

W. J. HADDOCK.
DOWNDRAFT WATER HEATER.
APPLICATION FILED AUG. 3, 1903.

NO MODEL.

FIG. 1.

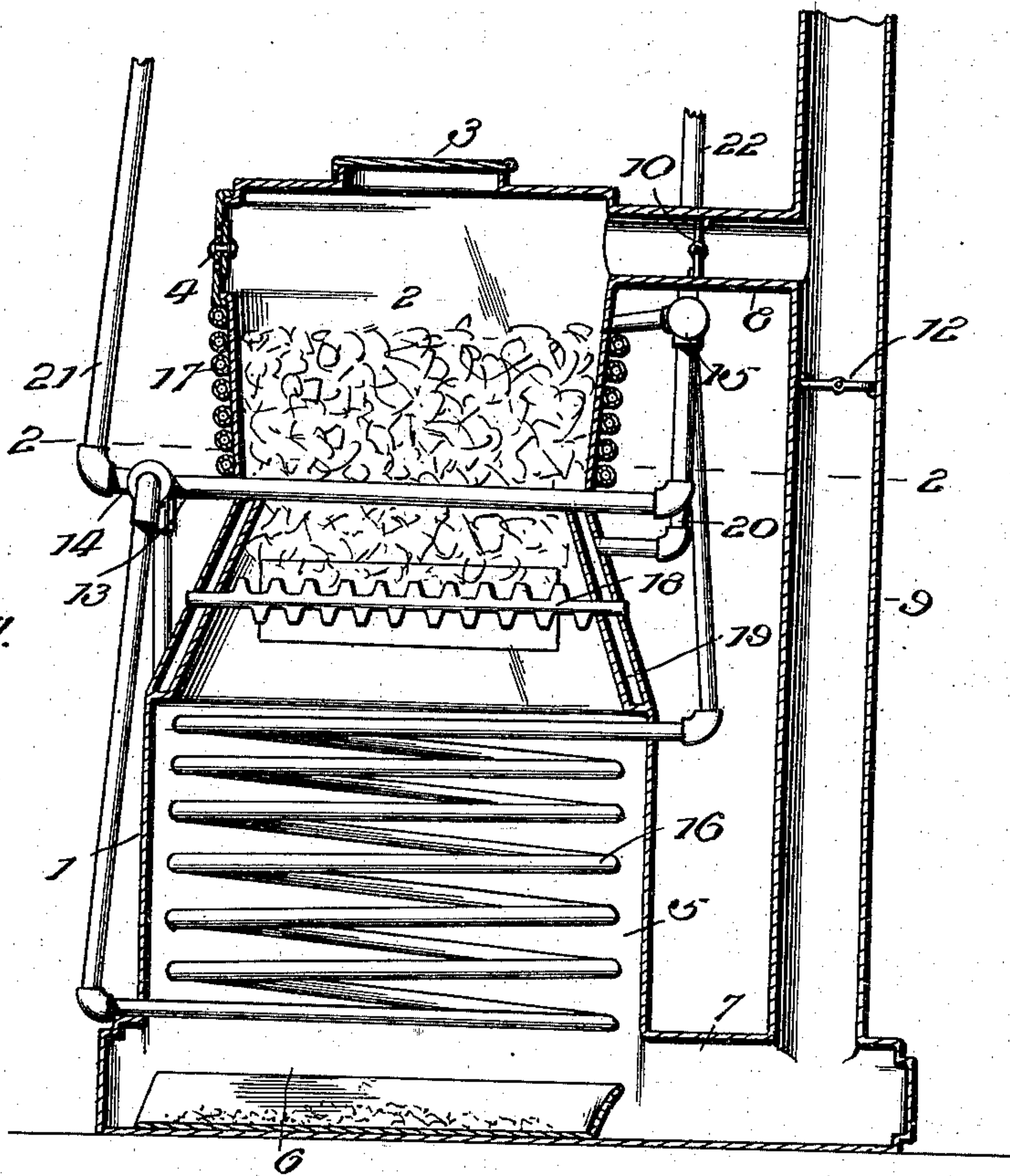
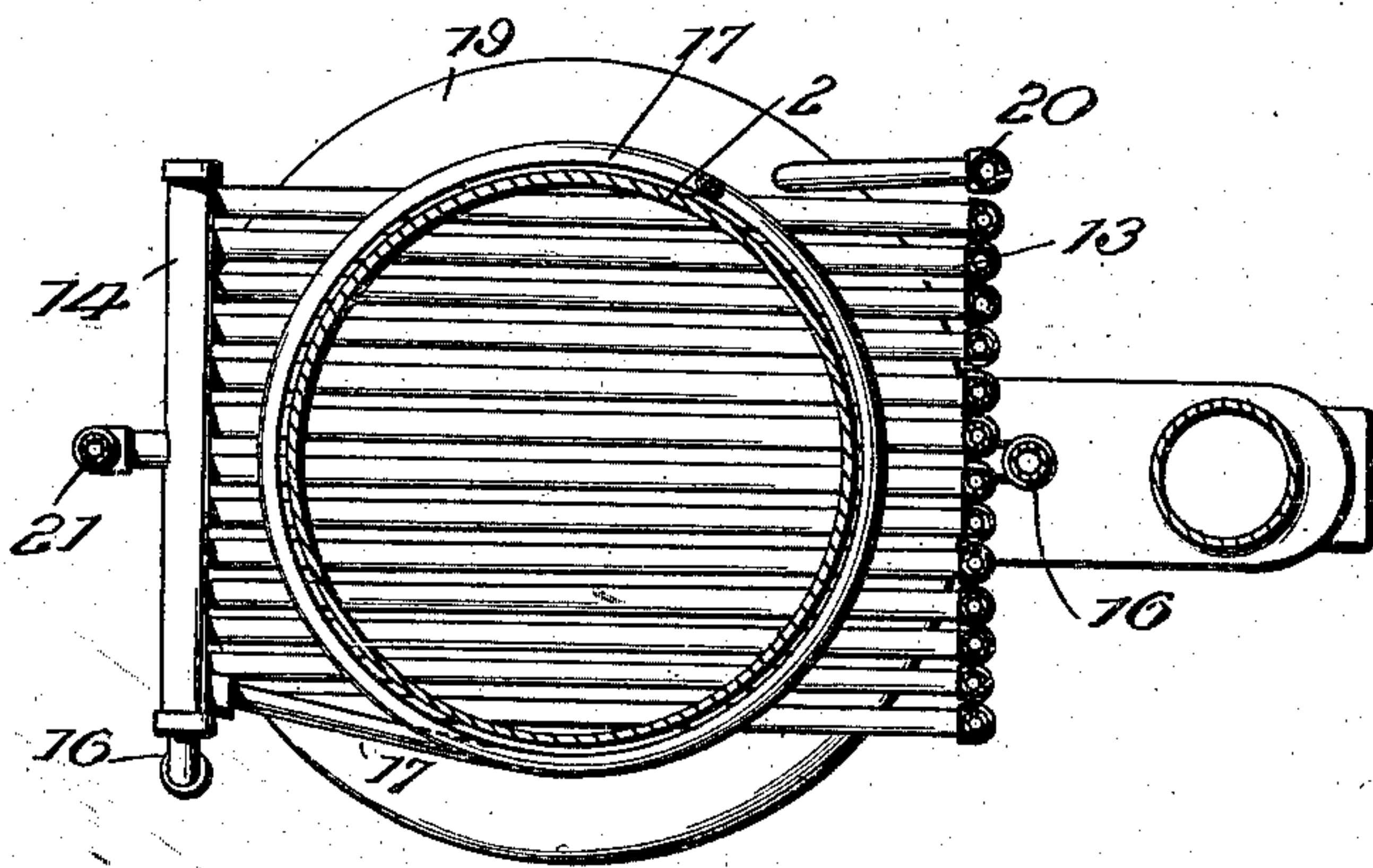


