H. S. HUMPHREY.

GAS BURNER FOR WATER HEATERS.

APPLICATION FILED APR. 25, 1904.

907,240. **Patented Dec. 22, 1908.**

2 SHEETS—SHEET 1.

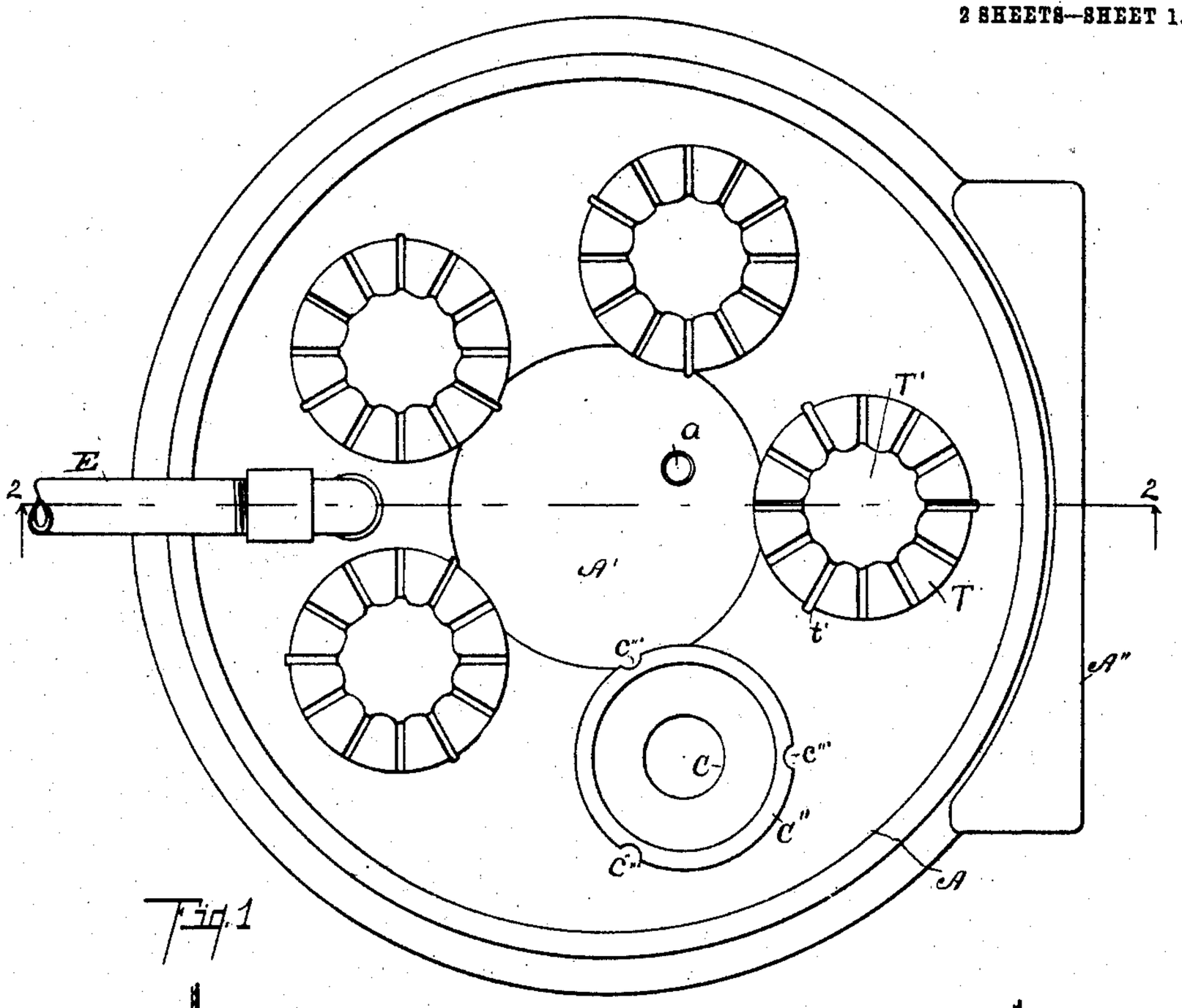

Fig. 1

