(No Model.)

H. B. CHESS.

HEATING BURNER FOR GAS AND OTHER HYDROCARBONS.

No. 322,791. Patented July 21, 1885.

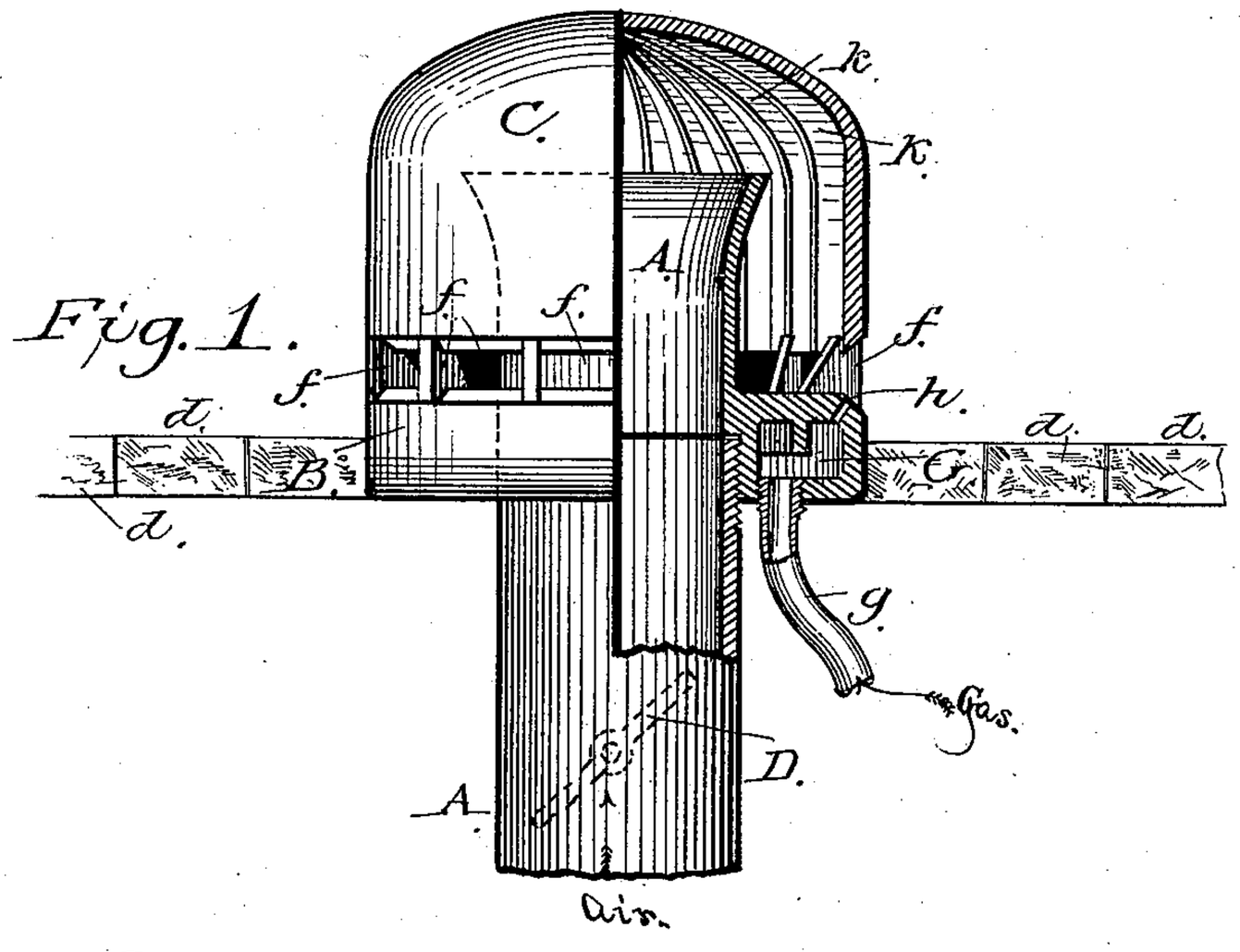


Fig. 1.

Fig. 2.

