W. BOGGETT & E. B. PETTIT.

HEATING, WARMING, AND COOKING BY GAS.

No. 10,793. Patented Apr. 18, 1854.

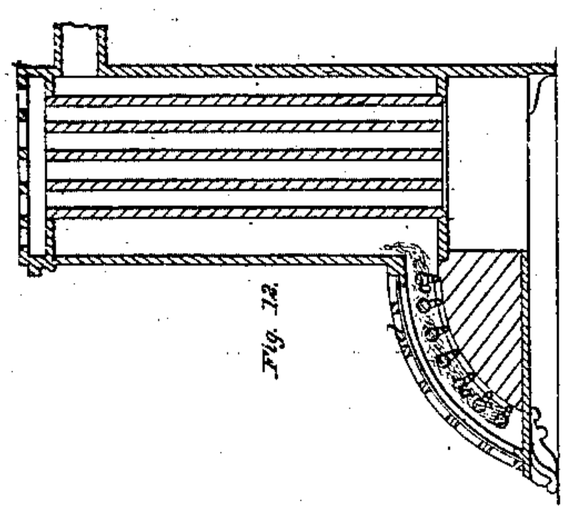

Fig. 12.

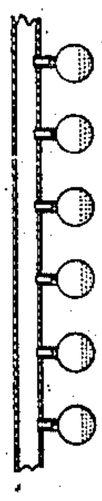

Fig. 13.

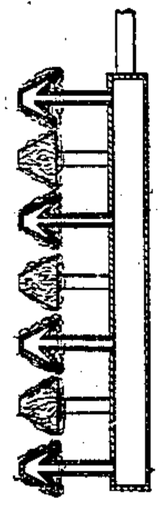

Fig. 14.

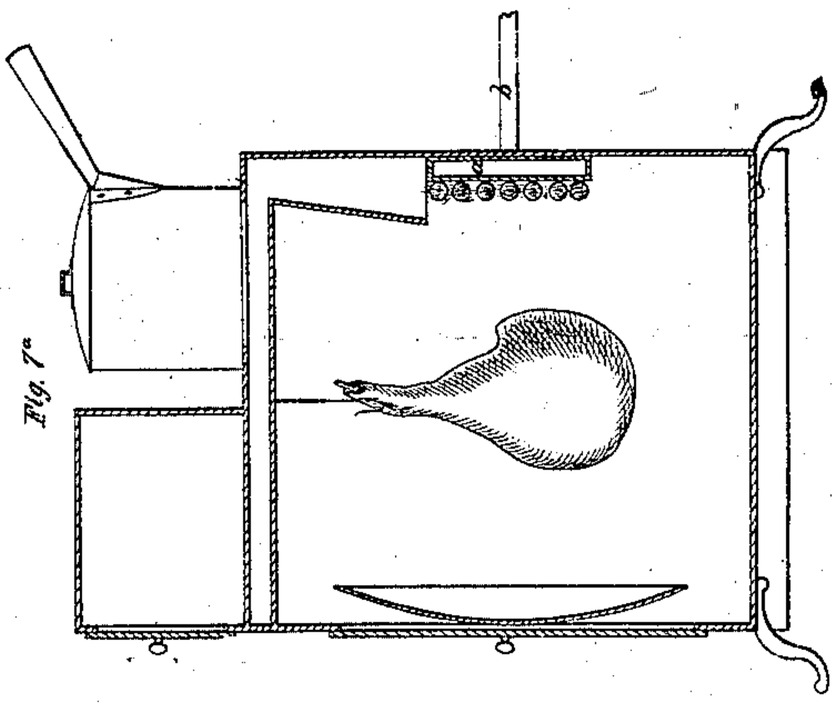

Fig. 7.

