

(No Model.)

2 Sheets—Sheet 1.

G. A. WATSON.  
APPARATUS FOR PRODUCING AND UTILIZING GAS FOR HEATING  
PURPOSES.

No. 503,817.

Patented Aug. 22, 1893.

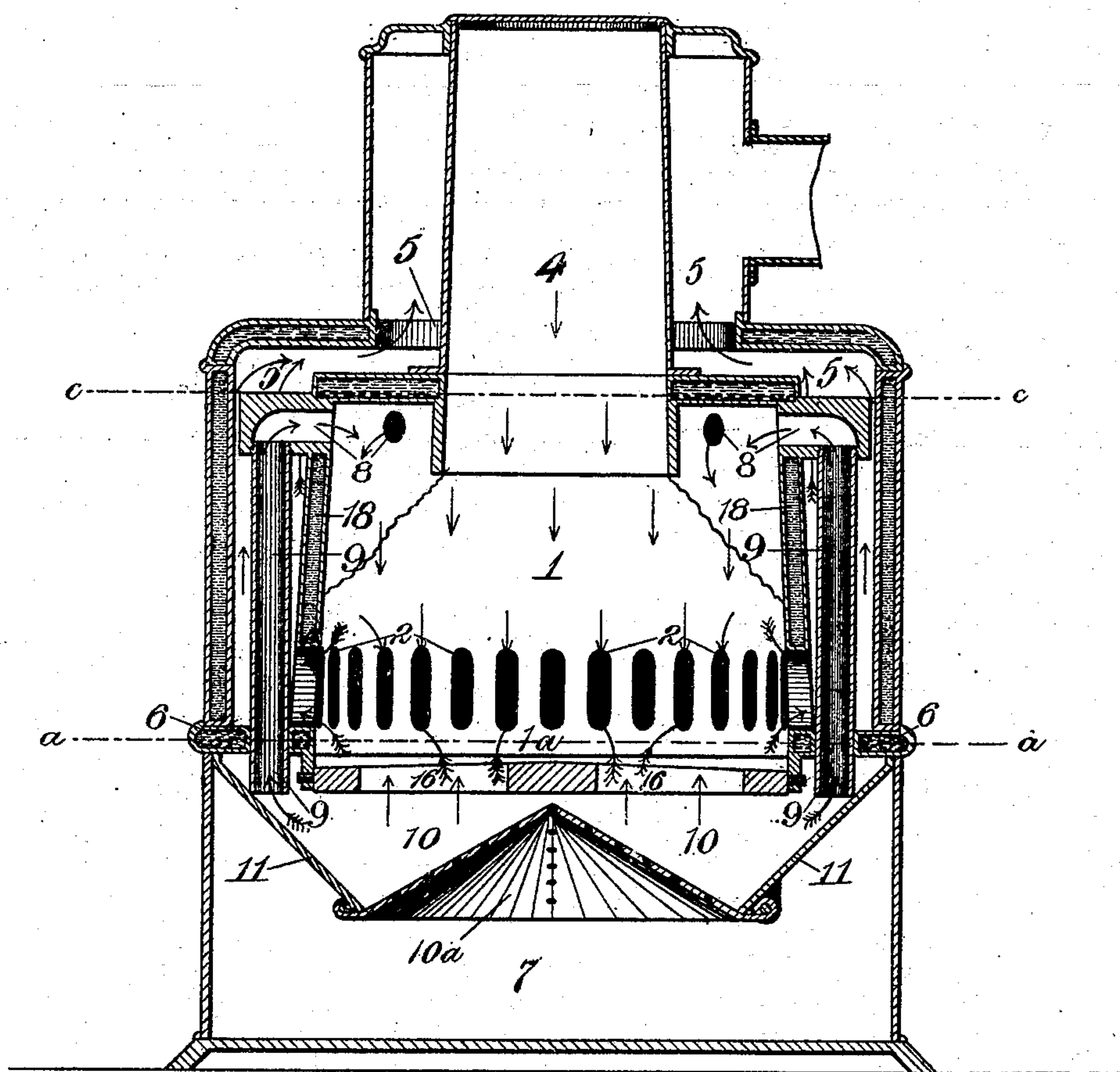


Fig. 1.

