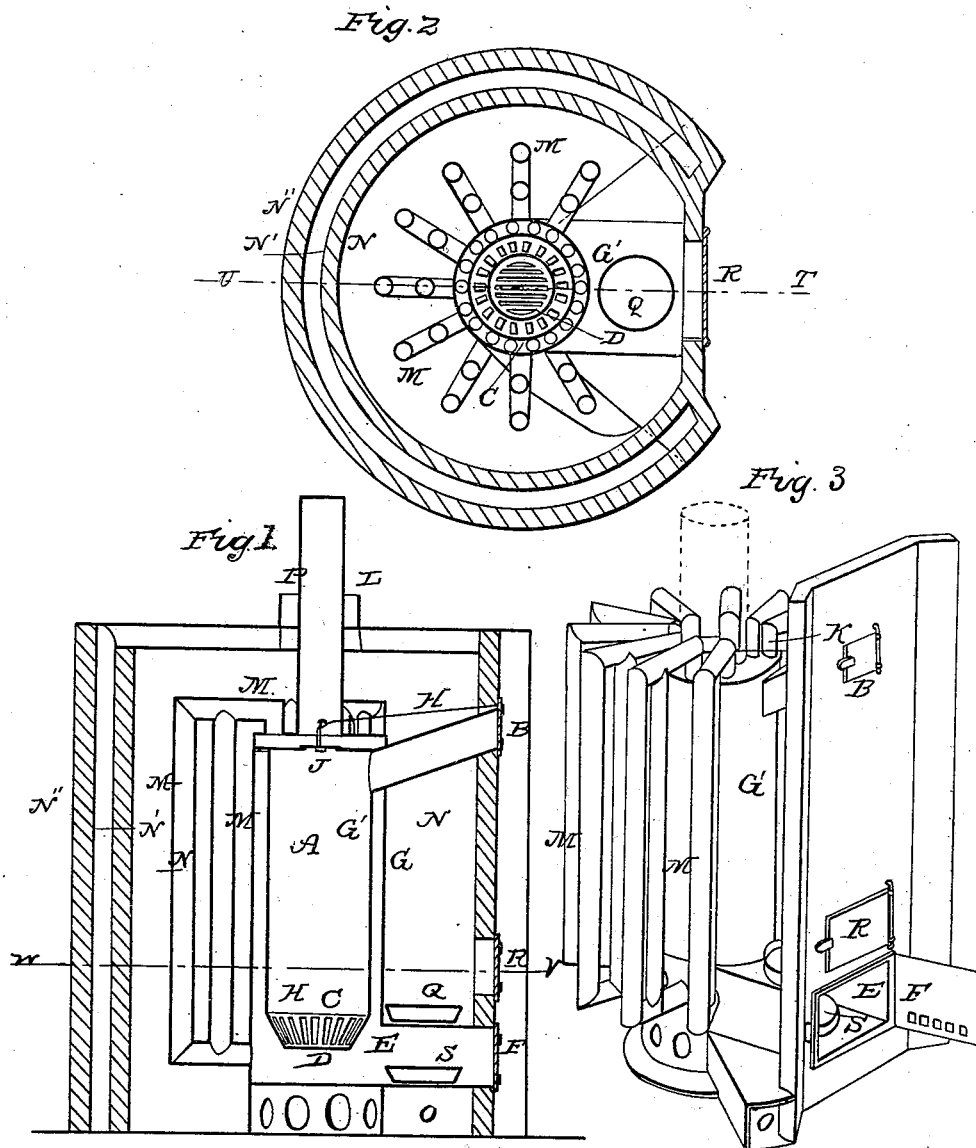


SHEDD & WORCESTER.

Hot Air Furnace.

No. 50,739.

Patented Oct. 31, 1865.



WITNESSES
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J. HERBERT SHEDD AND BENJAMIN WORCESTER, OF WALTHAM, MASS.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 50,739, dated October 31, 1865.

To all whom it may concern:

Be it known that we, J. HERBERT SHEDD and BENJ. WORCESTER, both of Waltham, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Mode of Effecting and Utilizing the Combustion of Fuel in Stoves and Hot-Air Furnaces; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of our invention consists in using the heated gaseous products of combustion as a circulating medium to convey the heat of the fire into channels, by means of which the heat can be given off to the surrounding air, said products of combustion returning, as they give off their heat, to the same fire, passing partly through it and partly through passages around and near it for reheating and further combustion, and repeating their circuit, the efficacy and advantage of the process being increased by admitting at pleasure steam or watery vapor, which supplies in part the want of oxygen for combustion at the same time that it increases the capacity of the heated products of combustion for conveying heat, and gives their channels an effect as radiators of heat similar to that of hot-water or steam pipes. By this repeated use of the products of combustion as a vehicle for conveying the heat of the fire to the radiating-surfaces, this heat is as effectually carried to its place of utilization as if conveyed by hot water or steam, and, when moisture is added to the gaseous products, the heat given off from the radiating-channels has the quality of heat given off from steam or hot-water pipes. The smoke is thoroughly consumed, the loss of heat through the chimney is reduced to the minimum amount of heated air necessary to be expelled for the admission of new air to the fire, this amount being further diminished by the supply of oxygen in steam or vapor, and by these several means a great economy of fuel is effected.