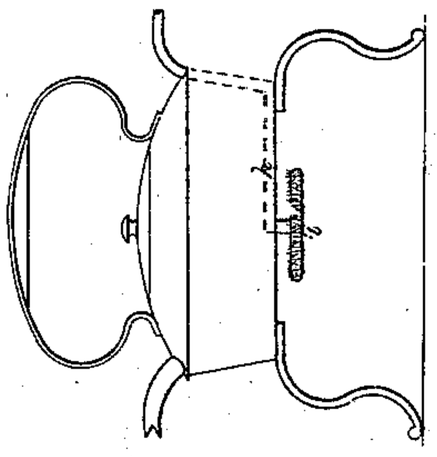

Fig. 16.

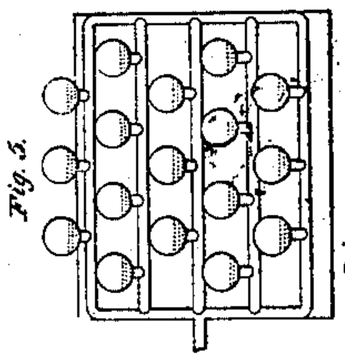

Fig. 5.

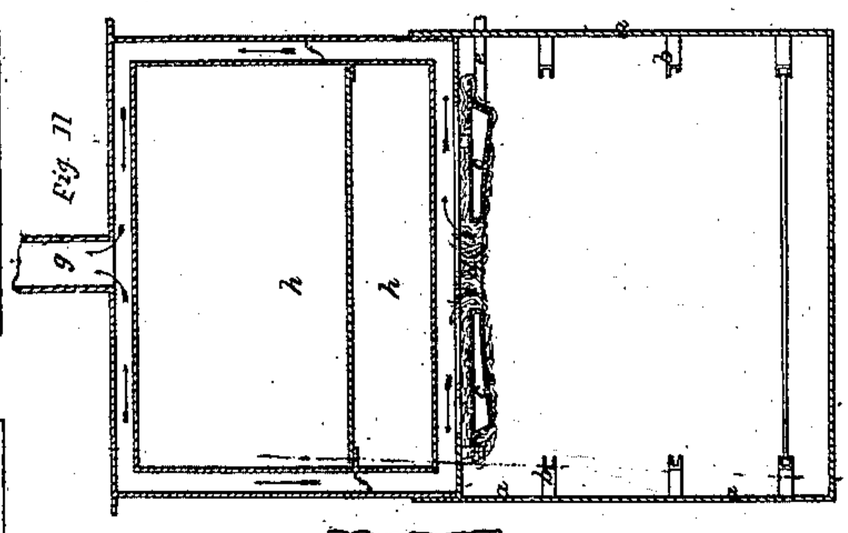

Fig. 11

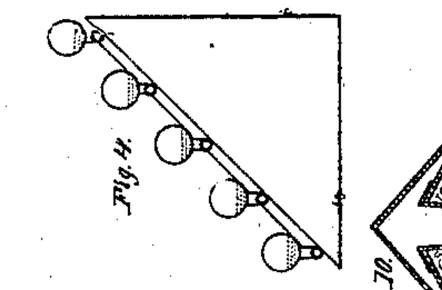

Fig. 4.

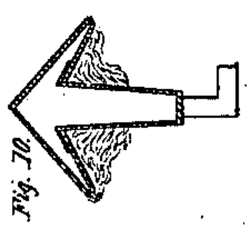

Fig. 10.

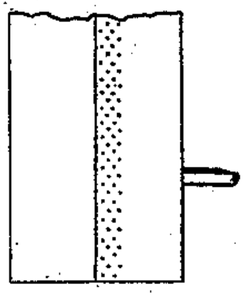

Fig. 10a.

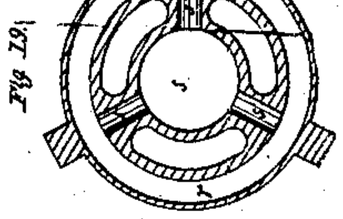

Fig. 19.

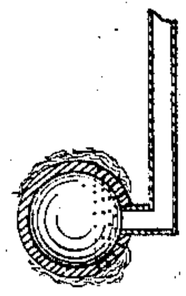

Fig. 3.

