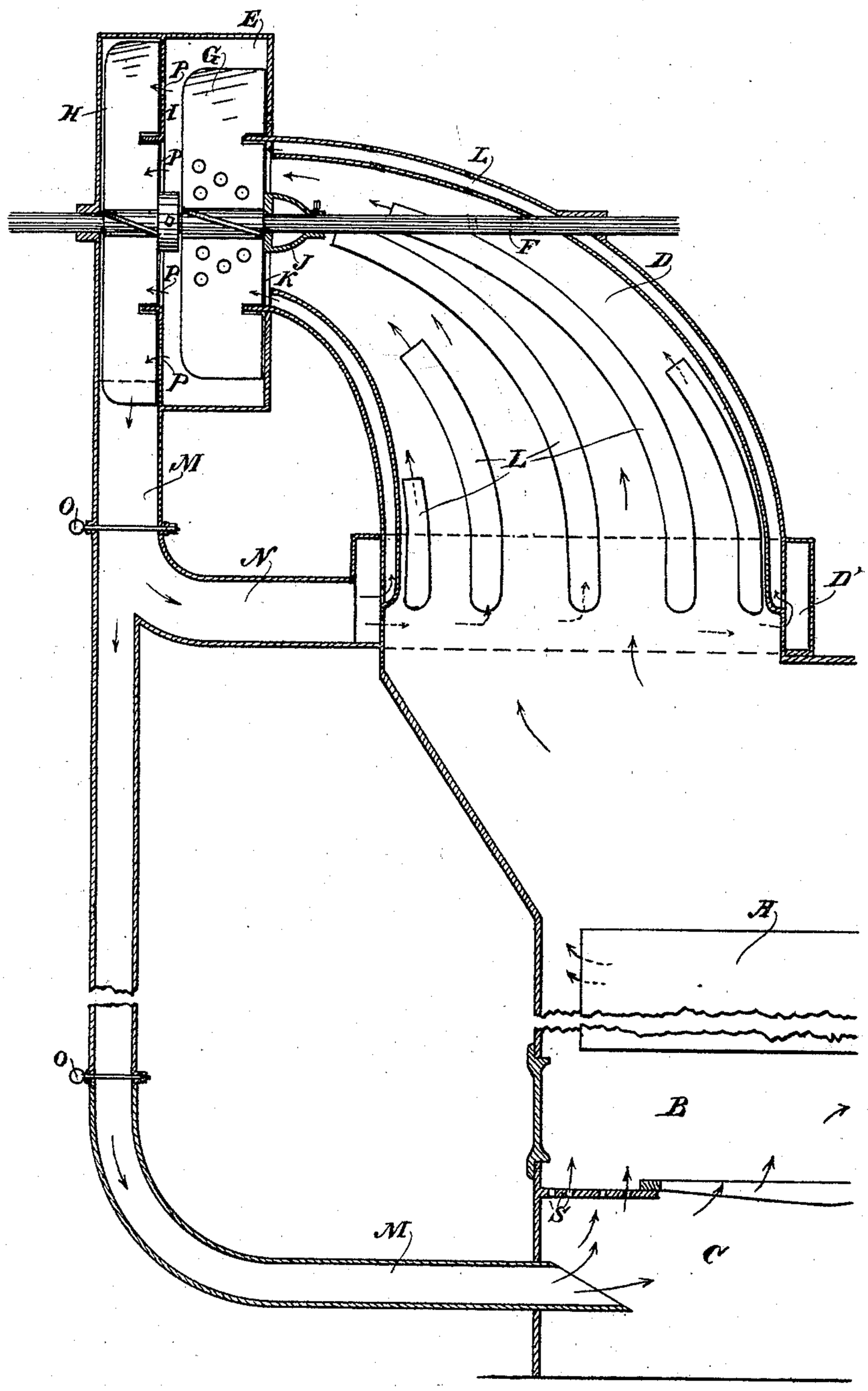
(No Model.)

T. P. MAGRATH.

SMOKE CONSUMER.

No. 540,212. Patented May 28, 1895.



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THOMAS P. MAGRATH, OF SAN FRANCISCO, CALIFORNIA.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 540,212, dated May 28, 1895.

