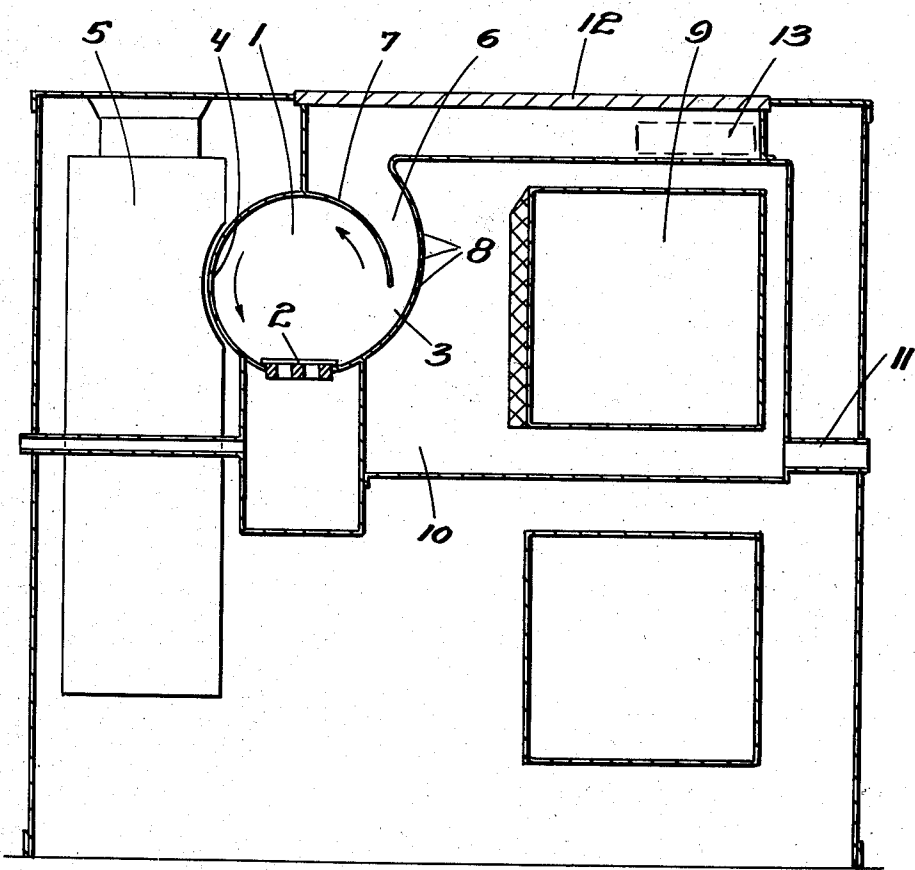


March 31, 1953

S. O. WERNHEIM
COMBUSTION APPARATUS
Filed May 24, 1949

2,633,120



Inventor:
S. O. Wernheim
By E. F. Wernheim
Att

UNITED STATES PATENT OFFICE

2,633,120

COMBUSTION APPARATUS

Sven Oskar Wernheim, Lidingo, Sweden

Application May 24, 1949, Serial No. 95,129

In Sweden June 1, 1948

1 Claim. (Cl. 126-34)

1

This invention relates to combustion apparatus for wood and other high gas-yielding solid fuel.

Several proposals have been made for constructing the furnace or combustion chamber of stoves and other combustion apparatus for wood and other high gas-yielding solid fuel in such a manner as to attain efficient combustion of the tar mist from the burning fuel. Such proposals have sought to obtain a circulating flow of the gases in the combustion chamber. According to one proposal a grating is arranged in the lower portion of the combustion chamber and a gas outlet in one chamber wall. The construction is so chosen that a higher temperature is set up adjacent this wall than in the remainder of the combustion chamber, which would cause the gases on this side of the chamber to tend to flow upward, and as a consequence a circulating gas flow would arise in the chamber. The intention was to cause a glowing layer of coal to remain upon the grating in the lower portion of the combustion chamber when the fuel is being degassed, and the gas circulation was intended to cause the gases leaving the fuel to be returned to this glowing coal layer to be cracked therein and converted into easier combustible gases. These gases were to depart and, through admission of secondary combustion air, to be burnt in a reheating duct. The wall of the combustion chamber opposite the gas outlet is provided with an opening for admitting primary combustion air. In addition combustion air is supplied through the ash-box situated below the grating, said air entering into the combustion chamber through the grating. However, it has been found that the effect aimed at, i. e. the intended circulating gas flow in the combustion chamber, practically failed to appear. This result would primarily be due to the fact that the flow resistance opposed against the air entering through the grating by the fuel in the combustion chamber becomes so great that practically all primary combustion air will be admitted into the chamber through the opening in the side-wall and only a negligible portion will pass through the grating. This will result in a draught through the combustion chamber from said air inlet opening in one side-wall transversely across the chamber to the gas outlet opening. In addition, on account of this rich air supply to one side of the combustion chamber a lively combustion will occur there resulting in a rise of the temperature to approximately the same value as is prevailing on the side where the gas outlet is situated. Thus it will be obvious that no substantial circulation due to temperature differences in the com-

2

bustion chamber can arise, and that, if such a circulation would tend to occur, this circulation will be removed immediately by the draught crossing the chamber. Also, in this construction there is a danger of gas explosions within the combustion chamber.