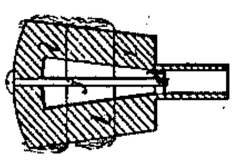

Fig. H.

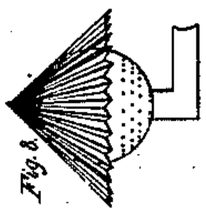

Fig. 8.

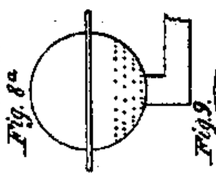

Fig. 8a.

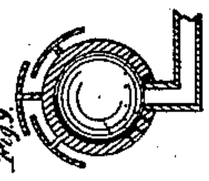

Fig. 9.

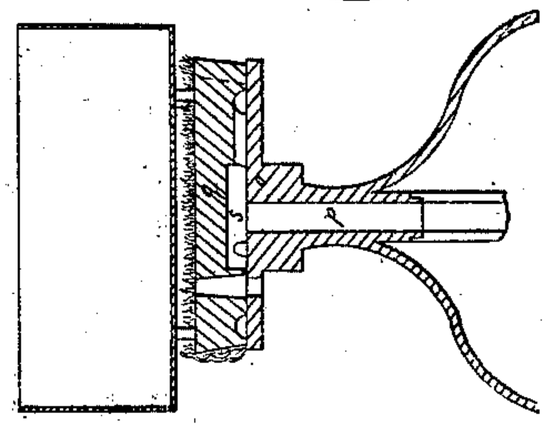

Fig. 18.

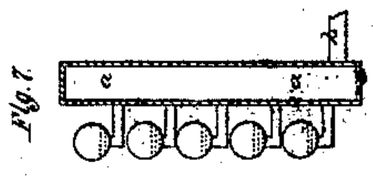

Fig. 17.

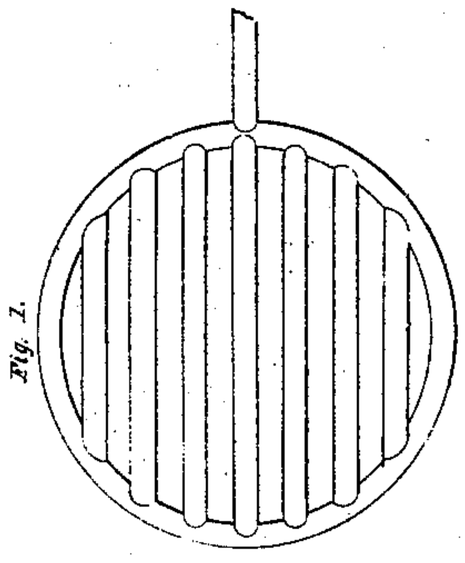

Fig. 1.

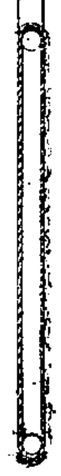

Fig. 2

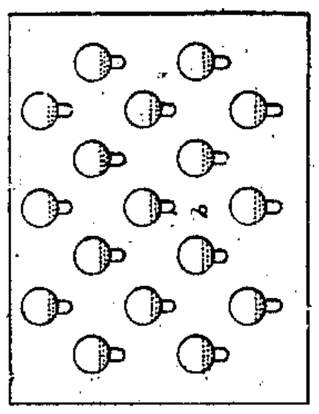

Fig. 6.

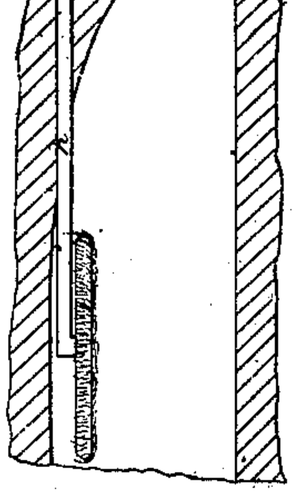

Fig. 15.

