No. 670,260.

Patented Mar. 19, 1901.

# F. W. WATERMAN.

## HOT BLAST STOVE.

(No Model.)

(Application filed Jan. 27, 1900.)

2 Sheets—Sheet 1.

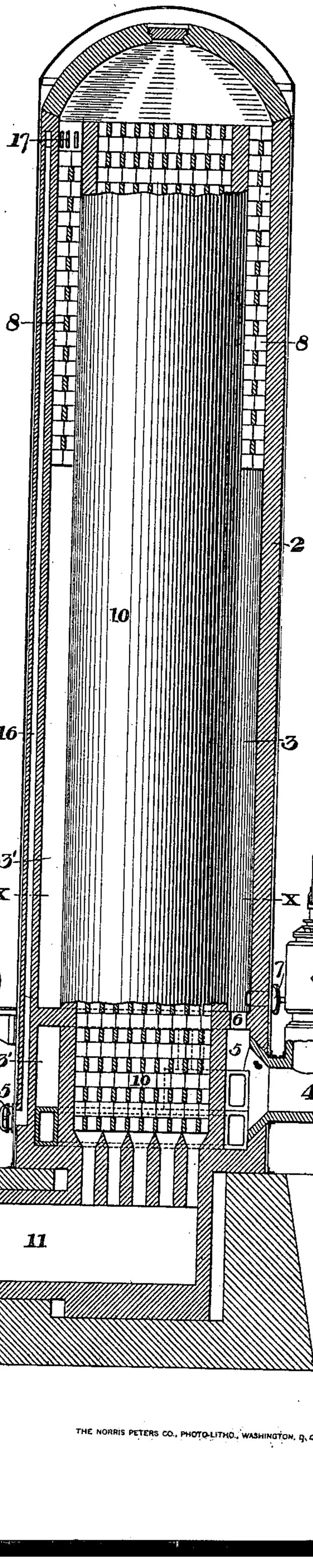


Fig. 1.

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Fig. 2.

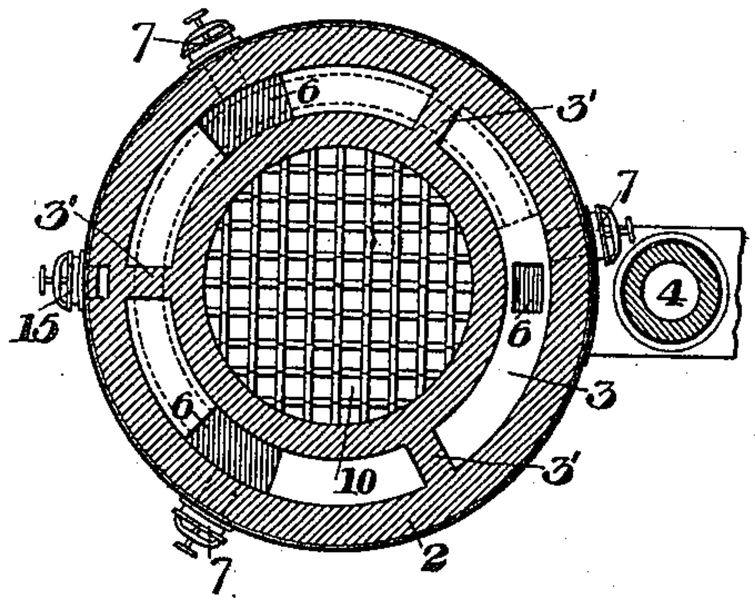
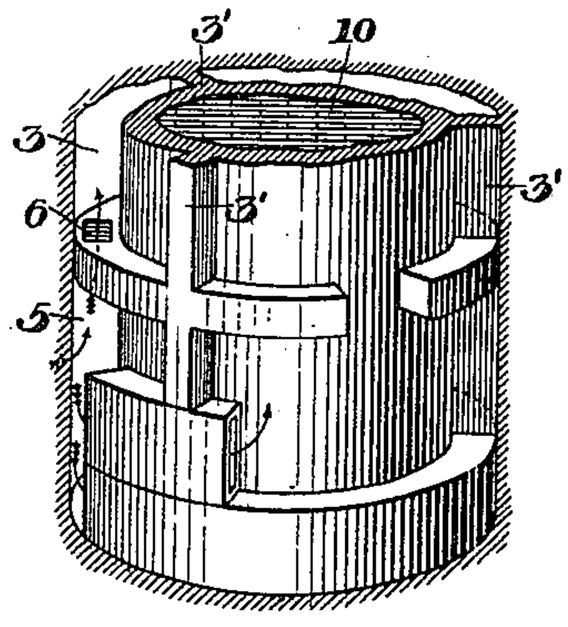



Fig. 3.




