No. 674,998. Patented May 28, 1901.

G. F. CONNER.

STRAW BURNING FURNACE.

(Application filed Dec. 20, 1900.)

(No Model.)

Fig. 1.

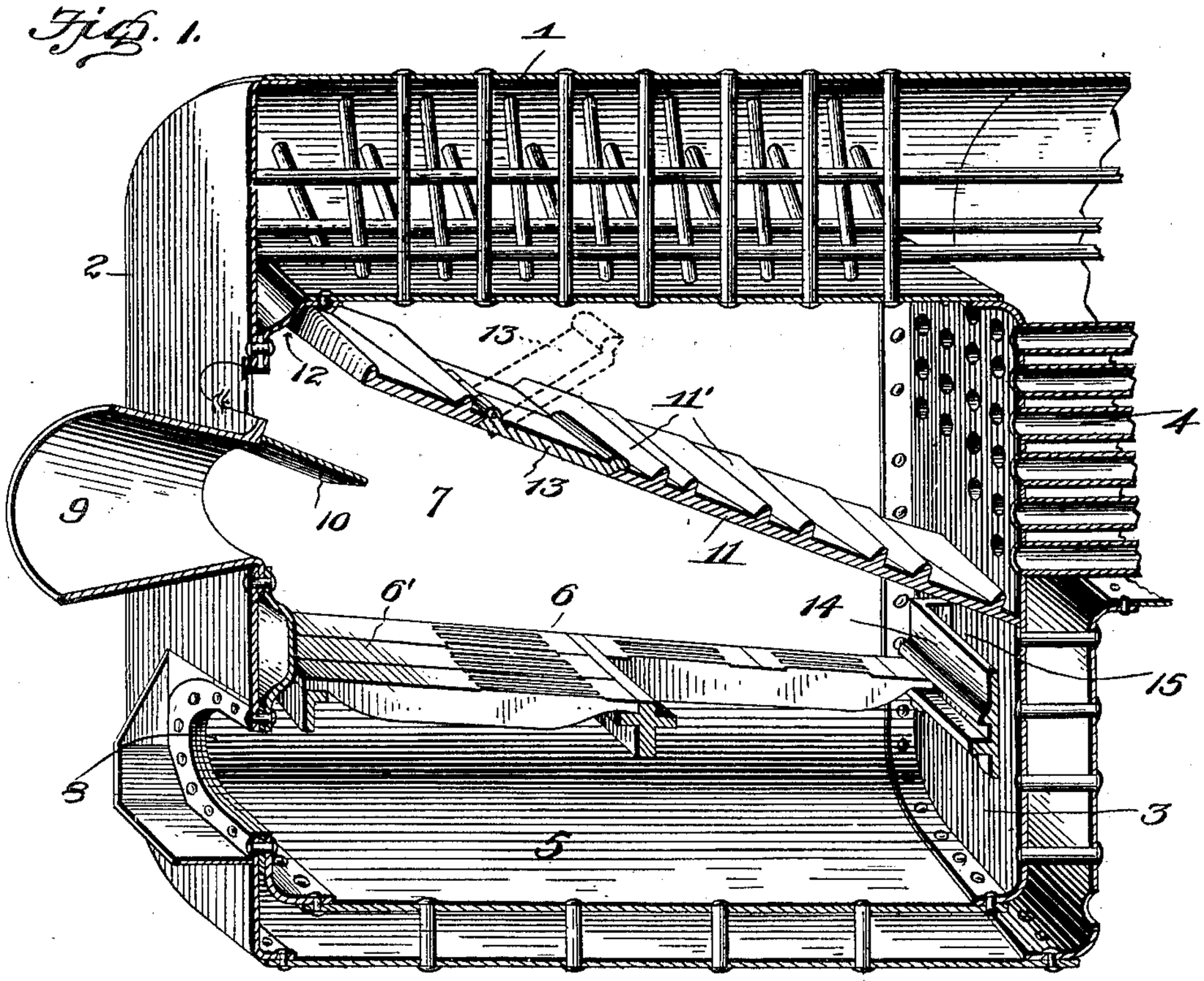


Fig. 2.