Witnesses,  
C. L. Lowrie.  
L. Foulds.

Inventor,  
Geo A Watson  
by Charles H. Riches  
his attorney

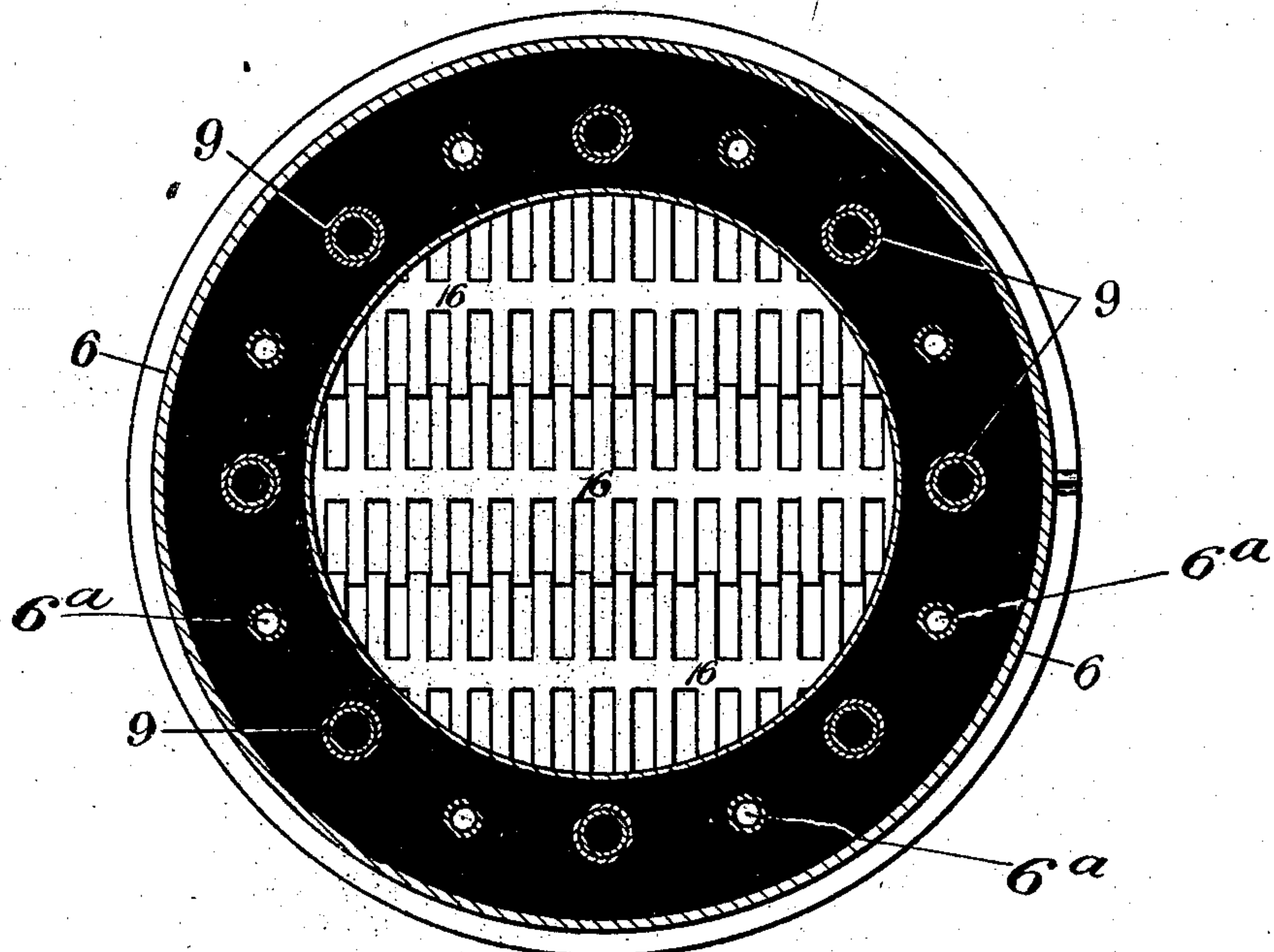
(No Model.)

