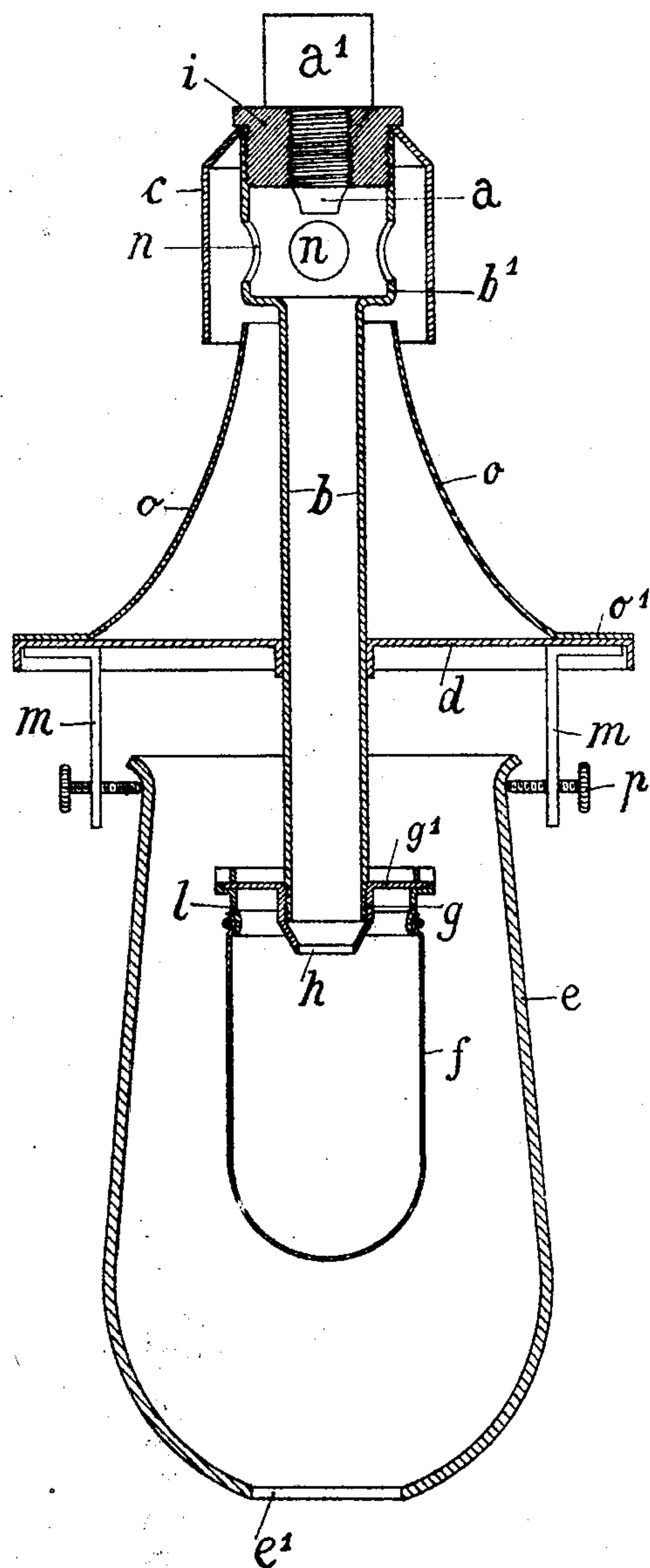


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E. KRAMER.
INVERTED INCANDESCENT GAS BURNER.
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Witnesses:

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INVERTED INCANDESCENT GAS-BURNER.

No. 814,459.

Specification of Letters Patent.

Patented March 6, 1906.

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To all whom it may concern:

Be it known that I, ERWIN KRAMER, a subject of the King of Prussia, German Emperor, residing at No. 9 Paul street, Berlin, Germany, have invented certain new and useful Improvements in Inverted Incandescent Gas-Burners, of which the following is a specification.

My invention relates to downwardly-directed or inverted gas-burners which carry the incandescent body or mantle at the lowest part of the mixing-tube.