FIG. 2.



Witnesses:
Jno. Mirie
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By Attorney

William J. Haddock
Inventor

J. H. Haddock

UNITED STATES PATENT OFFICE.

WILLIAM J. HADDOCK, OF IOWA CITY, IOWA.

DOWNDRAFT WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 742,633, dated October 27, 1903.

Application filed August 3, 1903. Serial No. 168,049. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. HADDOCK, of Iowa City, in the county of Johnson and State of Iowa, have invented certain new and useful Improvements in Downdraft Water-Heaters; and I 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.

The object of this invention is to provide improved means for utilizing the heat of a downdraft smoke-consuming furnace, avoiding all loss of gases, and effecting a thorough heating of the water by a simple and novel arrangement and combination of the water tubes and jackets.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of a furnace equipped with my improvement. Fig. 2 is a horizontal sectional view on line 2 2, Fig. 1.

Referring to the drawings, 1 designates the furnace-casing in its entirety, and 2 the fire-pot, which is provided at its top with the fuel-supply door 3 and with an air-inlet opening or openings 4 at any suitable point above the ordinary level of the fuel within the fire-pot. Beneath the fire-pot is what I call a "heat-radiating" chamber 5, in the bottom whereof is the ash-collecting pan or space 6. This chamber at its lower end and the fire-pot at its upper end are connected, by branches 7 and 8, respectively, with a pipe or flue 9, which opens into a smoke-stack or chimney. (Not shown.) Within branch 8 is a damper 10, and in flue 9 is a damper 12. The latter is closed and the former is opened in the starting of the fire, and their positions are reversed once the fire is well under way, with the result that the smoke and all products of combustion travel downwardly, exit being found only by passing through the radiating-chamber and into pipe 9 through branch 7.

