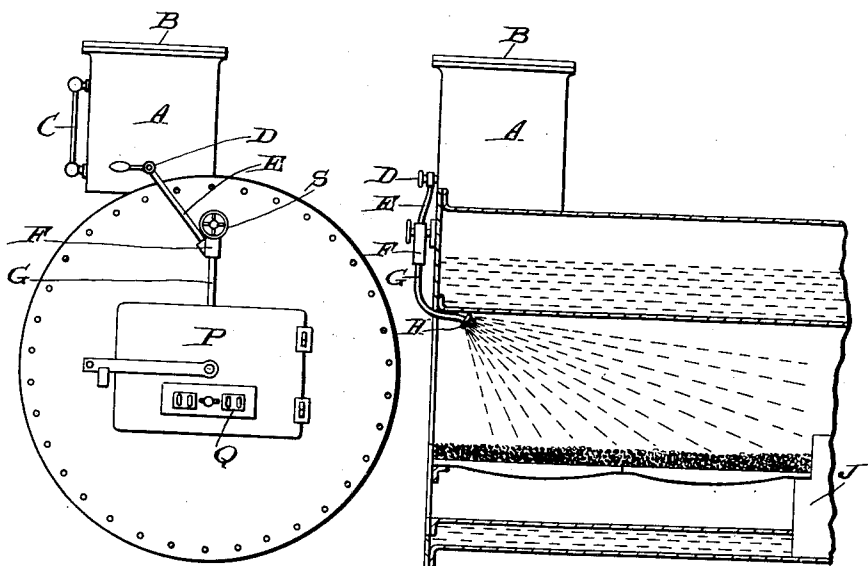


Fig. 1.

Fig. 2.

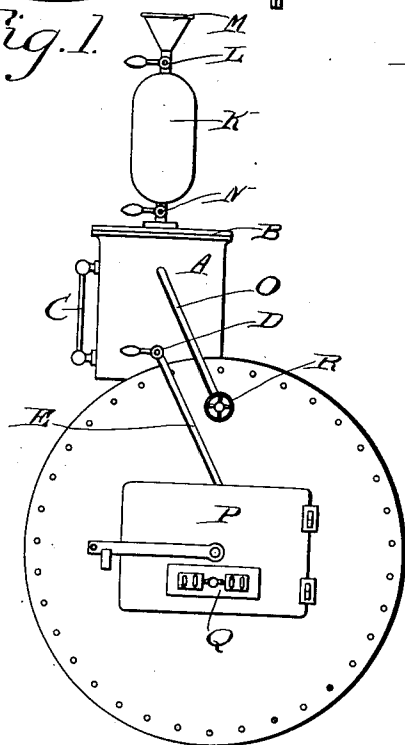


Fig. 3.

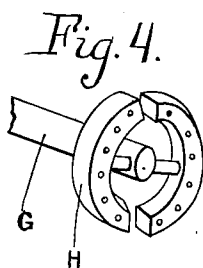


Fig. 4.

witnesses:

J. M. Fowler Jr.  
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# UNITED STATES PATENT OFFICE.

FREDERICK ALBERT LEWIS, OF MELBOURNE, VICTORIA, AUSTRALIA.

## APPARATUS FOR PREVENTING SMOKE.

No. 814,550.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed March 22, 1905. Serial No. 251,474.

*To all whom it may concern:*

Be it known that I, FREDERICK ALBERT LEWIS, manufacturer, a subject of the King of Great Britain and Ireland, residing at 339 Flinders Lane, Melbourne, in the county of Bourke, State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Apparatus for Preventing Smoke; and I do 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.

The object of my invention is to provide a cheap and effective means of arresting the smoke arising from the furnaces of vertical, horizontal, portable, stationary, or other classes of solid-fuel-fired steam-boilers. In the past a variety of devices have been used to this end; but with my invention, which is cheap both in its application and maintenance, the unconsumed fuel in a state of suspension in the furnace-crown is so attacked that combustion immediately occurs; but in order that my invention may be better understood I will now refer to the accompanying sheet of drawings, which are to be taken as part of this specification and read herewith.

Figure 1 represents a front elevation of a boiler with my invention applied thereto. Fig. 2 is a side sectional elevation through the boiler shown in Fig. 1. The fire-door frame and fire-door are removed. Fig. 3 is a front elevation of a modification. Fig. 4 is an enlarged perspective view of the nozzle attached to the lower end of the combined steam and liquid pipe.

Similar letters of reference indicate similar or corresponding parts where they occur in the several views.

