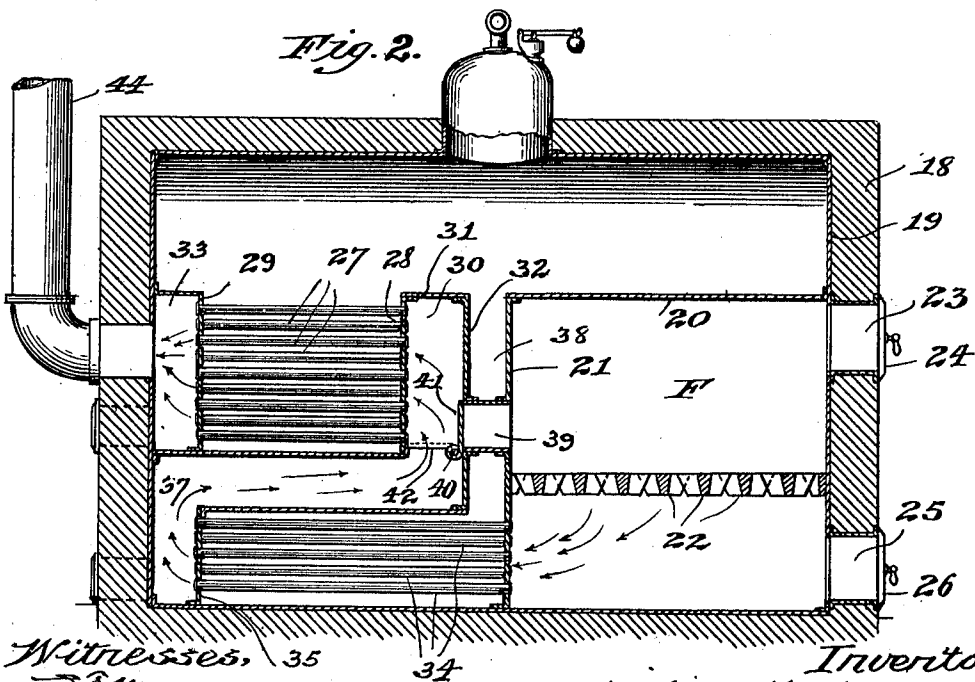
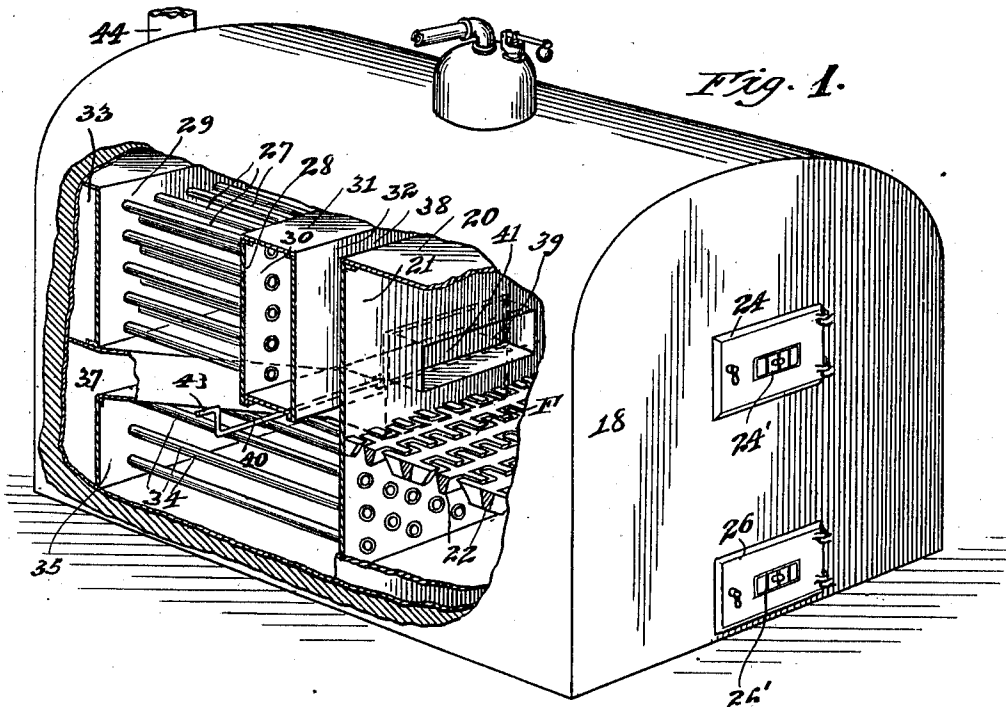


W. H. HURST.
FURNACE.
APPLICATION FILED MAR. 9, 1910.

992,198.

Patented May 16, 1911.



Witnesses,
D. Mann,
C. J. Schmidt

Inventor,
William H. Hurst
By Offield, Fowler, Graves & Offields
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM H. HURST, OF CHICAGO, ILLINOIS.

FURNACE.

992,198.

Specification of Letters Patent.

Patented May 16, 1911.

Application filed March 9, 1910. Serial No. 548,148.

To all whom it may concern:

Be it known that I, WILLIAM H. HURST, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces, of which the following is a full, clear, and precise specification.

My invention relates to furnaces, and its object is to provide improved construction and arrangement for more effectively and efficiently controlling and regulating the combustion and heating.

In the following specification and accompanying drawings my invention is clearly described and shown.