2 Sheets—Sheet 2.

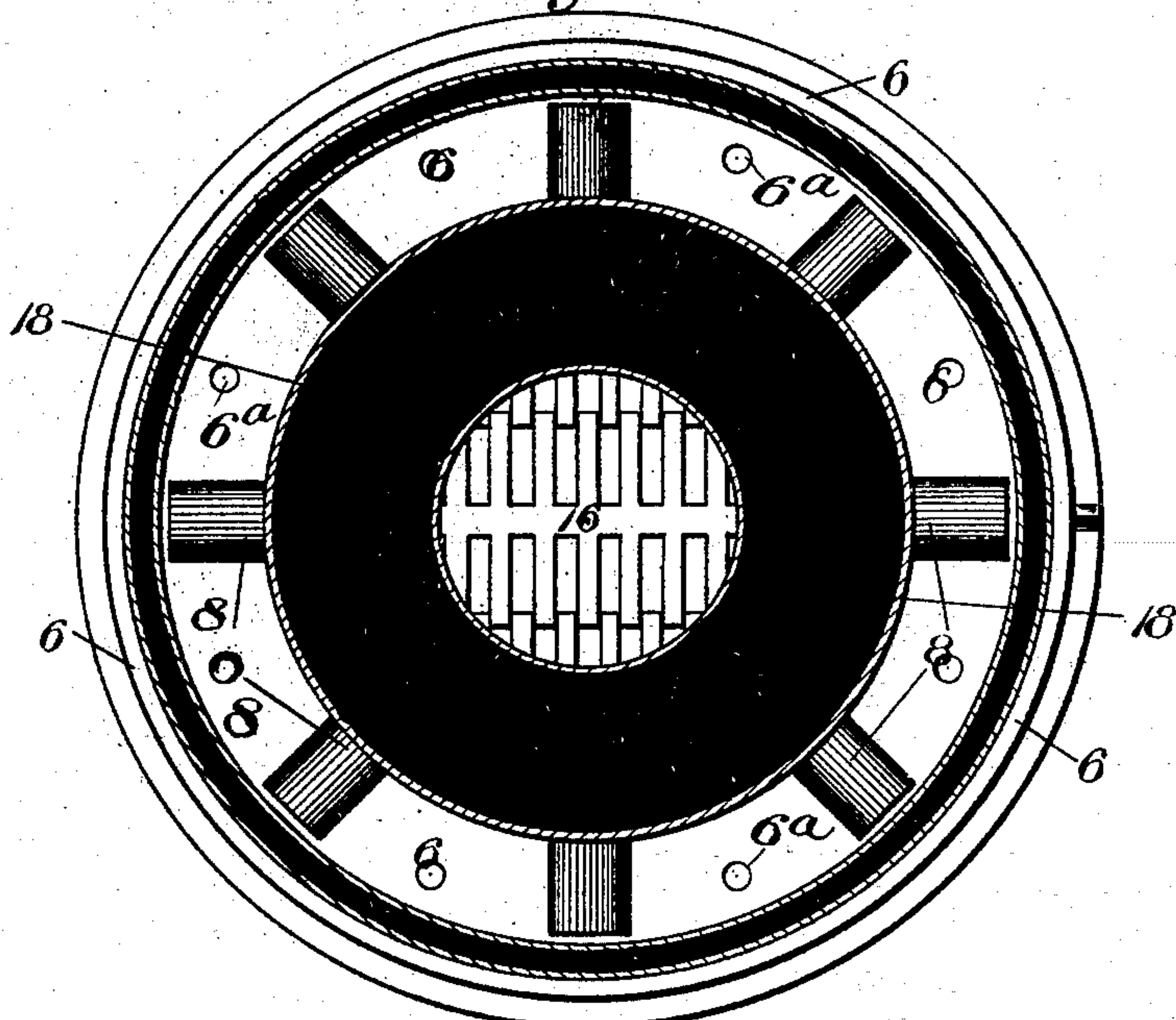
G. A. WATSON.  
APPARATUS FOR PRODUCING AND UTILIZING GAS FOR HEATING  
PURPOSES.