Application filed February 13, 1895. Serial No. 538,263. (No model.)

To all whom it may concern:

Be it known that I, THOMAS P. MAGRATH, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Smoke-Consumers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a device for consuming smoke, and other unconsumed products of combustion which ordinarily escape from the chimney or stack of boiler furnaces.

It consists in details of construction which will be more fully explained by reference to the accompanying drawing, in which the figure is a vertical section of my device and its application.

The object of this invention is to provide a mechanism by which the smoke and unconsumed products arising from the combustion of fuel in boiler furnaces are returned to a point beneath the grate and again delivered into the fire-box with the incandescent fuel, whereby these products are heated to a temperature which will entirely consume them.

A is a boiler of any suitable construction. In the present case it may represent a return flue boiler, having the fire-box B, ash-pit C, the rear combustion chamber into which the smoke and products of combustion pass, and flues through which they are returned to the front. Not shown. At this point they are delivered into a smoke-box, and in the ordinary construction of such furnaces, they are allowed to escape from the smoke-box through a stack.

In my invention I have shown a curved tapering pipe D connected with the top of the smoke-box, so that all products of combustion are delivered into this pipe. The curvature of this pipe is such that it forms approximately a quarter of a circle, and it tapers or diminishes in size from the receiving end at the smoke-box to the delivery end where it discharges into a fan case E. This case has a shaft F passing through it extending also outwardly through the curved top of the pipe D as shown. Upon this shaft are fixed the two sets of fans G and H. The fan G is adjacent to the end of the case E with which the pipe D is connected, and the other fan H is at the opposite end of the casing E. An annular diaphragm or partition I partially separates the chambers in which these two fans revolve. The end of the pipe D is continued a little way into the chamber in which the fans G revolve, and the blades of the fan are cut away so as to fit around this projecting end of the pipe as shown in section.

Around the shaft F and approximately filling the end of the pipe D is the cone J through the center of which the driving shaft passes, and to which the blades G are fastened. This cone serves to direct the current of smoke and gases arriving through the pipe D to the opening K formed between the cone J and the side of the case E.

Around the base or receiving end of the pipe D is an enlarged cylindrical drum D′ which incloses the exterior of the pipe D. Holes are made through the pipe D, so that the interior of the drum communicates with the interior of the pipe, and these holes open into passages L of different lengths which are fixed within the pipe D, as plainly shown, for a purpose to be hereinafter explained.

From the fan case E a pipe M opens, its inner end communicating with that part of the case in which the fan or blower H revolves.

This pipe has a branch N leading into the drum D′, and the extension of the pipe M is curved so as to lead into the ash-pit C of the furnace. If there is a battery of two or more boilers, it will be manifest that this connection can be made with the ash-pits of all of the boilers. Suitable cocks or valves O serve to close either of the passages M or N at will.

The operation of the device will then be as follows: Power being applied to the shaft F from any suitable source, not here shown, the fans G and H will be caused to revolve with any desired degree of rapidity. The action of these fans will be to produce a vacuum which will draw from the smoke-box through the pipe D the products of combustion as fast as they arrive. These being directed by the cone J, are delivered through the opening K and are drawn by the action of the fan G into the interior of the fan case. The fan G is of smaller diameter and of less capacity than the fan H, and the products of combustion received into that part of the chamber in which the fan G revolves, are delivered through a passage P similar to the opening K into that

part of the case in which the fan H revolves. The smoke and other products of combustion are then forced from the fan case E into the pipe M and the pipe N being opened, a part of them will be returned through this pipe into the annular chamber or drum D′ surrounding the pipe D, and will thence pass into the pipe D through the various passages L previously described. The length of these passages varies so that while a portion of them deliver almost directly into the opening K and thence into the fan case, the others deliver into the pipe D at various points, between the drum D′ and the end of the pipe. The remainder of the smoke products of combustion pass through the pipe M and are delivered into the ash-pit C whence a portion of the smoke and other products pass up through the grate bars directly into the incandescent fuel where they are again heated to such a point that any unconsumed particles will be consumed.

