

(No Model.)

J. L. HORNIG.
SMOKE CONSUMER.

No. 486,781.

Patented Nov. 22, 1892.

Fig 1

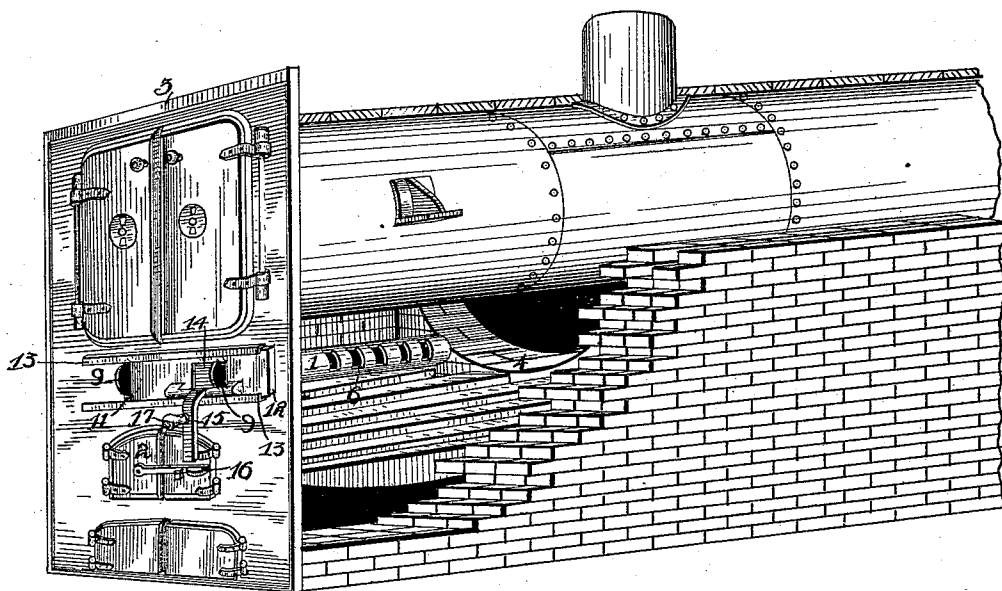
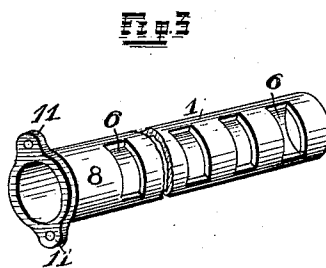
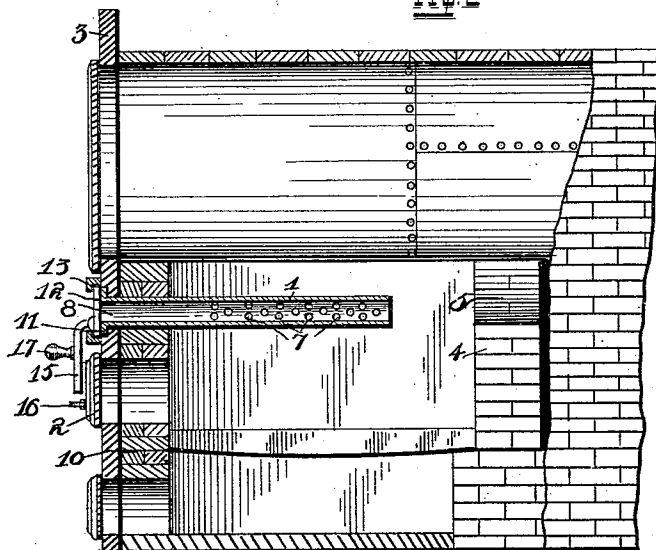


Fig 2



Witnesses
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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 486,781, dated November 22, 1892.

Application filed June 9, 1892. Serial No. 436,143. (No model.)