My invention includes (when a spray consisting of solution and steam is projected over the fire) a solution-reservoir A. This reservoir is of any material and for convenience is placed upon the boiler-top or adjacent thereto, as shown in Fig. 1. On the top of this reservoir is a cover B, which may be attached to the said reservoir in any well-known way. When the cover is removed, the reservoir is charged with liquid. On the side of the said reservoir is a gage-glass C. By this the height of the liquid within the reservoir is disclosed, or instead of a gage-glass test-cocks may be applied to the side of the reservoir, or a float may be placed inside the said reservoir connected by a wire, chain, or

any other means to an indicator on the exterior of the said reservoir. Near the reservoir-bottom is attached a discharge cock or valve D. To this the inlet end of the discharge-pipe E is connected. The discharge end of the said pipe is affixed to a combination steam-valve S and injector F, placed upon the boiler-front. To the lower portion of the combination steam-valve and injector is attached the upper end of a combined steam and liquid pipe G. The lower end of this is attached to a spraying-nozzle H. This is situated in the crown of the furnace and near the fire-door top. It is so placed that it is nearest to the new-fired coal, and it may have extensions from which to redistribute the spray. The said spray may be either coarse or fine. The spraying-nozzle consists of right and left hand semicircularly-formed extensions. These bear against the furnace-crown and are preforated in such a manner that the spray may be distributed as far as the fire-bridge J. In the furnace-door P is an air-door Q. In the foregoing a solution (hereinafter described) and steam are sprayed over the fire.

In a modification (when the solution sprayed over the fire is unmixed with steam, but forced through by steam) the solution-reservoir A before referred to is under pressure. It has its cover B bolted or otherwise secured to its shell. To charge the reservoir when under pressure, there is attached to the cover a receiving-chamber K. This chamber is hollow, and above it is an inlet-cock L. Above the said cock is a funnel M. Below the said receiving-chamber is a discharge-cock N. From the boiler a steam-pipe O, having a stop-cock R thereon, is connected to the top of the reservoir, and the discharge-pipe E instead of communicating with a combination steam-valve S and injector F communicates direct with the spraying-nozzle H. With the above-mentioned parts the solution hereinafter described in an undulated form by steam is forced in a spray over the fire.

The liquid in the solution-tank is obtained by dissolving crystals of sodium nitrate ( $\text{NaNO}_3$ ) or Chilian or Peruvian saltpeter, cubic niter, sodæ nitras (L) in water. To this end there is added approximately one-half ( $\frac{1}{2}$ ) pound of crystals to one (1) gallon of cold water. This is mixed and then placed in the reservoir. Instead of sodium nitrate or the materials before described being dissolved in water potassium chlorate ( $\text{KClO}_3$ ) or chl-

rate of potash, potassii chloras, (L.) or potassic chlorate may be used. The dissolution of the above materials is so thorough that no precipitation occurs when in the reservoir.

5 The cycle of operations when the solution and steam are sprayed over the fire-top is as follows: The cover of the solution-reservoir is removed and the solution hereinbefore described poured into the same. The discharge-  
10 cock D is then opened and the liquid runs down to the combination steam-valve S and injector F. The steam-valve on this is opened, and steam forces the liquid through the combined steam and liquid pipe to the spraying-  
15 nozzle H. Steam and solution are thus sprayed. The cycle of operations when the solution only is sprayed over the fire-top, due to the pressure of steam in the reservoir-top, is as follows: The discharge-cock N being  
20 closed and the inlet-cock L being open, liquid is poured into the funnel M. It gravitates downwardly into the receiving-chamber K. When the said chamber is full, the inlet-cock L is closed and the discharge-cock N opened.  
25 The liquid thereby falls down into the reservoir. When all has escaped, the discharge-cock N is closed. The steam-cock R is then opened and also the discharge-cock D on the reservoir. The liquid fills the bottom of the  
30 reservoir, and as the discharge-cock D is open the liquid passes down through the spraying nozzle H to the fire. Solution only is sprayed.

35 Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, the combination with a boiler, of a reservoir positioned upon said boiler, a removable top  
40 or cap carried by said reservoir, a valve secured to said reservoir, a combined steam valve and injector secured to said boiler, a

discharge-pipe connecting said valve and combined steam valve and injector, a steam and liquid pipe secured to said combined  
45 steam valve and injector and extending over the fire-box of said boiler, and a nozzle secured to the lower end of said steam and liquid pipe, said nozzle comprising right and left hand apertured, semicircular extensions. 50

2. In an apparatus of the class described, the combination with a boiler, of a reservoir carried by said boiler, a removable cover or cap carried by said reservoir, a valve secured to said reservoir, a combined steam valve  
55 and injector secured upon said boiler and communicating with the interior thereof, a vertical discharge-pipe connected to said valve carried by the reservoir and to said steam valve and injector carried by said  
60 boiler, a vertical steam and liquid pipe secured to said combined steam valve and injector, a nozzle secured to the lower end of said steam and liquid pipe, said nozzle comprising semicircular, apertured extensions, 65  
said extensions bearing against the furnace-crown.

3. In an apparatus of the character described, the combination with a boiler, of a reservoir carried by said boiler, a removable  
70 cover carried by said reservoir, a valve secured to said reservoir, a tubing or pipe secured to said valve and extending into and over the fire-box, a nozzle secured to the inner end of said tubing, said nozzle comprising semicircular, apertured extensions, said extensions  
75 engaging the furnace-crown.

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

FREDERICK ALBERT LEWIS.

Witnesses:

EDWIN PHILLIPS,  
CECIL W. LE PLASTRIER.