No. 503,817.

Patented Aug. 22, 1893.



*Fig. 2.*



*Fig. 3.*

*Witnesses,*  
*C. L. Lawrie.*  
*L. Foulds.*

*Inventor,*  
*Geo. A. Watson*  
*by Charles H. Riches*  
*his Atty.*



# UNITED STATES PATENT OFFICE.

GEORGE A. WATSON, OF TORONTO, CANADA, ASSIGNOR OF SIXTY-ONE ONE-HUNDREDTHS TO WILLIAM HENRY LAIRD, OF NEW YORK, N. Y.

APPARATUS FOR PRODUCING AND UTILIZING GAS FOR HEATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 503,817, dated August 22, 1893.

Application filed October 20, 1892. Serial No. 449,494. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. WATSON, pattern-maker, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented a certain new and useful Apparatus for Producing Gas and Utilizing the Produced Gas for Heating Purposes; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in heating stoves or furnaces, and particularly in that class of such devices wherein a down draft is employed to facilitate the combustion of the fuel, and the object is to provide a furnace of this character which shall present certain important advantages and economies over other devices heretofore employed, all as will be fully hereinafter described.

The novel features of my invention will be carefully defined in the claims.

In the accompanying drawings which serve to illustrate my invention—Figure 1 is a vertical axial section of a heating stove or furnace embodying my improvements and Fig. 2 is a cross sectional view on the lines *a—*a** Fig. 1. Fig. 3 is a cross sectional view on the lines *c—c* Fig. 1.

Like numerals of reference refer to like parts throughout the specification and drawings.

The device consists essentially of a fire box comprising a combustion chamber 1, the lower portion 1<sup>a</sup> of which is of a grate bar construction having openings 2, between the grate bars. These openings 2 are in direct circulation with the outlet 5 to the chimney. Formed integrally with the lower extremity of the combustion chamber 1 is an annular flange 6 which separates the outlet 5 to the chimney from the ash pit 7. Formed through the walls of the combustion chamber 1 at a point above the line of combustion is a series of openings 8 each of which opens into a duct 9. Each of the ducts 9 is preferably located on the outer side of the combustion chamber 1 and in the outlet 5 to the chimney and extends downwardly from the openings 8 through the annular flange 6 to the under side of the bottom of the combustion chamber. The lower end of each of the ducts 9 is open to permit

of the passage of a current of air upwardly through them to enter the upper portion of the combustion chamber within the fire-box. Formed in the ash pit 7 and on the underside of the bottom of the combustion chamber is a mixing chamber 10 having for its bottom a cone shaped perforated metallic plate 10<sup>a</sup> supported by an annular metallic band in the form of an inverted frustum of a cone. The perforated metallic plate 10<sup>a</sup> is so secured to the annular band 11 that it can swing downward to discharge off its upper surface the ashes which would naturally accumulate in the course of time upon it.

As shown in the drawings the lower extremity of the combustion chamber 1 is provided with a grate 16 suitably supported and of any ordinary construction. Located in the combustion chamber 1 and entering it at the upper end is a fuel magazine 4 which contains the fuel to be consumed within the combustion chamber. The fire or burning fuel rests upon the grate 16 closing the lower extremity of the combustion chamber 1. While the fuel on the grate 16 is burning the fuel within the combustion chamber 1 above the line of combustion is undergoing a system of decomposition or distillation. The gases produced from the fuel within the upper part of the combustion chamber are combined with a current of heated air introduced into the upper part of the combustion chamber by means of the air ducts 9. The oxygen of the heated air combining with the produced gases renders the gases highly inflammable. The gases combined with the oxygen of the heated air are then drawn downward through the burning fuel and are then permitted to pass through the openings 2 into the outlet 5 to the chimney.