The present invention, being based on the conception indicated in the foregoing, has for its object to offer a complete solution of the problem set out above and, in addition, to eliminate the risk of gas explosions. The mainly characterizing feature of the invention resides in that the wall of the combustion chamber opposite the gas outlet is arranged to be cooled by heat absorbing means, that the ash-box is arranged to supply all primary combustion air to the combustion chamber through the grating, and that the combustion chamber is provided above the gas outlet with a wall portion which is arranged to deflect gases developed within the chamber towards the cooled chamber wall.

The invention will now be described with reference to the accompanying drawing illustrating in vertical cross-section a cooking-range provided with a combustion apparatus according to the invention.

Referring to the drawing, the combustion chamber of the cooking-range is indicated at 1. A grating 2 is mounted in the lower portion of the combustion chamber, and a gas outlet 3 is arranged in one side-wall of the chamber above the grating 2. The chamber wall 4 situated opposite the gas outlet 3 is cooled by a water tank 5 disposed adjacent its outer surface. The flue-gases emitted through the gas outlet 3 are conveyed through a reheating duct 6 one side-wall of which is formed by the chamber wall 7 situated above the gas outlet 3. Secondary combustion air is admitted into the flue-gas duct 6 through apertures 8. The latter communicates with an air circulation duct 10 surrounding the oven 9 and into which air is admitted through a passage 11. The flue-gases flowing through the reheating duct 6 pass over the outer surface of the wall portion 7 and then sweep the under-side of the hot-plate 12 and finally escape through a flue-gas exit 13.

Upon degassing of the fuel introduced in the combustion chamber, incompletely burnt gases are developed which are strongly heated by the wall portion 7 exteriorly swept by the gases of combustion. This causes them to rise on that side of the chamber where the gas outlet is situated. On the opposite side of the chamber, on the other hand, the gases will be cooled by

3

the cooled wall 4 and descend along the latter. Accordingly, a circulating flow of the gas will be produced, the gas being caused repeatedly to flow past the lower portion of the combustion chamber, where degassed and glowing coal is encountered causing the gas to be cracked into easily combustible gases. The gas thus cracked will then be completely burnt within the reheating duct 6 when it is mixed with the secondary air entering through the apertures 8.

The water tank 5, to the same effect, could be replaced by a jacket or spiral-duct through which water is circulated. It is also possible, though not illustrated in the drawing, to permit the combustion air to sweep the exterior surface of the chamber wall 4 before being admitted into the ash-box or into the circulation duct 10. The effect in this case will be equivalent to that of water-cooling. Owing to the fact that a substantially circular or oval cross-section has been selected for the combustion chamber the walls will oppose minimum flow resistance to the gas flow in the chamber.

What I claim and desire to secure by Letters Patent is:

A combustion apparatus for wood or other high gas-yielding solid fuel including a substantially circular combustion chamber, a lateral gas outlet in one side wall of said combustion chamber, a grating in the lower portion of said combustion chamber, an ash-box disposed below said grating, means for supplying all primary combustion air to said combustion chamber through said ash-box and said grating, a water tank, comprising heat absorbing means, disposed out-

4

side said combustion chamber wall opposite that having said lateral gas outlet and adapted to cool said opposite wall, a curved baffle spaced from said side wall to define therewith a gas outlet and adapted to deflect gases developed in said combustion chamber to cause the gases to flow towards said cooled chamber wall, said baffle means for deflecting gases towards said cooled chamber wall being constituted by a portion of the wall of said combustion chamber, and apertures in the wall of said gas outlet opposite said deflecting baffle for supplying secondary combustion air thereto.

SVEN OSKAR WERNHEIM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,911	Melsheimer	Dec. 17, 1840
40,635	Pierce	Nov. 17, 1863
63,885	Harris	Apr. 16, 1867
106,688	Goodfellow	Aug. 23, 1870
133,081	Curtis et al.	Nov. 19, 1872
146,351	Mason	Jan. 13, 1874
654,543	Hood	July 24, 1900
1,289,321	Vest	Dec. 31, 1918
2,264,525	Hall	Dec. 2, 1941

FOREIGN PATENTS

Number	Country	Date
558,883	Germany	Sept. 14, 1932
64,585	Denmark	July 1, 1946