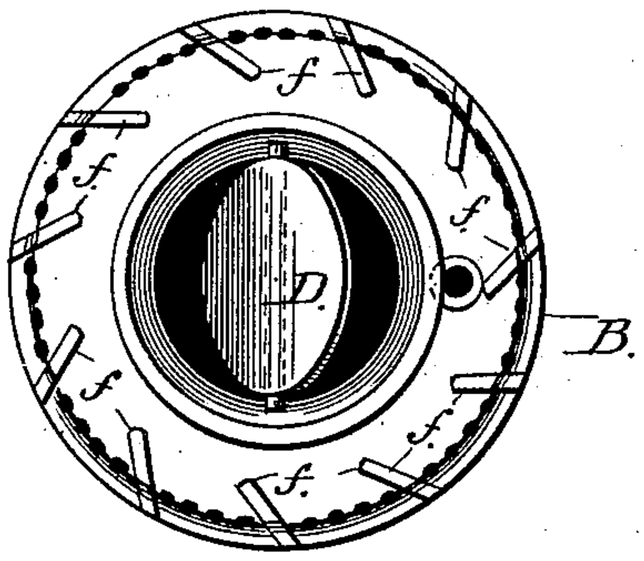
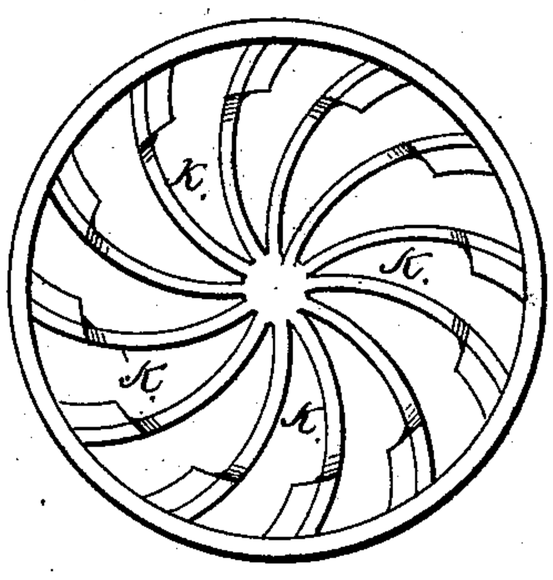


Fig. 3.



WITNESSES

T. Walter Fowler

H. B. Applewhaite

INVENTOR

Harry B. Chess

by A. N. Evans & Co.

Attorney

UNITED STATES PATENT OFFICE.

HARVEY B. CHESS, OF PITTSBURG, PENNSYLVANIA.

HEATING-BURNER FOR GAS AND OTHER HYDROCARBONS.

SPECIFICATION forming part of Letters Patent No. 322,791, dated July 21, 1885.

Application filed May 18, 1885. (No model.)

To all whom it may concern:

Be it known that I, HARVEY B. CHESS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Heating-Burners for Gas and Other Hydrocarbons, 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 represents a heating-burner and an air-tube. Fig. 2 is a plan view of the air-tube, showing a flange provided with a circular opening and suitable supports for a dome, as will be fully explained hereinafter. Fig. 3 is a plan view of the dome.

To enable others skilled in the art to make and use my invention, I will now proceed to describe the exact manner in which I have carried it out.

The object of my invention is to provide a means of heating and distributing gas in such a manner as to secure the greatest amount of heat from a given quantity of gas in the shortest possible time; and to this end it consists, first, in partially heating the gas and forcing it by pressure through fine orifices in a distributing-pipe, thus diffusing it into the surrounding heated air in a comparatively fine state, or, in other words, to substantially atomize the gas to facilitate ready and rapid combustion.

It consists, further, in providing a means of partially heating a current of air and diffusing the latter through the atomized gas as the latter emerges from the orifices, as will be hereinafter fully explained.

It consists, further, in giving the hot air and gas a spiral or circular motion, and thus completely commingling the one with the other to produce uniform heat throughout the combustible column of commingled gas and heated air.

To attain the greatest calorific power of all combustible gases, it is essential that gases and air shall be of proper temperature, that fixed quantities of these shall be brought together, and that this mingling shall be accomplished at such a point that perfect combustion shall ensue at the point or location desired, and that no extraneous air whatever, of proper or improper temperature, shall be allowed to mingle with such gas, or the mixture provided by fixed measurement, and that this properly-gaged (as to amount) gas shall be so finely divided as it commingles with the air that instantaneous combustion will ensue.

More than the proper quantity of air admitted is wasteful, as a factor of unnecessary dilution, and is a wasteful burden, as it must in its passage require or consume heat, this even if highly preheated. If the air be cold even more extreme consequences ensue. This applies to all unnecessary supply of air, whether supplied in the way provided for or by entrance through common supply air-openings into the combustion-chamber.