The object of my invention is to provide an incandescent gas-burner the mixing-tube of which is considerably heated by the waste gases, so that the combustible mixture of gas and air downwardly conducted within the burner is brought to a high temperature before combustion in order to get a very high luminous efficiency while insuring the greatest economy. In order to attain these purposes, I provide on the free end of the burner-tube a contracted or narrow mouth or a mouthpiece having such mouth, which arrangement allows a combustible mixture which is rich in air to be conducted and heated to a high temperature in the mixing-tube without lighting back of the flame. I prefer to arrange the mouthpiece detachably and changeably for regulating purposes. I further arrange a protecting-globe of glass or the like which surrounds the lower part of the burner-tube to such height that the hot waste gases are directed against and along the burner-tube, thereby heating the latter. For the purpose of further transmission of heat to the burner-tube I arrange thereon a heating-plate, by which the combustion-gases are led laterally above the edge of the globe. In order to prevent the upper part of the burner-tube from being cooled through the atmosphere, I provide a mantle or jacket of hot air round the tube. This air-mantle is inclosed in a funnel-shaped casing which, with its lower wide end, abuts upon the upper face of the heating-plate, while its upper narrow end extends to the head of the burner. Above the upper end of the funnel I place a cap which partially closes the opening at that end. Thus the mantle of hot air is in open communication with the atmosphere; but no circulation takes place. I further provide a washer of a substance which is a non-conductor of heat above the head or suction chamber of the burner. This insulating-body avoids the transmission of heat to the luster to which

the burner is fixed, whereby cooling of the burner would result and the luster would become blackened through the heat.

In the accompanying drawing, which forms a part of this specification, a burner adapted for carrying out these features of my invention is represented in a vertical section.

A nozzle *a*, formed in one piece with a nipple *a'*, projects into a chamber *b'*, which forms the head of the burner and is downwardly continued by a mixing-tube *b*. A number of perforations *n* are provided in the head *b'*, through which openings air is sucked into the suction-chamber by the jet of gas issuing from the nozzle *a* and downwardly conducted within the tube *b*, thereby mixing with the gas.

A mouthpiece *g*, having a contracted mouth *h*, is screwed to the lower end of the tube *b* or detachably fixed thereto by any other suitable means. The narrow opening *h* prevents the flame from lighting back to the nozzle *a*, so that the tube *b* can be made of such a width that even with low gas-pressures an abundant quantity of air is drawn in for inducing complete combustion. Owing to the arrangement of a wide mixing-tube and its narrow mouth, the suction effect of the burner is scarcely altered when becoming heated, and a very intense flame with a blue-green core is produced under all conditions, so that with a small gas consumption and with a single step of air-suction the mantle is raised to a high degree of incandescence. With a given quantity and pressure of gas the flame can be rendered as intense as desired only by altering the width of the opening *h* or by applying a mouthpiece with an opening of different width.

On a flange *g'* of the mouthpiece *g* a ring *l*, which carries the incandescent mantle *f*, is attached by means of a bayonet-joint fitting or the like allowing to fix or loosen the ring and the mantle, if desired.

A plate *d* of circular or any other convenient form is fixed on the tube *b* by means of screw-threads or by brazing, soldering, or the like, so that transmission of heat from the plate to the tube can take place.

Three or more arms *m*, connected with the plate *d* by riveting, brazing, or other suitable means, project downwardly and have screwed therethrough set-screws *p* near their lower extremity. The said screws *p* engage beneath the upper flanged edge of a protecting-globe *e*, of glass or the like, thus supporting

the same at a certain distance below the plate *d*. The globe *e*, which is provided at its lower end with one or more openings *e'* for admission of air to the flame, surrounds the lower part of the tube *b* to a certain height, so as to direct the hot products of combustion upward along the tube *b*, while the plate *d* conducts them laterally above the edge of the globe *e*. In this way the hot gases transmit their heat to the tube *b* and to the plate *d*, so that the mixture of gas and air is very highly heated in the tube. Moreover, this arrangement of the parts does not allow a large quantity of gas collecting in the globe, for which reason violent explosion cannot arise on kindling the burner. In order to prevent the upper part of the tube *b*, which is not touched by the hot waste gases, from being cooled, a mantle or jacket of hot air is formed round the tube by means of a bell, cup, or funnel shaped casing *o*, of metal, the lower wider end of which is fastened upon the upper face of the heating-plate *d*, with its flange *o'*, by riveting, brazing, or the like, forming a tight joint with the same. The upper narrow end of the funnel *o* extends near the head *b'*. I prefer to make the funnel of such a form that it is not in contact with the head *b'*, although the casing may be closed at that place. A cap *c* incloses at a short distance the head *b'* and the upper end of the funnel *o*, so that although the interior of the casing may be in open communication with the atmosphere at that place circulation and the entrance of fresh cold air are obviated. Owing to the close contact of the funnel *o* with the plate *d*, a certain amount of heat is conducted from the latter to the funnel *o*, which heats the air inclosed therein, thus producing a mantle of hot air round the tube *b*. The funnel is preferably made of highly-polished metal whose coefficient of radiation of heat is smaller than that of metal not polished.

