

E. G. HATCH.
SMOKE CONSUMING SYSTEM.
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Patented June 10, 1913.

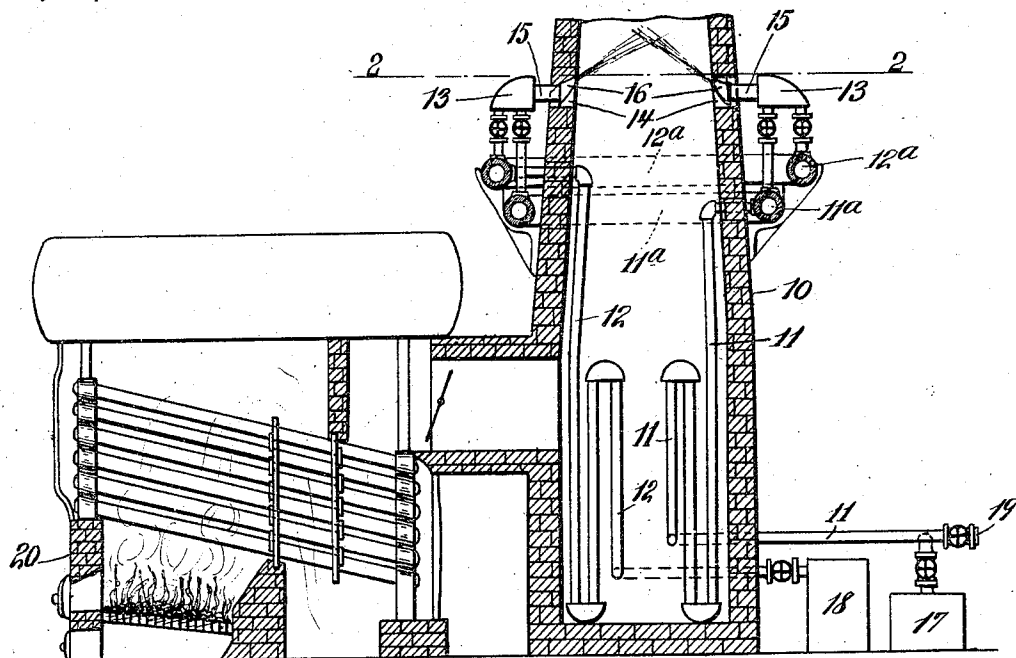


Fig. 1

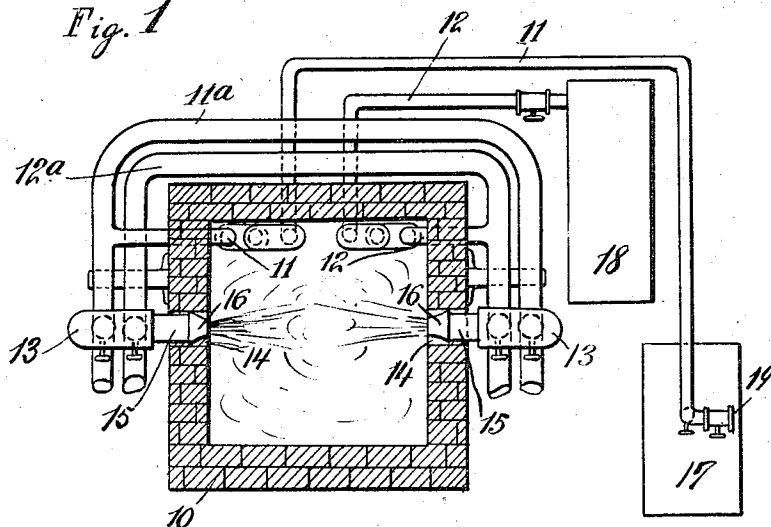


Fig. 2

WITNESSES:
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UNITED STATES PATENT OFFICE.

EDWIN G. HATCH, OF NEW YORK, N. Y.

SMOKE-CONSUMING SYSTEM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN G. HATCH, of the city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in Smoke-Consuming Systems, of which the following is a full, clear, and exact description.

My invention relates to improvements in a system for consuming or at least reducing the unburned products of combustion as they issue from the furnace in the form of soot, cinders and gases. As is well known, numerous attempts have been made to prevent the objectionable issuance of smoke and noxious gases, together with cinders, etc., from the stack of a furnace, and as is also well known, these schemes have been rather unsuccessful or impracticable, for the reason largely that conditions vary so much at the furnace, that is to say the varying conditions of draft, the occasion for quickly getting up additional steam supply, etc., call for varying charges of coal, and consequently the amount of objectionable material emitted by the stack is a variable one. Attempts have been made to consume the smoke, or rather the objectionable products of combustion, by locating burners along the path of the draft, but these have generally been on the principle of supplying a flame to consume such objectionable products and change them to colorless and innoxious gases. These attempts do not meet the requirements of varying cases, chiefly for the reason that it usually happens that there is insufficient uncombined oxygen present to make possible complete combustion of the burner fuel, and further the oxygen used to consume the burner fuel is made unavailable to burn the objectionable unburned products.