WITNESSES

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# UNITED STATES PATENT OFFICE.

FRED W. WATERMAN, OF ELYRIA, OHIO.

## HOT-BLAST STOVE.

SPECIFICATION forming part of Letters Patent No. 670,260, dated March 19, 1901.

Application filed January 27, 1900. Serial No. 3,026. (No model.)

*To all whom it may concern:*

Be it known that I, FRED W. WATERMAN, of Elyria, in the county of Lorain and State of Ohio, (residing temporarily at Sydney, Cape Breton, Nova Scotia, Canada,) have invented a new and useful Improvement in Hot-Blast Stoves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view of my improved hot-blast stove. Fig. 2 is a horizontal cross-section on the line X X of Fig. 1, and Fig. 3 is a perspective view of the annular supply-chamber.

Like symbols of reference indicate like parts wherever they occur.

In hot-blast stoves as usually constructed the combustion-chamber is situate centrally or on the side of the stove, the flues for the products of combustion, which lead to the stack, being arranged annularly around or about the central or side combustion-chamber. One great objection to the hot-blast stoves now in common use is that the parts of the stove are unevenly heated, owing to the fact that the products of combustion and flames from the combustion-chamber do not pass equally and evenly through all and all parts of the flues leading to the stack. The result of this uneven heating of the parts of the stove is that the walls of the stove are burned and cut by excessive heat at certain parts. They are subjected to great strain, owing to the unequal expansion and contraction, they crack and become leaky and defective, there is more or less waste of heating-surface, and the air-blast is insufficiently heated.

The object of my invention is to overcome these difficulties by so constructing the stove that all parts of the same shall be properly heated by the products of combustion and the flames from the combustion-chamber.

My invention consists in a stove having an annular and outer combustion-chamber and an inner and central checker-work or flue which leads more less directly to the stack, according to the size, shape, and construction of the stove, and arranged as hereinafter more fully described, and set forth in the claims.

I will now describe my invention so that others skilled in the art may construct and use the same.

In the drawings, 2 represents the outer wall or shell of the hot-blast stove, within which is the annular combustion-chamber 3, having partition-walls 3′, which extend vertically and divide the annular flue into three or any greater number of compartments. The gas-inlet 4 opens into an annular supply-chamber 5, which is situate directly below the annular combustion-chamber 3 and communicates therewith by a series of ports 6 6 6, which open respectively into the several compartments into which the annular flue is divided by the vertical partition-walls 3′. These ports should be of proper size to distribute the gas evenly to all parts of the combustion-chamber, and to this end the port directly above the gas-inlet should be smaller than the other ports, which are more remote from the gas-supply. By thus dividing the annular flue vertically into compartments I am able to distribute the gas in even quantity throughout the whole annular flue, and thus to make the combustion and heat in all parts of the flue substantially the same. Situate above each of the gas-ports 6 are air-valves 7 7 7, which supply air for the support of combustion in the combustion-chamber and by means of which a graduated supply of air may be admitted to different parts of the combustion-chamber. More or less of the upper portion of the combustion-chamber may be filled with checker-work, as is shown at 8. Gas is supplied to the stoves through the ordinary gas-valve 9. Within the annular combustion-chamber and arranged centrally with relation thereto is the central checker-work downdraft-flue 10, with which the outer annular flue communicates at the top. This central downdraft-flue opens into or communicates with the stack-flue 11 at the base of the stove. This stack-flue is provided with the usual shut-off valve 12, by means of which communication between the stove and the stack is cut off when the air-blast is turned on. The cold-air-blast pipe 18 opens into the stove at the stack-flue 11 at the base of the stove and the hot-air blast leads from the stove at the gas-inlet 4 through the usual hot-blast valve 13 and conduit 14. In certain cases and with certain-sized stoves it may be

desirable to provide the parts of the annular combustion-chamber that are remote from the gas-inlet with additional air-valves to supply an additional amount of air for the support of combustion at these parts. This may be done by a valve or valves 15, situate at the lower portion of the stove, leading into an air-flue 16 in the outer shell of the stove and opening into the combustion-chamber through the ports 17 at the upper part or at any desired part of the combustion-chamber.