In the free end of the chamber *b'* a washer or ring *i* of a substance which is a non-conductor of heat—such as steatite, porcelain, for example—is fastened by corresponding screw-threads, and through a central perforation of the washer the nozzle *a* is screwed, so as to project into the chamber *b'*. The arrangement of the ring *i* presents the advantage that heat is not transmitted from the burner to the luster to which the nipple *g'* is fixed, whereby, on the one hand, the burner would inopportunately be cooled and, on the other hand, the luster becomes blackened. It is not necessary that the joint of the washer on the nozzle and on the head should be gas-tight, and therefore no packing is required. As the gas is not yet expanded in the cold pipe, the flash issuing from the nozzle possesses its full sucking capacity and is able, therefore, to draw in a large quantity of air. Under certain conditions the insulating part or a sec-

ond such may, however, be provided above the nozzle.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; and means for suspending the globe, substantially as described. 75

2. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe having air-admission apertures at its lower end; and means for supporting the globe, substantially as described. 80

3. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; and a protecting-globe fixed to the heating-plate, substantially as described. 85

4. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe which surrounds the lower part of the mixing-tube; and means for supporting the globe, substantially as described. 95

5. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber having air-admission apertures; a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; and a protecting-globe which surrounds the lower part of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the upper edge of the globe, substantially as described. 105

6. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube; a mouthpiece with a narrow mouth detachably fixed to the free end of the mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe; and means for supporting the globe, substantially as described. 110

7. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube; a mouthpiece with a narrow mouth detachably fixed to the free end of the mixing-tube; a heating-plate arranged on the mixing-tube; and a protecting-globe which surrounds the lower part of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the edge of the globe, substantially as described. 125

8. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; means for supporting the 130

globe; and a casing above the heating-plate which is closed in its lower part and incloses a mantle of hot air round the mixing-tube, substantially as described.

5 9. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe having air-admission apertures at its lower end; means for supporting the globe; and a funnel-shaped casing fixed upon the heating-plate, thus forming a chamber in which a mantle of hot air is inclosed round the mixing-tube, substantially as described.

10. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube with a contracted mouth; a heating-plate fixed with its center on the mixing-tube; a protecting-globe; means for supporting the globe; and a funnel-shaped casing fixed with a flange of its lower wider end to the upper face of the heating-plate, substantially as described.

25 11. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber having air-admission apertures; a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; means for supporting the globe; and a funnel-shaped casing which is fixed with a flange at its lower wider end to the upper face of the heating-plate and the upper narrow end of which is not in contact with the mixing-tube, substantially as described.

12. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe which surrounds the lower end of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the edge of the globe; and a funnel-shaped casing fixed upon the heating-plate, thus forming a chamber in which a mantle of hot air is inclosed round the mixing-tube, substantially as described.

50 13. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; means for supporting the globe; a funnel-shaped casing fixed with a flange of its lower wider end to the upper face of the heating-plate; and a cap surrounding the head of the mixing-tube and the upper narrow end of the funnel, substantially as described.

14. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber with air-admission apertures; a mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe which

surrounds the lower part of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the edge of the globe; a funnel-shaped casing fixed with a flange of its lower wider end to the upper face of the heating-plate and the upper narrow end of which is not in contact with the suction-chamber nor mixing-tube; and a cap surrounding the suction-chamber and the narrow end of the funnel, substantially as described.

15. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber with air-admission apertures; a mixing-tube; a mouthpiece with a contracted mouth detachably fixed to the free end of the mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe with air-admission apertures at its lower end; means for supporting the globe; a funnel-shaped casing which is fixed with a flange of its lower wider end to the upper face of the heating-plate and the upper narrow end of which is not in contact with the mixing-tube; and a cap surrounding the suction-chamber and the narrow end of the funnel, substantially as described.

16. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber having air-admission apertures; a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; means for supporting the globe; and a cap surrounding the head of the burner, substantially as described.

17. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube; and a body of insulating material inserted between the mixing-tube and the gas-nozzle, substantially as described.

18. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube having a contracted mouth; and a body of insulating material inserted between the mixing-tube and the gas-nozzle, substantially as described.

19. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a body of insulating material which is inserted between the suction-chamber and the nozzle; a mixing-tube; and a heating-plate arranged on the mixing-tube, substantially as described.

20. In an inverted incandescent gas-burner the combination with a gas-nozzle; of a suction-chamber; a body of insulating material which is inserted between the suction-chamber and the nozzle; a mixing-tube having a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe; and means for supporting the globe, substantially as described.

21. In an inverted incandescent gas-burner,

the combination with a gas-nozzle; of a suction-chamber having air-admission apertures; a body of insulating material which is inserted between the suction-chamber and the nozzle; a mixing-tube; a mouthpiece with a contracted mouth detachably fixed to the free end of the mixing-tube; a heating-plate arranged on the mixing-tube; and a protecting-globe which surrounds the lower part of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the edge of the globe, substantially as described.

22. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a body of insulating material inserted between the suction-chamber and the nozzle; a mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe with air-admission apertures which surrounds the lower part of the mixing-tube and is fixed below the heating-plate at such a distance as to allow the waste gases to escape between the plate and the edge of the globe; and a funnel-shaped casing fixed upon the heating-plate, thus forming a chamber which incloses a mantle of hot air, substantially as described.

23. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a body of insulating material inserted between the suction-chamber and the nozzle; a mixing-tube; a mouthpiece with a contracted mouth detachably fixed to the free end of the mixing-tube; a heating-plate arranged on the mixing-tube; a protecting-globe; means for supporting the globe; and a casing above the heating-plate which incloses a mantle of hot air round the mixing-tube, substantially as described.

24. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a body of insulating material inserted between the suction-chamber and the nozzle; a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe having air-admission apertures at its lower end; means for supporting the globe; a funnel-shaped casing which is fixed with a flange of its lower wider end to the upper face of the heating-plate and the upper narrow end of which is not in contact with the mixing-tube; and a cap which surrounds the head of the burner, substantially as described.

25. In an inverted incandescent gas-burner,

the combination with a gas-nozzle; of a suction-chamber; a body of insulating material which is inserted between the suction-chamber and the nozzle; a cap surrounding the suction-chamber; a mixing-tube with a contracted mouth; and a heating-plate arranged on the mixing-tube, substantially as described.

26. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a suction-chamber; a body of insulating material inserted between the suction-chamber and a nozzle; a cap which surrounds the suction-chamber; a mixing-tube with a contracted mouth; a heating-plate arranged on the mixing-tube; a protecting-globe which surrounds the lower part of the mixing-tube; and means for fixing the globe below the heating-plate, substantially as described.

27. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube; a heating-plate fixed with its center on the mixing-tube; and a funnel-shaped casing fixed upon the heating-plate, thus forming a chamber round the mixing-tube, substantially as described.

28. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a vertical mixing-tube; a heating-plate fixed with its center on the mixing-tube; and a funnel-shaped casing fixed upon the heating-plate, thus forming a chamber round the mixing-tube, which casing is made of highly-polished metal, substantially as described.

29. In an inverted incandescent gas-burner, the combination with a gas-nozzle; of a mixing-tube having a contracted mouth; a heating-plate arranged with its center on the mixing-tube; a protecting-globe; arms downwardly projecting from the heating-plate; and set-screws which engage beneath the flanged edge of the globe, substantially as described.

30. In an inverted incandescent gas-burner, the combination with a gas-nozzle, of a mixing-tube, a heating-plate arranged with its center on the mixing-tube, a protecting-globe and means projecting downwardly from the heating-plate for supporting said globe, substantially as described.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

ERWIN KRAMER.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.