In the drawings Figure 1 is a perspective view of a furnace and boiler partly in section to show my invention applied thereto, and Fig. 2 is a longitudinal vertical central sectional view of the apparatus shown in Fig. 1.

Referring to the figures, 18 represents a wall inclosing the main shell 19 of a boiler. Within this shell plates 20 and 21 form the upper and rear walls of a fire box F across which extends a grate frame 22. Above the grate frame the wall 18 has a fuel charging opening 23 controlled by a door 24, and below the grate frame the wall has the opening 25 controlled by a door 26 through which ashes may be removed from the ash compartment below the grate. The water in the boiler circulates about flues 27 extending between heads 28 and 29, these flues communicating at their front end with passageway 30 formed by the head 28, the top wall section 31 and the upright wall section 32. The rear ends of the flues communicate with the compartment 33. Flues 34 extend from the ash pit between the wall 21 and the rear head 35 and connect the ash pit with the passageway 37 whose front end is adapted to communicate with the compartment 30. The space 38 between the walls 21 and 32 form a water leg for the circulation of water to and from the flues 34. Extending through the water leg and connecting the walls 21 and 32 is a duct 39. Pivoted on a rod 40 adjacent the lower rear edge of the duct is a damper plate 41 which in its upper position shown closes the duct 39 and which in its lower position, as indicated by dotted lines, will open the duct 39 and will close the opening 42 to shut off communication between passageway 37 and compartment 30.

The damper rod terminates in a handle 43 at the exterior of the boiler.

With the arrangement as described the damper can be adjusted to cause either up draft or down draft conditions through the grate. When the damper is up, as shown, the draft will be downwardly through the fire and grate, through the flues 34 and through passageway 37 into compartment 30, and then through flues 27 and compartment 33, up through discharge pipe 44 and out through the chimney. Any unburned gases and smoke will thus have to pass through the hot fire and will be consumed. Such down draft conditions are preferably used when green fuel is charged to the grate through opening 23, and the down draft is regulated by opening the draft slide 24' in door 24 or by opening this door. If it is desired to create up draft conditions the damper is swung downwardly to open duct 39 and to close off passageway 37 from compartment 30 whereupon the draft will be upwardly through the grate and fire, through duct 39 and through the flues 27 and escape pipe 44, the main draft conditions being then controlled by door 26 or the draft slide 26' therein. Thus when green fuel has been added down draft conditions can be established so that the generated gases and smoke must pass through the hot fire to be consumed, and after such consumption the up draft conditions can be restored, intermittent reversal of the draft conditions resulting in more thorough and complete combustion of the fuel.

It will be noted in the arrangement shown that during down draft conditions greater heating surface is added, as the heat must pass through the additional flues 34 and through the passageway 37. This increased heating surface will offset the reduction in temperature resulting more or less when the fire is damped by the application thereto of cold green fuel. Also when a fire is started and down draft conditions established not only will the gases and smoke be consumed but the water in the boiler will be more quickly heated on account of the increased heating surface capacity. If at any time the temperature of the water or steam drops suddenly recovery can be quickly effected by establishing down draft conditions to bring into effect the additional heating surface of

the flues 34. Also, if the temperature or pressure become too great up draft conditions can be established and the flues 34 cut from service. A single damper mechanism
5 suffices to establish either up draft or down draft conditions.

I do not wish to be limited to the precise construction and arrangements which I have disclosed, as changes may readily be made
10 which would still come within the scope of my invention, and I, therefore, desire to secure the following claims by Letters Patent:

1. In a furnace, the combination of a chamber, a grate in said chamber and dividing it into upper and lower compartments,
15 draft inlets to said compartments, an outlet for products of combustion, there being a path from said upper compartment to said outlet, flues interposed in said path, there
20 being a path from the lower compartment to said first mentioned path, flues included in said last mentioned path, said flues being surrounded by water to be heated, and
25 damper mechanism adapted to be actuated to disconnect the upper compartment from the first mentioned path and to connect the paths whereby draft flow through the furnace is downwardly through the grate and
30 through all the flues, and said damper mechanism being adapted to be actuated to disconnect the second mentioned path whereby draft flow through the furnace is upwardly through the grate and through only
35 the flues in the first mentioned path.

2. In a furnace, the combination of a chamber, a grate in said chamber for dividing said chamber into upper and lower compartments, a boiler surrounding said chamber for containing water to be heated, two

sets of flues interposed in said boiler, an outlet for receiving products of combustion
40 from said flues, one set of flues communicating with said lower compartment, said other set of flues being adapted for communication with said upper compartment, and damper
45 mechanism adapted in one position to effect communication of said other flue set with said upper compartment and to shut off the first mentioned flue set from said outlet, and
50 said damper mechanism in another position effecting disconnection of said second mentioned flue set from said upper compartment and affording connection for said first mentioned flue set with said outlet.

3. In a furnace, the combination of a
55 chamber, a grate in said chamber and dividing it into upper and lower compartments, an outlet for products of combustion, a set of flues extending from said lower compartment, a second set of flues adapted for communication with said upper compartment,
60 and damper mechanism adapted in one position to effect communication of said second set of flues with said upper compartment and to shut off connection of said first set of
65 flues with said outlet, and said damper mechanism adapted in another position to disconnect the second set of flues from the upper compartment and to allow both sets
70 of flues to be serially interposed between said lower compartment and said outlet.

In witness hereof I hereunto subscribe my name this fourth day of March, 1910.

WILLIAM H. HURST.

Witnesses:

CHARLES J. SCHMIDT,
NELLIE B. DEARBORN.