The operation is as follows: In order to heat the stove, the air-blast inlet and outlet being closed, gas is permitted to pass into the combustion-chamber through the gas-inlet and sufficient air to support combustion in all parts of the combustion-chamber is admitted through the air-valves. Combustion taking place in the combustion-chamber, the flames and products of combustion pass up into the checker-work at the top of the same and are drawn by the stack-draft finally into the checker-work of the central downtake-flue that leads to the stack. The flames being distributed equally around the central checker-work, all parts of the stove are heated without abrupt changes in temperature in the different parts. When the stove has been sufficiently heated, the gas and air valves are closed, together with the stack-valve, and the blast-valves are opened, permitting the air to pass from the inner central checker-work flue, which has received its heat from the products of combustion and also from the outer annular chamber and has been protected from cold thereby, thence to the combustion-chamber, which has been subjected to the direct heat of the flame of greatest combustion, and thence to the hot-blast conduit.

I do not desire to limit my invention to the exact construction herein shown and described, as I have only shown one form of stove embodying my invention, which form may be modified by one skilled in the art without departing from the principle of the invention as claimed.

The advantages of my invention will be appreciated by those skilled in the art, since

What I claim is—

1. In a hot-blast stove, the combination of an annular combustion-chamber, a gas-inlet, a gas-inlet chamber connected to the gas-inlet and having a series of ports of increasing areas according to their distance from the gas-inlet and opening into the combustion-chamber, air-inlets opening into the combustion-chamber, and a central offtake-flue; substantially as described.

2. In a hot-blast stove, the combination of an annular combustion-chamber, a gas-inlet chamber beneath it, and having a gas-inlet port, said inlet-chamber having a series of ports of increasing areas according to their distance from the gas-inlet and opening into the combustion-chamber, air-inlet ports opening into the combustion-chamber above the gas-inlet ports, and a central offtake-flue; substantially as described.

3. In a hot-blast stove, the combination of an annular combustion-chamber, a gas-inlet chamber having a gas-inlet and provided with a series of ports of increasing areas according to their distance from the gas-inlet, air-inlets arranged at several parts of the combustion-chamber, valves controlling the air-inlets and a central offtake-flue connected to the annular combustion-chamber; substantially as described.

4. In a hot-blast stove, the combination of a central offtake-flue, an annular combustion-chamber having air and gas inlets for maintaining combustion, and an air-inlet situate at the upper part of the combustion-chamber adjacent to the central flue to support combustion at this part of the stove; substantially as described.

5. In a hot-blast stove, the combination of an annular combustion-flue having partitions of less height than the chamber and separating it into shorter vertical compartments, and an inner central flue connected at its upper end to the annular combustion-flue and at its lower end to the stack-flue; substantially as described.

6. In a hot-blast stove, the combination of an annular combustion-flue, an inner central flue connected thereto, a stack-flue connected to the central flue, vertical partitions dividing the lower portion of the annular combustion-flue into separate vertical compartments, and checker-work in said combustion-flue above the partitions; substantially as described.

7. A hot-blast stove having an annular combustion-chamber, vertical partitions dividing the same into compartments, a gas-chamber beneath the combustion-chamber and having a gas-inlet, ports leading from the gas-chamber to the compartments of the combustion-chamber, the ports more distant from the gas-inlet being larger than those in proximity to it, and an inner central flue connecting at its top with an annular combustion-flue and at its lower end with the stack-flue; substantially as described.

In testimony whereof I have hereunto set my hand.

FRED W. WATERMAN.

Witnesses:
J. F. LEWIS,
H. H. MCDOUGALL.