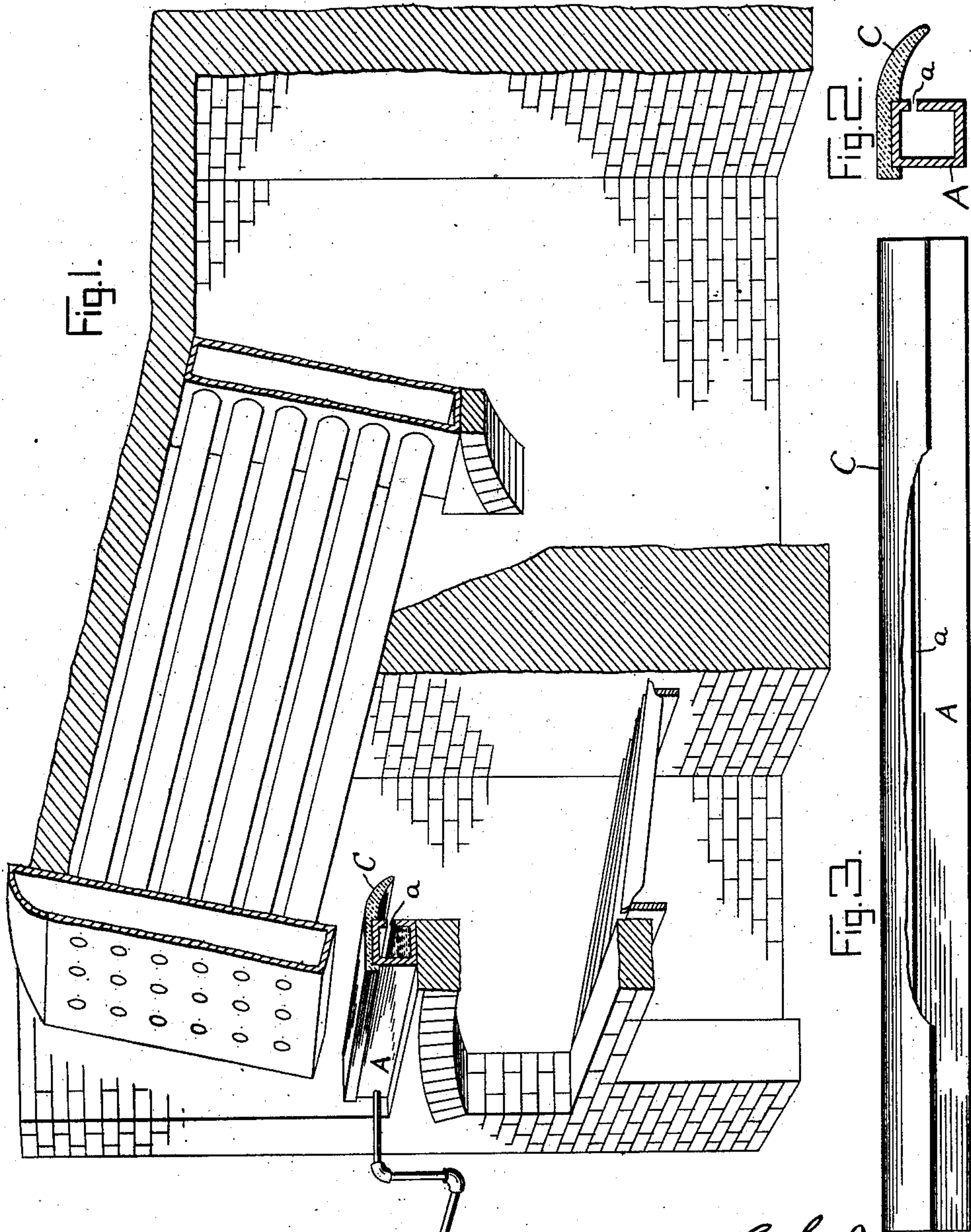


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 DEVICE FOR INCREASING HEAT.

APPLICATION FILED JUNE 28, 1909.

973,581.

Patented Oct. 25, 1910.



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# UNITED STATES PATENT OFFICE.

GAMALIEL C. ST. JOHN AND FREDERIC A. D. RANKINS, OF NEW YORK, N. Y.

DEVICE FOR INCREASING HEAT.

973,581.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed June 28, 1909. Serial No. 504,868.

*To all whom it may concern:*

Be it known that we, GAMALIEL C. ST. JOHN and FREDERIC A. D. RANKINS, citizens of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Devices for Increasing Heat; and we 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.

This invention consists in a device for obtaining enhanced effect from the burning of fuel in increase of the heat by more complete conversion of the products of combustion and avoidance of escape of free carbon, thus saving fuel.