It has been found in the use of natural gas that heating it highly or to the temperature of the usual preheated air is wasteful and generally produces mischievous results. Heated to a temperature of 1,200° Fahrenheit the carbon is disassociated and it is deposited (upon such disassociated gases first meeting the air) in the solid form of soot or coke, and so adjacent to the point of emission as to frequently clog the apparatus.

It has been found that natural gas, physically, is so volatile and light that the mixing and commingling are best accomplished by injecting it into highly heated or preheated air at a very low temperature, and out of this fact of its extreme natural rarefaction comes the necessity for injecting it in finely-divided streams into the heated air-currents, and this at a proper point. Introducing it in large streams results in its traveling unconsumed, because its mass, like that of all fluids, may travel undisturbed and unbroken in the form of clots or clouds, with only the outer surfaces acted on and affected by the oxygen of the admitted air. The result of this is lost effect at the proper place, and the combustion finally may occur in an improper place, as beyond the hearth or heating-chamber, in the uptake, chimney, or even open air, all of which is wasteful of the fuel, and in the case of combustion in the chimney decidedly mischievous. This ideally-perfect fuel is inflexible in its adherence to the well-known law that for perfect combustion the fuel must be finely divided, and that to each atom of fuel a proper atomic proportion of oxygen, properly pre-

pared by heating, must be combined for perfect combustion.

The final direction of both gas and air supply is important, and the velocity of the gas should be such as to assist in determining both the direction and velocity of the incoming air.

A designates the air tube or nozzle, the upper end of which is made bell-shaped to accommodate the heated air as it is expanded. In the lower portion of this tube is a valve, D, to regulate the amount of air which shall be admitted into the dome. This tube is provided at its upper portion, near its mouth, with a flange, B, which forms an annular chamber extending around it, and within it, on the top of this flange, is a series of projecting ribs, *f f*. Below the upper surface of this flange is formed the annular chamber G, into which the gas is conducted, and by perforations or holes *h h h* the gas escapes and is diffused throughout the heated air substantially in an atomized state. The gas is fed into the annular chamber G by the pipe *g*.

C designates a dome, which fits over the tube A and rests on the ribs *f f*. The interior of the dome from apex to bottom, and integral therewith, is provided with radial ribs *k k k*, which provide a larger heating-surface for the air, as well as being a means of strengthening the dome. By making these ribs *k k* concavo-convex in cross-section and longitudinally I get the effect of giving the heated air a torsional or circular motion as it emerges from the lower edge of the dome through the spaces between the projections *f f*, which latter are also at an angle to the radius of the flange B on the tube A.

The burner may be rectangular in shape without departing from the spirit of my invention.

The dome is preferably made of metal where low temperature is employed; but where the temperature is to be very high the dome should be made of brick or the refractory material of a crucible.

By making the device elongated it is better adapted for firing boilers, while the circular form is better adapted for use in circular furnaces.

By removing one or more of the grate-bars it may be placed in position, while the remaining bars are covered or floored over with fire-bricks *d d*, laid flatwise to exclude external air. This removal of a few of the bars and the bricking of the remaining area is the only modification needed to change from the usual solid fuel to that of gas, as it will be seen the same principles are used and the same arrangement and effect is produced.

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

1. In a heating-burner for gas, the combination of the tube A, the dome C, and flange B, forming the annular chamber G, and having the perforations *h h*, substantially as herein described.

2. In a heating-burner for gas, the tube A, having the bell-shaped nozzle, and the annular chamber G, provided with the orifices *h h*, in combination with the dome C, substantially as herein described.

3. In a heating-burner for gas, the bell-shaped tube A, having the flange B, said flange provided with the projections *f f*, in combination with the dome C, substantially as herein described.

4. In a heating-burner for gas, the dome C, provided with ribs *k k*, in combination with the tube A, having the flange B, forming the annular and perforated chamber G, substantially as herein described.

5. In a heating-burner for gas, the tube A, having the valve D, and annular chamber G, provided with the perforations *h h*, in combination with the dome C, substantially as herein described.

6. In a heating-burner for gas, the tube A, having the annular chamber G, provided with openings *h h*, in combination with the dome C and the bricking *d d*, substantially as herein described.

HARVEY B. CHESS.

Witnesses:
W. N. EASTON,
T. J. RODGERS.