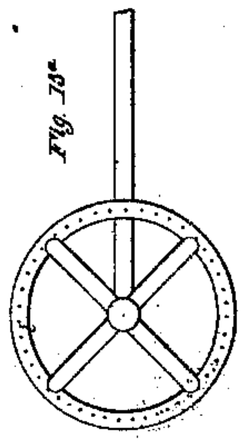

Fig. 13a.

UNITED STATES PATENT OFFICE.

WILLIAM BOGGETT AND G. B. PETTIT, OF WESTMINSTER, ENGLAND.

METHOD OF HEATING, WARMING, AND COOKING BY GAS.

Specification of Letters Patent No. 10,793, dated April 18, 1854; in England, October 22, 1851.

To all whom it may concern:

Be it known that we, WILLIAM BOGGETT and GEORGE BROOKS PETTIT, of Lisle street, in the city of Westminster, England, gas-engineers, subjects of the Queen of Great Britain, have invented Improvements in Heating, Warming, and Cooking; and we do hereby declare that the following is a full and exact description of our said invention.

Many attempts have been made and contrivances invented for applying the combustion of inflammable gases to the purposes of heating baking boiling roasting and cooking in general but we believe that prior to our invention this object has never been effected with economy or efficiency and for the reason that the burners have been constructed to effect the combustion of the gas in the same or essentially the same manner as for the purpose of illumination. When applied to the purpose of illumination the flame from the gas should be of light yellow color or nearly white and to obtain such a flame it has long been known that the supply of gas and oxygen must be free and copious for if the supply of oxygen is insufficient the combustion will be imperfect and unconsumed carbon will escape in the form of smoke which is even more objectionable in the operations of cooking and heating than for illuminating purposes. To prevent the emission or escape of smoke previous inventors have so contrived their burners for the purposes of heating and cooking as to effect the combustion of the gas on the same principle or according to the method usually pursued in the combustion of gas for illumination such burners must of necessity have produced a light yellow flame with a wasteful expenditure of gas producing at the same time much light and little heat while a blue flame will give much heat and but a faint light. So long therefore as the supply of gas and oxygen is copious the result will be the very reverse of what is desired. And if the supply of oxygen be insufficient for the supply the carbon of the gas will escape unconsumed and produce smoke.

Pursuing the method adopted for the application of the combustion of gas to illuminating purposes those who have heretofore attempted the application of carbureted hydrogen to the purposes requiring intensity of heat have generally made the apertures for the escape of the gas at the upper part of the vessel or tube containing or supplying the gas and when the apertures have been made at the side they have been made through a surface inclining backward from the vertical line so as to make the escape as nearly upward as practicable in order that the flame should not be impeded by striking the surface and so that the upward current of atmospheric air produced by the rarefaction should as little as possible impede the discharge of the gas.

Another important consideration in the combustion of gas for heating is to produce the greatest result with the least consumption of the combustible. It is well known that the higher the temperature of the combustible and the supporter of combustion (oxygen of the atmosphere) before actual ignition takes place the greater will be the intensity of heat produced with a given consumption of combustible. But this however important in the generating of heat is directly objectionable in the production of light and hence this important means of economy has not heretofore been brought into requisition in the application of gas to the purposes of heating.

In perfecting our invention we have pursued a method directly the reverse of that heretofore pursued in the combustion of gas for light and heat and in conformity to our improvements we cause the upward current of air produced by the rarefying influence of the heat to oppose or prevent the efflux or discharge of the gas and not only to impede the discharge but to cause the air to impinge as much as practicable against the gas at the point of discharge or by checking the upward movement of the inflammable gas cause it to press laterally and thus avoid the precipitation of unconsumed carbon and thereby effectually prevent smoke and at the same time heat the approaching atmospheric air and the vessel through which the gas passes to the point of ignition. We are thus enabled to effect the combustion of the gas with a blue flame so as to produce an intense heat without smoke and with a slight expenditure of gas while at the same time we are enabled to produce the flame on the under surface of the gas chamber from which the gas escapes so that for the purposes of roasting boiling and other cooking purposes the heat of the flame will be radiated downward onto the

article to be cooked thus avoiding the injurious effects caused by the falling of the fatty and other liquid or liquefied matter onto the fire or ignited gas below and also preventing the articles during cooking from being injured by the products of combustion. In order to effect these objects and to obtain the greatest possible amount of heat from the combustion of the gas we propose to supply the gas for the purposes of heating and cooking through minute apertures in combination with the method of causing the upward tendency of the air by rarefaction to impinge upon or move toward the gas apertures so as to check the discharge of the gas and effect its combustion at or near the orifice or orifices of discharge.