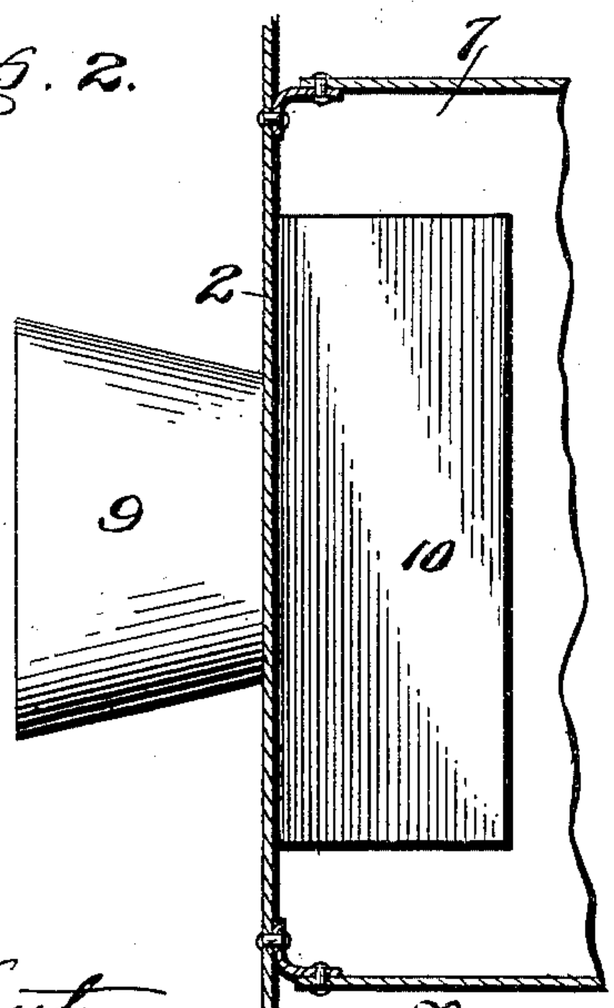
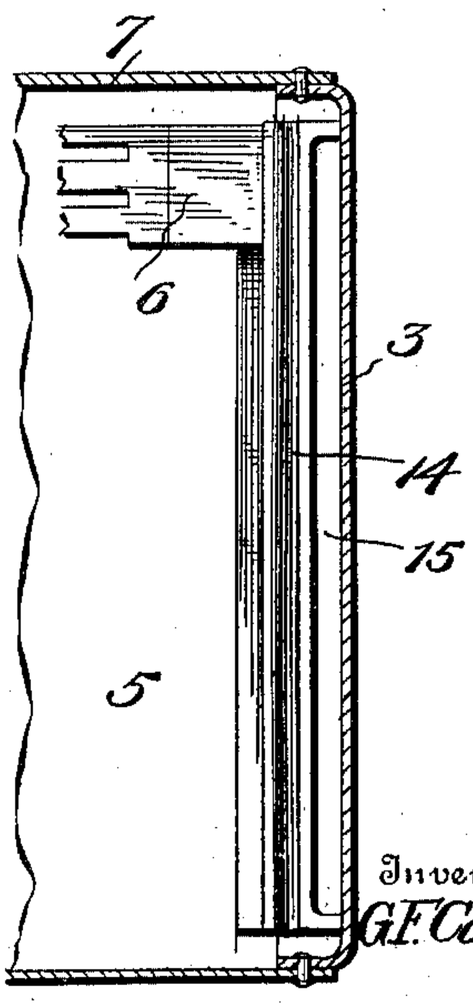


Fig. 3.



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UNITED STATES PATENT OFFICE.

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STRAW-BURNING FURNACE.

SPECIFICATION forming part of Letters Patent No. 674,998, dated May 28, 1901.

Application filed December 20, 1900. Serial No. 40,568. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. CONNER, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in Straw-Burning Furnaces; 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.

This invention relates to improvements in furnaces of that type adapted for burning light fuel, such as straw and other similar materials.

One object of the invention is to provide an improved construction and arrangement of parts in a furnace of this character whereby the ends of the fire-tubes may be readily cleaned from without and a more effective circulation of the draft afforded to promote combustion, keep the baffle-plates cool, and intensify the heat.

A further object of the invention is to provide means to prevent as far as possible choking of the tubes by charred bits of straw and refuse and the interference thereof with the draft.

With these and other minor objects in view, which will appear as the nature of the invention is better understood, the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view in perspective of a furnace embodying my invention. Fig. 2 is a detail horizontal section through the door-frame looking down upon the deflecting door-plate, and Fig. 3 is a detail sectional view through the updraft-deflector plate and tube-sheet or header of the furnace.

Like reference characters designate corresponding parts throughout the several views.

The numeral 1 in the drawings represents the shell of the furnace, which may be of the ordinary or any approved construction and is provided with the door-frame 2, tube-sheet or header 3, which receives the contiguous ends of the fire-tubes 4, the ash-pit 5, grate 6, and combustion-chamber or fire-box 7. The door-frame is formed with a draft-hole 8, communicating with the ash-pit, and above the same with a fuel-feed opening in line with a funnel-shaped fire-door 9, through which the straw or other similar fuel material is fed to the grate in the usual manner. A portion of the grate adjacent to the fire-door is "blind"—that is, imperforate, as shown at 6—to catch all the chaff dropping from the straw and allow it to be burned instead of dropping through into the ash-pit.