By reference to the drawings it will be noticed that the fuel in the upper part of the combustion chamber is cone-shaped leaving a space between itself and the walls of the combustion chamber in which space the gases accumulate. These gases preferably pass downward through the fuel at or near the outer edge of the fuel or that portion of the fuel contiguous to the inner wall of the combustion chamber. These gases after having passed through the fuel are converted into carbon dioxide by an additional current of



heated air permitted to pass upward through the grate 16 from the mixing chamber 10 below the under side of the said combustion chamber and which combines with the said gases in the outlet 5 to the chimney a second combustion taking place in the said outlet. The fuel which is consumed in the lower part of the combustion chamber is before it is consumed in the form of coke and the air which supports this combustion is obtained from this additional current of air. The inflammable gases after passing from the fuel pass through the openings 2 to the outlet 5 to the chimney. To effect more complete combustion with some classes of coal I find it advisable to form through the annular flange 6 a series of small openings 6<sup>a</sup> to admit of a small additional current of heated air from the mixing chamber 10 to the outlet 5 to the chimney. This said small current of air assists the combustion taking place within the said outlet.

By the passage of the afore-mentioned gases through the burning fuel the conversion of the said gases into carbon dioxide is accomplished and the heat units are abstracted from the said gases during such conversion and these gases which have hitherto passed from the furnace in the form of soot, smoke, and other condensed matter on account of their non-conversion into carbon dioxide are clarified during their passage through the burning fuel and the carbon dioxide into which they are converted passes off in the form of an invisible gas thus completely solving the momentous question of the smoke difficulty.

It might here be stated that after the gases have been abstracted from the coal the coal is converted into what is commonly known as coke and this coke is what we have been describing principally as the burning fuel.

The heat radiated from the combustion chamber is so intense that I find it advisable to surround the combustion chamber by a water jacket 18 which is fitted with suitable flow and return pipes or if necessary it may be put into circulation with additional water sections so arranged around the furnace that they will absorb any of the escaping heat from the combustion chamber.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In the herein described apparatus for producing gas and utilizing the produced gas

for heating purposes the combination of a combustion chamber, a series of tubes surrounding the outer side of the combustion chamber and extending from the lower extremity to a point at or near the upper extremity thereof the combustion chamber having formed through its wall at or near the upper extremity a series of apertures to connect with the passages through the said tubes, means for connecting the lower extremity of the tubes with the atmosphere said tubes adapted to convey a current of air to the upper portion of the combustion chamber, a gas chamber and means for forming an outlet to the chimney, the combustion chamber having formed at or near its lower extremity a series of openings to the gas chamber, the gases and air in the upper portion of the combustion chamber adapted to be drawn downwardly through the burning fuel and pass through the openings at the lower extremity of the combustion chamber to the outlet to the chimney, substantially as described.

2. In the herein described apparatus for producing gas and utilizing the produced gas for heating purposes the combination of a combustion chamber, a series of tubes surrounding the outer side of the combustion chamber and extending from the lower extremity to the upper extremity thereof, a gas chamber on the outer side of the combustion chamber, an outlet from the gas chamber to the chimney, a series of openings formed at the upper extremity of the combustion chamber to connect with the passages in the said tubes, a series of openings at the lower extremity of the combustion chamber to connect with the gas chamber, a mixing chamber below the combustion chamber, means for connecting the mixing chamber with the lower extremity of the said tubes, means for feeding the mixing chamber with atmospheric air, said tubes adapted to feed a current of atmospheric air from the mixing chamber to the upper extremity of the combustion chamber to combine with the gases thereat, the combined gases and atmospheric air adapted to be drawn downwardly through the burning fuel and pass through the openings at the lower extremity of the combustion chamber to the gas chamber, substantially as described.

Toronto, October 8, 1892.

GEO. A. WATSON.

In presence of—

ROBERT LAIRD,

CHARLES H. RICHES.