The burners which we have invented to effect these objects consists of a chamber through which the gas passes to the discharge aperture or apertures for the escape of the gas the said chamber being so located that the flame shall be in actual contact with it for the purpose of heating it and thereby raising the temperature of the gas preparatory to its ignition the air being also heated as it approaches the flame.

In the accompanying drawings we have shown various plans for carrying our invention into effect consisting principally of different constructions or arrangements of burners all of which for whatever purposes they may be employed are constructed on the same principle.

Figure 1, is a plan and Fig. 2, a sectional view of the simplest form of burner which consists merely of a number of tubes perforated on their undersides so as to allow the combustible gas when issuing therefrom to become mixed with the atmospheric air which will impinge and press against the issuing gas. This arrangement may be applied either to cooking or heating purposes and it will be seen that the flame of the gas will heat the gas in the pipes before it issues therefrom.

Fig. 3, is a novel form of burner which we employ for either cooking or heating and find to give out immense heat. It consists simply of a hollow ball perforated on its under side for the purpose of allowing the gas to issue therefrom and commingle with the oxygen of the atmosphere. The gas during ignition will envelop the ball and make it red hot and cause it to give out an intense heat in addition to the heat of the flame. Any convenient number of these burners may be combined together by screwing or otherwise fixing them on lateral supply pipes as shown in Figs. 4 and 5 and they may be screwed either in the upper or underside of these pipes.

Fig. 6, is a front elevation and Fig. 7, a sectional view of another arrangement in which the burners are attached to a vertical chamber *a* which is supplied with gas by a pipe *b* and may be employed for the purposes of either heating or cooking.

Fig. 7[a] is a sectional view of a cooking stove provided with a set of these burners arranged vertically.

Figs. 8, 8[a], and 9, are other forms of burners which are merely modifications of that shown in Fig. 3 and are more particularly applicable for cooking purposes as will be more fully explained hereafter.

When these burners are used for warming or heating buildings we sometimes place between them asbestos which when heated by the flame of the gas will increase the heat given off by the apparatus. The burners may also be covered up with talc and the products of combustion carried away through perforated bricks made of fire clay. As shown in Fig. 12 *c c* are the series of burners and *d d* the perforated bricks through which the products of combustion are conveyed to the flue and in so doing heat the bricks and cause them to radiate heat into the apartment.

Fig. 10 is a somewhat different form of burner to that shown in Fig. 3, but constructed on the same principle. In this instance the apertures for the escape of the gas for ignition are placed at the sides of a long narrow chamber which is provided at top with a kind of penthouse cover. The gas in issuing from the lateral apertures heats the metal cover and not only gives off great heat but also raises the temperature of the gas in the chamber before it issues therefrom. This burner is also peculiarly applicable for broiling purposes in as much as the burners are protected from being clogged up by any fat or other extraneous matter that may fall thereon.

The burner shown on Fig. 3, may be protected in the same manner by means of a roof as shown at Fig. 8, or by a circular shoulder as shown in Fig. 8[a].

Fig. 11, is a sectional view of a cooking stove with another form of burner especially adapted for the purpose but constructed upon the same principle of downward burning. *a a* is the outward case of the apparatus, *b b* are grooves or ledges attached to the sides of the same for the purpose of receiving a metal plate or trough on or in which may be placed the article or articles to be cooked. *c c* is the burner which consists simply of a flat shallow chamber perforated at its under side which is also made slightly conical or inclined toward the center where there is a large circular opening *d* for the purpose of allowing the products of combustion to escape into the flue. Gas is supplied to the interior of the chamber *c* through the pipe *e* which may be made

to communicate with the gas main by means of a flexible pipe.