To the inner side of the door-frame, at the top of the fuel-feed opening, is attached a downwardly and inwardly projecting deflecting-plate 10, which is of less width than the furnace and acts to direct the straw and draft entering through the fire-door in a downward direction, which aids combustion and prevents the chaff from being drawn up by the draft up around said deflecting-plate and toward the tubes. It has been customary heretofore to employ plates of this character attached to an inner shell of the furnace independent of the door-frame and to make the plate of the same width as the furnace and to extend it horizontally above and parallel with the grate. The objection to this construction is that the draft is permitted to flow in an unbroken sheet above the grate and is prevented from having any upward escape, whereby the chaff and lighter particles are blown back in a partly-consumed or charred state and choke up the ends of the fire-tubes, while at the same time the access of air to support combustion of the unconsumed gases at the top of the fire-boxes is prevented and a large proportion of the available heat units of the fuel allowed to go to waste. By supplying a plate of less width than the fire-box a current of air is permitted to pass to the top of the fire-box, at each side thereof, to commingle with the unconsumed hot gases and support combustion, thus intensifying the heat at the point most needed, and by projecting said plate downward the chaff and other lighter particles are directed down into the fire and prevented to a large extent from passing to the fire-tubes in a partly-unconsumed state.

The fire-box is divided into upper and

lower compartments in the usual way by an inclined baffle-plate 11, which extends the entire width of said chamber from the tube-sheet 3 at a point between the grate and fire-tubes and terminates at its outer end above the inner end of the deflector-plate 10 and interiorly of the door-frame 2, forming a passage 12, through which the flame and unconsumed gases rising from the bed of fuel pass from the lower chamber of the fire-box to the upper chamber thereof and thence to the fire-tubes. The object of this baffle-plate, as is well known, is to cause the flame and gases to pass first to the front and then to the rear the entire length of the combustion-chamber each way to increase the distance through which such flame and gases must pass before escaping to utilize as much as possible of the available heat thereof; but in order to increase this action and provide for the more effective circulation of the flames and gases and abstraction of the heat therefrom I provide said plate with ribs or flanges 11′, which act as auxiliary baffle devices, which stop or retard to a great extent the outward passage of any unconsumed solid particles of fuel which may pass along with the flame and gases and at the same time provide an increased surface for the storage up of heat. To permit also of the ready cleaning out of the ends of the fire-tubes, I provide the baffle-plate with a hinged door 13, which is adapted to open upwardly under pressure from a poker or clean-out rod inserted from the exterior through the fire-door 9, as indicated by broken lines in Fig. 1, whereby the ends of the tubes may be easily and conveniently kept clear without the necessity of removing said tubes or dismantling the furnace. This door may, however, be hinged to drop down or be mounted in any other approved manner.

In the ordinary construction of straw-burning furnace no provision is made for oxygenating the unconsumed gases and products of combustion passing upwardly from the bed of fuel, and consequently a large proportion of the available heat is lost by the discharge of these gases and products of combustion in a still unconsumed state through the fire-tubes. To obviate this objection in a simple and effective manner, I provide at the rear of the grate and between the same and the tube-sheet 3 a draft-deflector plate 14, which is spaced apart from said sheet 3 to form therewith an air duct or passage 15, through which air may pass from the ash-pit into the lower compartment of the combustion-chamber 7, and with the currents of air passing upwardly on opposite sides of the fuel-deflecting plate 10, also into the upper compartment of said chamber through the passage 12, thereby oxygenating the unconsumed gases and products of combustion and placing them in condition to be readily consumed before discharging, by which the heat within the fire-box is highly intensified in an obvious manner. The course of the flame, hot gases, and air is clearly indicated by the arrows in Fig. 1.

From the foregoing description, taken in connection with the accompanying drawings, the construction and mode of operation of my improved furnace will be readily understood and the advantages thereof will be obvious. While the preferred embodiment of the invention is as herein shown and described, it will of course be understood that modifications within the scope of the invention as defined by the appended claims may be made without departing from the spirit or sacrificing any of the advantages thereof.

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

1. In a straw-burning furnace, the combination with the furnace-shell having an ash-pit, a combustion-chamber, a grate, and a fire-door and fire-tubes in communication with the combustion-chamber, of an inclined baffle-plate dividing the combustion-chamber into upper and lower chambers and forming a passage at the front thereof, a deflecting-plate extending downwardly and inwardly from the top of the fire-door to deflect the fuel and draft down into the grate, said deflecting-plate being of less width than the combustion-chamber to form air-draft passages, and an air-duct at the rear of the grate and connecting the ash-pit with the lower compartment of the combustion-chamber, substantially as set forth.

2. In a straw-burning furnace, the combination with the furnace-shell having an ash-pit, a combustion-chamber, a fire-door, and fire-tubes in communication with the combustion-chamber, of a grate having a blind or imperforate portion adjacent to the fire-door, an inclined baffle-plate dividing the combustion-chamber into upper and lower chambers and forming a passage at the front thereof, said baffle-plate being provided with a clean-out door, a deflecting-plate extending downwardly and inwardly from the top of the fire-door to deflect the fuel and draft down onto the blind portion of the grate, said deflecting-plate being of less width than the combustion-chamber to form air-draft passages, and an air-duct at the rear of the grate and connecting the ash-pit with the lower compartment of the combustion-chamber, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE F. CONNER.

Witnesses:
G. R. HAIGH,
L. R. LISCOM.