My invention contemplates the consumption of the objectionable materials in the products of combustion, the burning of unconsumed combustible matter to colorless gases, and the promotion of draft in the stack, by not only supplying burners and combustible gaseous fuel at necessary intervals in the path of the products of combustion, placed preferably at or just beyond the furnace proper, but further and chiefly by providing a large and regulable supply of heated air or oxygen sufficiently in excess of the amount required for the complete combustion of the gaseous or vaporous fuel and at a sufficiently high tem-

perature to make easy the combustion of the objectionable products issuing from the furnace, and at the same time, by increasing the temperature of the products of combustion in the stack, render them much lighter than the outer air, thus greatly increasing the draft, so that a shorter stack can be efficiently used.

I further contemplate the making available for useful purposes of much of the heat generated by the combustion of the usually objectionable matter, for when burners are placed near the furnace and make possible the combustion of the objectionable matter near the furnace, much of the heat generated by such combustion is made available to heat the boiler or one or more economizers when economizers are used. Ordinarily, the potential heat of the unburned matter emitted from the stack is lost and such loss of heat may amount to a very appreciable percentage of the possible heating power of the fuel used. In carrying out this idea it will be obvious that various devices can be used for injecting the supply of combustible gaseous fuel mixed with heated air, and that the supply can be provided at as many points between the furnace and the open air as may be necessary. I do not therefore limit my invention to any precise construction, though I show a practical means of carrying the invention into effect.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a broken sectional elevation of an ordinary furnace provided with my improvements, and Fig. 2 is a sectional plan showing the arrangement of the burners and mixers on line 2-2 of Fig. 1.

The stack 10 of the furnace 20 can obviously be of any approved construction and height, and may be of brick, iron, or other material. Along the stack I lead main air supply pipes 11 which can convey an accelerated draft of heated air to the burners, and I also by means of main pipes 12, supply combustible gas or vapor, from the source 18 and by using the terms combustible gas or vapor, I mean any gaseous fuel which when mixed with oxygen or air may be ignited and burned. Means is provided for supplying the air either at atmospheric

pressure from the air inlet 19 or at such pressure as may be required from the compressor 17, this of course varying with different furnace conditions, and I also call
 5 attention to the fact that while the air supply pipes may be on the exterior of the stack, they can be as well arranged in the interior as shown, thereby keeping the air heated more easily than if they are exposed to the
 10 weather. This, however, does not affect the principle of the invention. As a matter of convenience I show the pipes 11 and 12 connecting with circular branch pipes 11^a and 12^a, which encircle the stack and which con-
 15 nect at necessary intervals with the mixing chambers 13 in which the gas and air may be mingled, while issuing from these mixers are jet pipes 15 which project through openings 14 in the stack and terminate in
 20 nozzles 16 which may be of any approved kind and adapted to serve the purpose of projecting the mixture of combustible gas or vapor and air into the path of the prod-
 25 ucts of combustion of the furnace, in substantially the same plane inside the stack.

I wish it distinctly understood that the particular arrangement shown while being practical and well adapted for the purpose, is not absolutely essential, and I wish it further
 30 understood that the system of injecting heated air and combustible gaseous fuel, can be located at as many points as may be desirable, and at any particular place along the path of the products of combustion from
 35 the furnace to the open air. It is, however, desirable, and I consider it necessary, to have the arrangement such as shown in the drawings to avoid any structures extending across the path of the furnace draft, as such
 40 structures interfere with the draft, collect soot, are inaccessible, and are generally objectionable.

Where burners have been used in the draft of a furnace, they have, so far as I know,
 45 depended for their air supply on the air in the draft, and this is often, and I be-

lieve usually inadequate to maintain proper combustion. By leaving the draft clear, however, and providing means as the compressor 17 for forcing any required amount
 50 of oxygen into the gaseous products of combustion issuing from the furnace, I get all the heat required to raise the temperature of the unburned matter to its combustion
 55 point, and can consume the solid matter and sufficiently oxidize the noxious gases to render them colorless and innocuous so that no noticeable smoke and no great amount of deleterious gases will issue from the
 60 stack.

I claim:—

The combination of a furnace of the type burning a primary fuel and having a fuel bed, a combustion chamber and a draft flue terminating at the outlet to atmosphere of
 65 the stack or chimney, and smoke consuming and draft accelerating apparatus applied to said draft flue and comprising a series of burners arranged to discharge in substantially the same plane inside of said draft flue
 70 intermediate the fuel bed and the outlet of the draft flue to atmosphere, without obstructing the draft, separate and independent main air pipes and main auxiliary fuel pipes
 75 extending from the base of the draft flue to points in proximity to said burners, a plurality of branch pipes partially encircling the stack and connecting said main independent air and fuel pipes to the burners for separately supplying fuel and an ac-
 80 celerated draft of air to the burners and mixing the air and fuel at the burners, means for supplying a regulable accelerated draft of air under pressure to the air pipes and means for supplying a regulable quan-
 85 tity of gaseous or vaporous fuel to the auxiliary fuel pipes.

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Witnesses:

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 ARTHUR G. DANNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."