To all whom it may concern:

Be it known that I, JULIUS L. HORNIG, a citizen of the United States, and a resident of St. Louis, State of Missouri, have invented certain new and useful Improvements in Smoke-Consumers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to the class of smoke-consumers in which air is admitted above the grate-bars; and it consists in the novel construction, combination, and arrangement of devices hereinafter specified, and designated in the claims.

In the drawings, Figure 1 is a perspective view of my invention applied to a horizontal brick-set boiler, parts of the setting walls being broken away. Fig. 2 is a sectional side elevation of the same, and Fig. 3 is a detail view of an air-heating tube made use of in carrying out the invention.

The object of my invention is to provide a very simple and efficient smoke-consuming attachment for boiler-fronts, which shall act as an accumulator of heat when the fire-doors are in a closed position and as an air-warmer and distributor when said fire-doors are opened, and thereby bring about the discharge of a more uniform and steady volume of heat beneath the boiler or through the flues thereof during operation. In ordinary boiler-furnaces devoid of any smoke-consuming device the production and discharge of smoke in burning bituminous coal has been during the passage of cold air into the furnace and over the fire while the fire-doors were open in firing, and I have found that in such cases the prevention of the passage of cold air above the fire at such time will prevent the discharge of smoke from the furnace to a great degree. Therefore I have directed my invention to the prevention of the passage of cold air above the fire. Heretofore the proper regulation of the hot-air supply has been difficult and unsatisfactory and has caused loss and waste by admitting too much air above the fire, all of which has been obviated by my improved device, which I will now proceed to describe.

My invention consists, primarily, in placing one or a series of air-heating tubes 1 in a horizontal position in the furnace, all preferably in the same plane where more than one is used, and in a plane a sufficient distance above the fire door or doors 2 to permit of the attachment presently described.

The air-heating tubes 1 are preferably cylindrical in form, constructed of cast-iron or fire-clay, and of a sufficient length to extend from the boiler-front 3 to a point closely adjacent to the bridge-wall 4 and the passage 5 above said wall.

The area of the opening through the air-heating tube or tubes 1 should be about equal to that of the fire-door opening. I prefer to make use of a series of two or more of such tubes, as I find that the distribution of hot air above the fire will be more perfectly brought about than if a single tube were employed for the purpose, and besides a single tube of sufficient size would be so bulky in many cases that it could not be located in the space above the fire-doors and the bottom of the boiler.

The tubes 1 each have open ends and a clear passage through them. They are each provided with a series of narrow slits 6, extending through the material, and located therein transversely of the tubes, and on opposite sides of each tube, so as to form sort of reticulated walls for said tubes. This purpose may be accomplished in any other suitable way—such, for instance, as by a series of perforations 7. (Shown in Fig. 2.)

The slitted or perforated walls of the tubes 1 extend rearwardly to a point closely adjacent their inner ends; but their forward ends, for a purpose hereinafter mentioned, are imperforate and devoid of any slits or other transverse openings. The imperforate portions of the tubes, which I will designate by the numeral 8, are those which are not subjected to as high a temperature as that to which their inner ends are exposed, and these portions are to be secured in suitable apertures 9 formed in the boiler-front 3, and additionally supported and protected by the usual fire-brick front and brickwork 10.

The tubes 1 are each preferably located

horizontally with the passage therethrough in a direct line with the passage 5 above the bridge-wall 4, so as to form a more direct passage for air from the exterior of the furnace than is formed by way of the fire-doors 2, so as to bring about the result hereinafter stated.

The front end of each tube 1 is preferably provided with laterally-projecting opposite perforated ears 11, by means of which said front ends may be secured to the boiler front 3, by means of suitable bolts or screws passing through the perforations of said ears.