13 designates a water-tube grate composed of a series of tubes extended transversely through or beneath the fire-pot at the lower end thereof, such tubes being connected at one end by a header 14, while at their other ends, which are turned upwardly to allow for

expansion, they open into a header 15. Within the radiating-chamber 5 is a pipe-coil 16, which at its upper end opens into header 15, while the lower end of such coil is carried upwardly and connects with the header 14. A further series of coil-pipes 17 surrounds the fire-pot and is connected at one end to header 14, its other end opening into header 15.

18 designates an ordinary shaker-grate located a suitable distance below the water-tube grate, so that it will catch such portions of the fuel as may drop through the latter and allow them to be consumed by the hot flame of the burning gas and smoke.

Surrounding the combustion-space beneath the fire-pot and the water-tube grate is a water-jacket 19, which is connected at a low point with header 14, while at an upper point this jacket is connected by a suitable riser 20 with header 15. A suitable covered opening is formed in the jacket to permit of cleaning the grates. The system return-pipe 21 preferably opens into header 14.

In practice the fuel rests directly upon the water-tube grate 13. After the fire is started and damper 10 is turned to close outlet branch flue 8 and damper 12 is opened a direct draft down through the coal in the fire-pot and on through the radiating-chamber is secured, the gases, smoke, and fresh air to support combustion being carried down into the fire, where the smoke and gases are consumed with the coal. In this way the water in the water-tube grate is thoroughly heated by the bed of incandescent fuel resting thereon, the heat in the combustion-space heats the water in the surrounding jacket 19, and all the heat passing downwardly into the radiating-chamber is utilized for heating the water within the coil 16. The heat of the fire-pot is also utilized for heating the water within the coil 17, the several convolutions of which are placed close together, while those of coil 16 are spaced apart to allow the free circulation of the heat therearound. In this way the water will circulate freely throughout the entire heating system and as thus heated may be utilized in any desired manner. Preferably I form connections with a series of radiators (not shown) by a supply-riser 22, leading from header 15.

From what has been said the advantages of

my invention will be apparent to those skilled in the art to which it appertains.

It will be seen that I have provided extremely simple and highly efficient means for effecting the full utilization of the heat of a downdraft smoke-consuming furnace for raising the temperature of water contained in a complete connected system of water tubes and jackets extending beneath and around the fire-pot and encircling the combustion-space and also within the radiating-chamber.

I claim as my invention—

1. In a downdraft-furnace, in combination, a fire-pot, a water-grate composed of a series of tubes and headers into which said tubes open, a radiating-chamber beneath the fire-pot, and a continuous pipe-coil arranged within such chamber in communication with the water-tube grate, substantially as set forth.

2. In a downdraft-furnace, in combination, a fire-pot, a water-grate composed of a series of tubes and headers into which said tubes open, a coil of pipe encircling said fire-pot and connecting at its ends with said water-tube grate, a radiating-chamber beneath said fire-pot, and a water-tube coil within such chamber and also connected with said grate, substantially as set forth.

3. The combination with the casing having the fire-pot and the radiating-chamber, of the outlet flue or pipe, branches connecting said fire-pot and chamber with said pipe, dampers for controlling the passages directly from the fire-pot or through the radiating-chamber, a water-tube grate extending through said fire-pot and having headers at its ends, a coil of pipe surrounding said fire-pot and opening into said grate, and a second coil of pipe located within said radiating-chamber and connected at its ends with said grate, substantially as set forth.

4. In a downdraft-furnace, in combination,

a fire-pot having an upper outlet branch, a radiating-chamber beneath such fire-pot having a lower outlet branch, an upright flue or pipe into which both branches open, dampers for controlling the passages through such branches, grate-bars intermediate said fire-pot and radiating-chamber, a water-tube grate located above said grate-bars, a pipe-coil within said radiating-chamber connected at its ends with said grate, and a water-jacket surrounding the combustion-space beneath said grate, substantially as set forth.

5. In a downdraft-furnace, in combination, a fire-pot, a radiating-chamber thereunder, grate-bars beneath such fire-pot, a series of water-tubes above such grate-bars forming a water-tube grate, said water-tubes being upwardly turned at one end, headers into which said water-tubes open at their ends, and a water-jacket surrounding the combustion-space beneath said grate and connected to one of said headers, substantially as set forth.

6. In a downdraft-furnace, in combination, with a water-circulating system, a fire-pot, a water-tube grate thereunder having headers, a water-jacket into which the system return-pipe opens and which is connected to one of said headers, a coil surrounding said fire-pot connected to one of said headers and to said grate, the supply-riser leading from such header, and a coil within the radiating-chamber connected at its ends to said headers, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM J. HADDOCK.

Witnesses:

CHAS. G. MARTEN,
WILLIAM E. CRUM.