The gas when supplied to the chamber *c* issues therefrom through the perforations on the under side and while burning heats the chamber and by reflection throws down a great heat on any article that may be placed beneath. The heated gases ascend through the opening *d* and pass around the hollow space *f*, which surrounds the oven *h* above and thereby heats the same after which it escapes into the flue *g*. Sometimes we employ a series of burners similar to those shown at Fig. 3 with this exception that their position is reversed and the upper or curved part is perforated. This arrangement is shown in Fig. 13ª, and acts in precisely the same manner as that already described. For boiling or stewing we employ the forms of burners shown in Figs. 3, 8, 8ª, or 9 arranged in the manner shown in Fig. 13ª, so that a saucepan or other vessel may be placed thereon.

Fig. 14, is a sectional view of another form of burner which we call the boiling or stewing burner. It consists simply of a vertical tube with lateral openings and is provided with a conical cover on the top of which the cooking vessel may be placed. A number of these are screwed onto a flat shallow chamber composed of two plates as shown. Fig. 15, represents a plan for heating a bakers oven by means of a downward flame. *h* is a supply pipe connected with the gas main from whence gas is conveyed to a circular or ring burner *i i* perforated at its underside.

Fig. 16, is an elevation of a tea-kettle which may be heated by gas. A ring burner *i* is placed at the bottom of the kettle and communicates with a pipe *h h* inside and having its entrance aperture at back. To this is attached a flexible pipe communicating with the supply pipe and a very small supply of gas will suffice to boil the water in the kettle in a very short time. It is obvious that this arrangement can be applied to other vessels besides tea-kettles.

Fig. 17, is another form of burner which somewhat differs from some of the preceding ones inasmuch as the exit apertures for the gas are not holes or jets but narrow passages or slits extending all around the burner which consists of three parts connected together by means of a central rod or pin *j* which passes right through and is screwed into a cross piece *k* below. The parts *l l l* of the burner are kept a slight distance apart by means of a washer or other contrivance which will allow the gas to pass from the interior between the parts *l l* and issue in a narrow stream or thin film which when ignited will embrace the burner and heat the same as in the former instances.

Fig. 18 is a sectional view of a modification of the above as applicable for heating water or cooking whereas the construction shown in Fig. 17 and just described is more particularly applicable for warming and heating apartments. This burner consists principally of two plates *o* and *q*. The plate is supported upon feet and has an opening made through the center to admit the gas to a central space *s* made in the upper plate as shown in the plan view Fig. 19, of this plate. The central space *s* communicates by means of the radial channels *s′*, *s′*, with an annular space or channel *r r* near the external edge of the chamber. It will now be seen that as the gas rises from the pipe *p* it enters the central space and passes therefrom into the annular chanel *r r* and from thence out of the burner in a thin film or stream which when ignited will heat the whole of the burner and also the vessel placed above.

Although the best results will be produced by the use of all these burners on our improved plan yet a partial result may be obtained by other burners of a somewhat different construction but on the same principle and therefore we do not wish to be understood as limiting ourselves to the peculiar construction of burners herein shown and we are aware that gas burners have been made with a gas chamber heated by the flame but in such cases the surface has either been inclined from the flame or placed beneath it instead of being inclined toward, that is over the flame or partially so for the purposes and according to the method herein specified.

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

1. Making gas burners for heating and cooking purposes with minute apertures from an inverted or inclined surface or surfaces, substantially as herein described, so that the upward current or currents of atmospheric air shall be made to impinge and act on the issuing gas at the point or points of issue on the principle and for the purpose specified.

2. And we also claim combining with burners constructed and operated on the principle specified, a chamber through which the gas shall pass to supply the issues and so located that the flame shall impinge against the surface thereof, for the purpose and in the manner set forth.

WILLIAM BOGGETT.
GEORGE BROOKS PETTIT.

Witnesses:
FRED WALKDEN,
T. CHAMPION.