The application of this invention, represented in the accompanying model and drawings, is to a base-burning furnace, for which it is peculiarly but not exclusively adapted.

The construction of the furnace thus represented is as follows:

A is the fire-pot, to be filled with coal by the door B.

C is the grate, in basket form, with a shifting bottom grate, D.

E is the ash-pit, with a close-fitting door, F, which door has a valve or slide for the admission of a small regulated amount of fresh air.

G is the smoke-chamber inclosing the fire-pot, and itself inclosed by the cylinder G', a few inches distant from the fire-pot, this cylinder resting on the upper cylindrical part of the ash-pit.

H is a horizontal circular frame, supported by the cylinder G', and itself supporting the fire-pot. This frame is made open for the free passage of smoke and air.

I is a cylinder, supporting the ash-pit, and largely perforated to allow free passage of air through its sides.

J is a valve, opening into the smoke-pipe from the top of the fire-pot.

K is a rod connecting the valve J with the fire-door B in such manner that the opening or closing of the door B will open or close the valve J.

L is the smoke-pipe leading to the chimney.

M M M are flues or pipes for conveying the smoke and heated air arising from the fire through the air-chamber to the ash-pit, where it will come again to the fire for reheating and further combustion.

N is the hot-air chamber, in which the cold air admitted from beneath the ash-pit is warmed by the flues M M and by the cylinder G', and is given off through the flues P P.

N' is the inner wall of the hot-air chamber N, N'' being the outer wall.

O is the inlet for cold air to pass first under the ash-pit and then into the air-chamber N.

R is a door, through which is filled the water-pan Q.

S is a water-pan in the ash-pit for giving vapor to the smoke and burned air.

The operation of this furnace is as follows: The fire being lighted in the grate and the fire-pot filled with coal, the fire-door B is closed with the valve J, and the ash-door F is also closed, the admission of air being regulated by its valve or slide. The smoke and burned air, leaving the fire at the grate, will rise to the top of the smoke-chamber, and as much will pass off through the smoke-flue to the

chimney as there is admitted of fresh air to supply its place. This admission being very small, the escape of smoke is very small, and the large remainder of smoke and hot air pass into the pipes M M M, into and through which they find free passage and are drawn by the descent of the contents of these pipes to supply the partial vacuum created in the ash-pit by the rise of the hot air and smoke. To these pipes the hot air and smoke give off their heat, and through them to the air to be heated in the air-chamber, what is not so given off returning to the fire. Thus, by the tendency to fall caused in the smoke and burned air by its cooling and condensation in the pipes M M, and by the tendency to rise caused by the heat of the fire in the fire-chamber G, a constant circulation of the smoke and burned air is maintained. By this circulation the heat of the fire is conveyed rapidly and economically to radiating-surfaces, its smoke is effectually consumed, and the ordinary waste by the chimney very materially reduced, all these effects being heightened by the addition at pleasure of watery vapor or steam from the pan S, or in any convenient manner. The addition of vapor or steam has the further effect of making the warming of the air by the pipes similar to that by steam or hot-water pipes. The open smoke-pipe and very slight admission of fresh air secures the entrance of air at joints, instead of the escape of smoke and gas into the air-chamber. The opening of the valve J whenever the fire-door is opened takes the smoke and gas into the chimney instead of permitting them to puff out at the door, and the closing of the valve when the door is closed insures its not being left open by mistake.

Similar advantages are gained by the application of our method in somewhat different form to other forms of stove or furnace, to almost all of which it is applicable, and a special advantage is that by the more complete combustion of smoke and utilization of long flame it is better adapted for the burning of bituminous coal than ordinary stoves and furnaces.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The use of the heated gaseous products of combustion as a circulating medium to convey the heat of the fire through channels, whereby the heat can be given off to the surrounding air, these products then returning to the fire and passing partly through it and partly near and around it for reheating and further combustion, substantially as and for the purposes set forth.

2. The application of watery vapor or steam to the gaseous products of combustion to increase their efficacy and beneficial effect as a medium of heat to radiating-surfaces for the heating of air, substantially as and for the purposes set forth.

3. The device of connecting the direct valve of a smoke-pipe with the fire-door by rod or chain in such manner that when the door is opened the smoke-pipe valve will also be open, and when the door is closed the valve will be closed.

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Witnesses:

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