The openings 9 in the boiler front are to be closed or partly closed by means of a sliding plate 12, mounted in suitable guides 13, when the fire-doors 2 are closed, and opened or partly opened when said doors are opened. I make the arrangement such that the fireman must open the apertures 9 and admit air above the fire before he can accomplish the opening of the fire-doors. This is done in the following manner, although, of course, it may be accomplished by any equivalent means without departing from my invention. The sliding plate 12 is provided with an opening 14, which is adapted to register with one of the openings 9 in the front 3 whenever the plate is in such position that all the other like openings are uncovered. Said plate is also provided with a downwardly-projecting arm 15, which is of such length as to lie in front of one of the fire-doors in the path traversed by it in opening, and terminates in such position that it rests over and adjacent the door-latch 16, and must be removed from such path and position before said fire-door can be opened or the latch raised. The arm 15 is provided with a suitable handle 17, of wood or other heat-insulating material, which may be grasped by the fireman in sliding said plate. The handle 17, instead of being located on the arm 15, may in some instances be applied directly to the sliding plate 12. Whether the fireman is expeditious in closing the fire-doors need not be provided for.

A single sliding plate 12 may be used to cover and uncover the openings to all of the air-heating tubes of the series, said plate being of course constructed of sufficient length for such purpose, and provided with an opening 14 for each aperture; or there may be two or more plates 12 of shorter length.

In some instances I may arrange the arm 15 to normally hold the fire-door in a closed position, by simply locating said arm a little nearer the door than it is here shown, so that if the fireman desires to have his fire-doors held in closed position, it will be essential for him to move the arm into contact with said door or doors, which will have the effect of closing or partly closing the apertures which admit air to the tubes upon the interior of the furnace. By this construction the sliding of the plate 12 to such position as will admit

air to the tubes is assured prior to the opening of the fire door or doors, and the reverse movement of said plate is assured prior to the complete closing of said door or doors. This improvement operates, therefore, to prevent streams of cold air being admitted above the fire, air upon the exterior of the furnace preferring to take the shorter route to the opening or passage 5 above the bridge-wall than to enter the furnace by way of the fire-doors.

Although the difference in length of the routes through the air-heating tubes 1 and through the fire-doors is not great, yet I have found it in practice to be sufficient for the purpose named.

The operation is as follows: The furnace, be it a boiler-furnace or a furnace of any kind, being properly connected to a source of draft, such as a chimney or smoke-stack, and the fire started upon the grate-bars, air will be drawn in through the tubes 1 when the parts are in a position shown in Fig. 1, and such air will be heated to a high temperature by passing through the hot tubes exposed to the action of the fire. Cold air entering the tubes and passing therethrough expands in volume and a portion of it passes directly through said tubes from their forward to their rear ends and is discharged in a highly-heated condition at a point closely adjacent to the opening above the bridge-wall, and its oxygen unites with the carbon of the products of combustion and consumes it and in a great measure prevents the discharge of smoke from the chimney or smoke-stack. Other portions of the air which enters said tubes and is expanded by heating is discharged through the slits 6 in said tubes, and also assists in bringing about a good combustion at the point of discharge. When the fire door or doors are opened for any purpose whatever the openings to the tubes 1 must first have been uncovered. This permits air to enter said tubes and be started through them in a continuous stream toward the passage above the bridge-wall, in advance of the entrance of cold air by way of the fire-doors, leaving no possibility of any great amount of cold air entering by way of the fire-doors. Cold air entering the tubes 1 will prevent overheating thereof.

What I claim is—

1. A portion of a furnace having a fire-door, an air-heating tube located in said furnace and constructed to discharge heated air therein, and a device constructed to lock said door in a closed position when the passage leading to said tube is closed or partly closed, substantially as specified.

2. A furnace having a fire-door, an opening adjacent to said fire-door, an air-heating tube having one end connected with said opening and its opposite end free, the body of said tube being provided with perforations; and a

device constructed to prevent the opening of said fire-door prior to admission of air to the said tube, substantially as specified.

3. The combination, with a furnace comprising a fire-box and doors opening therein, said furnace being provided in its front with an air inlet or inlets located above said doors, of a horizontally-adjustable slide for closing said inlet or inlets, and an arm depending
5
10 from said slide and adapted when the latter

is in closed position to project over and lock the doors in closed position, substantially as and for the purpose set forth.

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

JULIUS L. HORNIG.

Witnesses:

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HERBERT S. ROBINSON.