Promotion of combustion with the beneficial effects incident thereto has heretofore been attempted in many ways; but, in all procedures, more or less efficient, where the vapor of water has been employed, this vapor has either been presented directly to the solid fuel, or, if to the gaseous, or volatile, or other escaping products of combustion thereof, then, in admixture with atmospheric air, or other substance, and in no case in predetermined ratio; while, in all cases, the construction of somewhat complicated and expensive apparatus, or of a special plant, has been involved.

Under the present invention, the vapor of water is, by itself, presented to the products of combustion of fuel, that is, over, or across, the bed of fuel, preferably at a predetermined ratio between the water evaporated and the fuel supplied, preferably at the pressure within the fire-box, preferably,—as for more readily automatic supply,—under generation therein, and, preferably, at the starting place of motion toward the exit of the volatile products of combustion.

The method may, of course, be carried into effect in various ways and, only so that the several performances are effected, is not limited to any particular means for any one of them. A simple and convenient device, however, for practicing the method is illustrated in the accompanying drawings; and no claim is herein made to the method, as the same forms the subject of a separate application for patent, filed June 28, 1909, Serial No. 504,869.

In the accompanying drawings forming

part of this specification and in which like letters of reference indicate corresponding parts, we have shown one of many ways of carrying our invention into effect, and, in these drawings, Figure I is a view in sectional perspective of a suitable device as applied to a Babcock and Wilcox boiler furnace, one side and the front of the furnace being broken away to show the interior, the view displaying a preferred situation and kind of a vapor-generator and provision of a hood for direction of the vapor, also a preferred situation and kind of a water-supply to the generator. Fig. II is a view in cross-section, showing a preferred form of vapor-generator having a preferred form of discharge namely, a slot, or slit, and showing a form of vapor-director; and Fig. III is a view in front elevation showing generator and director, latter broken away in front to display part of slot.

This simple device may readily be applied to any appropriate furnace.

Taking this simple apparatus as suitable means for carrying the invention into effect, burning fuel being on the grate-bars of the furnace, and vapor-generator, A, having, at its front, a longitudinal slot, *a*, being supplied with water, preferably, from a regulator, B, to keep the water in the generators at a predetermined level, steam passes out of the generator through the slot and mingles with the volatile products of combustion above the bed of fuel and may be directed into them,—as toward the fire,—by a hood, C. In this instance, the steam to mingle with the products of combustion is generated within and is at the pressure within the fire-box, the action being automatic, the burning fuel generating the steam and supplying itself therewith; but it is obvious that it may be generated outside the fire-box and be suitably admitted thereby under the same action, or be somewhat above the pressure within the fire-box, and equalized therein. To produce the best results, however, so far as ascertained, the pressure of the steam and that within the fire-box should be the same.

We have established a ratio between the weight of the water evaporated and that of the fuel supplied and have ascertained, that, while between 3 and 4 per cent. of water for hard coal and between 5 and 6 per cent. of water for soft coal give the best results, yet, by supply of the vapor of from 1 to 8



per cent. of water, heat and horse-power are increased.

Under ordinary conditions, with a generator 7 ft. long by 6 inches wide (7 inches deep) a maintained level of about 1 3/8 inches of water will supply about 3.32 lbs. of water (in vapor) to each 100 lbs. of coal, and a maintained level of 1 1/2 inches will supply about 5.3 lbs. of water (in vapor), to each 100 lbs. of coal.

We have found, that, by the practice of our method, and as the result of numerous tests, the gain in horse-power, of the boiler, is from 10 to 26 per cent., and the gain in steam produced within the boiler, is from 13 to 27 per cent. per lb. of coal.

Having thus fully described our invention, what we claim and desire to secure by Letters Patent of the United States, is:

1. The combination in a furnace, of the fire-box thereof, and a steam-generator positioned at its front, above the bed of fuel, and having a steam discharge extending, substantially, from side to side of the fire-box, and directed across the furnace bed, the pressure within the generator being the same as the pressure within the fire-box.

2. The combination in a furnace, of the fire-box thereof, and a steam-generator positioned at its front, above the bed of fuel, and having a steam discharge extending, substantially, from side to side of the fire-box, and directed across the furnace bed,

the pressure within the generator being the same as the pressure within the fire-box, and means for maintaining a predetermined level of water in the generator.

3. The combination in a furnace, of the fire-box thereof, and a steam-generator positioned at its front, above the bed of fuel, and having a steam discharge extending, substantially, from side to side of the fire-box, and directed across the furnace bed, the pressure within the generator being the same as the pressure within the fire-box, and automatic means for maintaining a predetermined level of water in the generator.

4. The combination in a furnace, with the fire-box thereof, of a steam-generator comprising a water-box, positioned above the bed of fuel at the front of the fire-box and having a longitudinal discharge, extending, substantially, from side to side of the fire-box, and a hood above the point of discharge, the pressure within the generator being the same as the pressure within the fire-box.

In testimony whereof, we affix our signatures, in the presence of two subscribing witnesses.

GAMALIEL C. ST. JOHN.  
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Witnesses:

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