Through what is known as the dead plate S, which is a horizontal plate situated between the front ends of the grate bars and the furnace front, I make a series of vertical holes which will allow a portion of the smoke which has been returned into the ash-pit through the pipe M to pass upward between the boiler front and the doors, and the fuel upon the grate. The object of this is to protect the doors and front to a certain extent from the more intense heat of the fuel, and thus prevent the destruction of these parts, and this is effected by reason of the smoke having been considerably cooled in passing through the fan casing and pipes, so that when it does pass up into the front end of the fire-box, the heat of the fuel is absorbed in raising the temperature of this unconsumed smoke to the point where it will again be burned.

Although I have described this apparatus as connected with what is known as the return flue boiler, it will be manifest that it may be applied to any other form of boiler the connections being made in an essentially similar manner to those here described.

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

1. The combination, with a boiler furnace, of a curved tapering pipe leading from the smoke-box, a fan and a case therefor into which the reduced end of said pipe delivers said case having a perforated diaphragm dividing it into two compartments, a drum surrounding the base of the curved pipe and communicating with the interior thereof, and branches from the discharge pipe of the fan case, one of which delivers into said drum and the other into the ash-pit of the furnace.

2. The combination with a boiler furnace of a pipe connected with a smoke-box, a fan case into which the discharge end of said pipe delivers, fans of different diameters mounted upon a shaft and rotatable within the case, a conical or diverging center at the discharge end of the pipe having openings around its periphery through which the smoke is delivered into the chamber of the smaller fan, other openings through which smoke is delivered from the chamber of the first fan to the chamber of the second fan and supplemental air openings to the exterior air, whereby the fan draws a supply of air into the casing to mix with the smoke, and the larger fan draws the whole of the smoke and air from the receiving end of the casing, and a discharge pipe connecting with a fan casing and delivering into the ash-pit of the furnace.

3. In a smoke consumer, a curved tapering pipe having the larger end connecting with the smoke-box of a boiler furnace, and the smaller end with a fan casing, a shaft extending through said casing having two fans of different diameter fixed upon it, openings from the discharge end of the curved pipe into the chamber of the smaller fan, and air openings surrounding the exterior of the pipe, also opening into the same chamber, a perforated diaphragm between the two fans through which the contents of the smaller fan chamber pass into the larger fan chamber, a pipe or pipes through which the contents of the larger fan chamber are expelled, a drum surrounding the inlet end of the curved pipe having openings made from it into the interior of the pipe, and curved conveying pipes of different lengths fixed along the interior of the main pipe whereby the contents are discharged at various points within said pipe, branches from the discharge pipe of the fan casing, one of which delivers into said drum and the other into the ash-pit of the furnace.

4. In a smoke consumer, a curved tapering pipe into which the smoke and products of combustion are delivered after escaping from the furnace, a drum surrounding the base of said pipe having openings communicating with passages within the pipe, said passages being of different lengths so as to deliver at various points within the pipe, a fan casing with which the discharge end of said pipe is connected and into which it extends a short distance, a directing cone around the central shaft whereby the contents of the pipe are directed toward the inner periphery of the pipe, openings or passages through which the contents of the pipe and the small passages are delivered and air passages around the exterior of the pipe also opening into the fan case, a fan wheel rotating in close proximity with the side of the case and fitting over the projecting end of the inlet pipe, a second fan wheel of larger diameter fixed to the shaft and rotating in a chamber at the opposite end of the fan casing, passages through which the contents of the first fan chamber are delivered into the second, a discharge passage through which the contents of the second fan chamber are expelled, said pipe having one branch leading to the ash-pit of the furnace, and the second branch leading to the drum which sur-

rounds the curved smoke conveying pipe whereby a part of the material is again returned through the fans and another portion delivered directly to the fire-box of the furnace.

5. In a smoke consumer, the combination, of a pipe leading from the smoke box of a furnace, and into which the smoke and products of combustion are delivered after escaping from the furnace, a fan case connecting with the discharge of the pipe, fans of different diameters mounted within said case, a pipe connected with the fan case discharge and leading into the ash-pit of the furnace, and a dead plate in front of the grate bars of the furnace having holes made in it whereby a portion of the smoke and gases are directed up between the fire and the furnace doors.

In witness whereof I have hereunto set my hand.

THOMAS P. MAGRATH.

Witnesses:
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