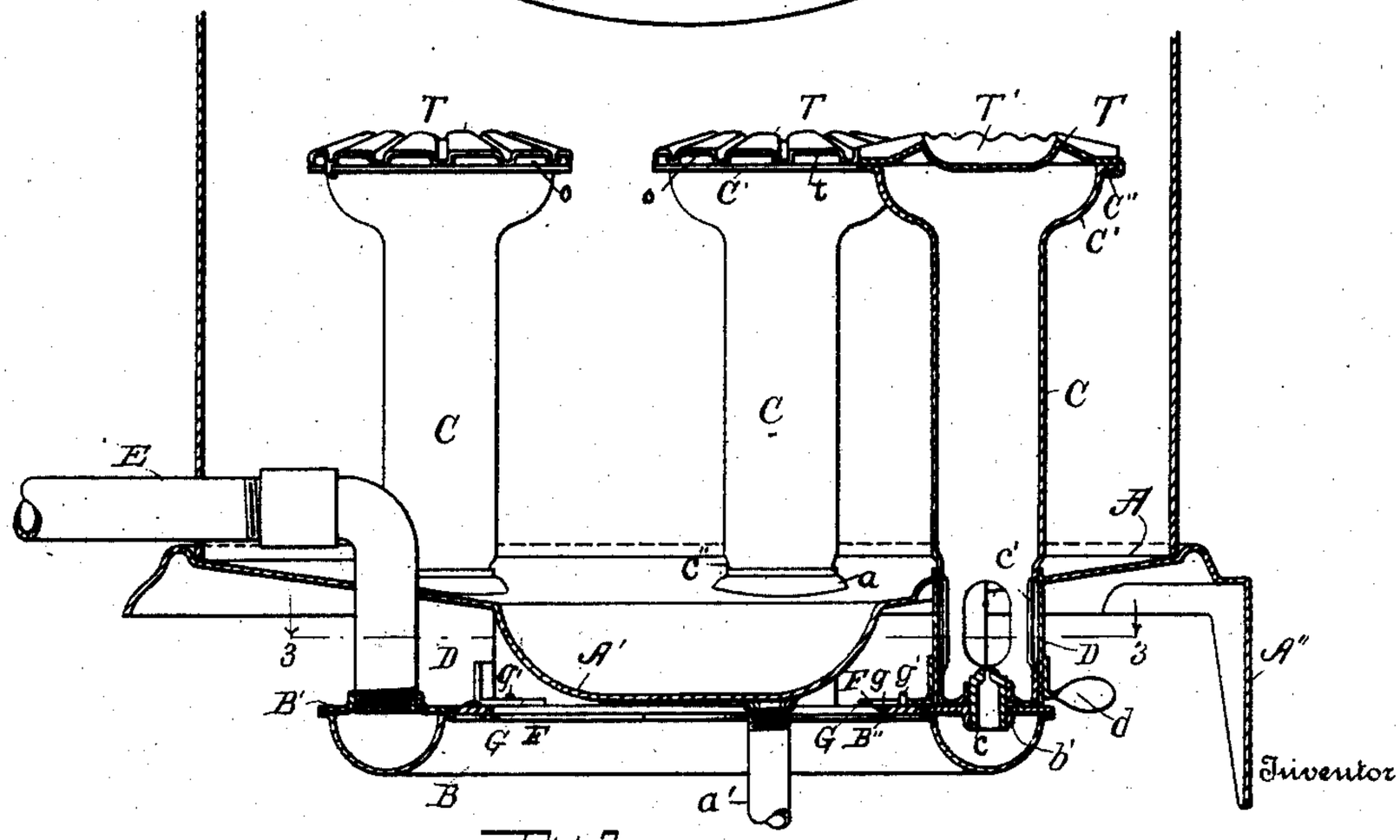

Fig. 2

Witnesses
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Ethel A. Seller

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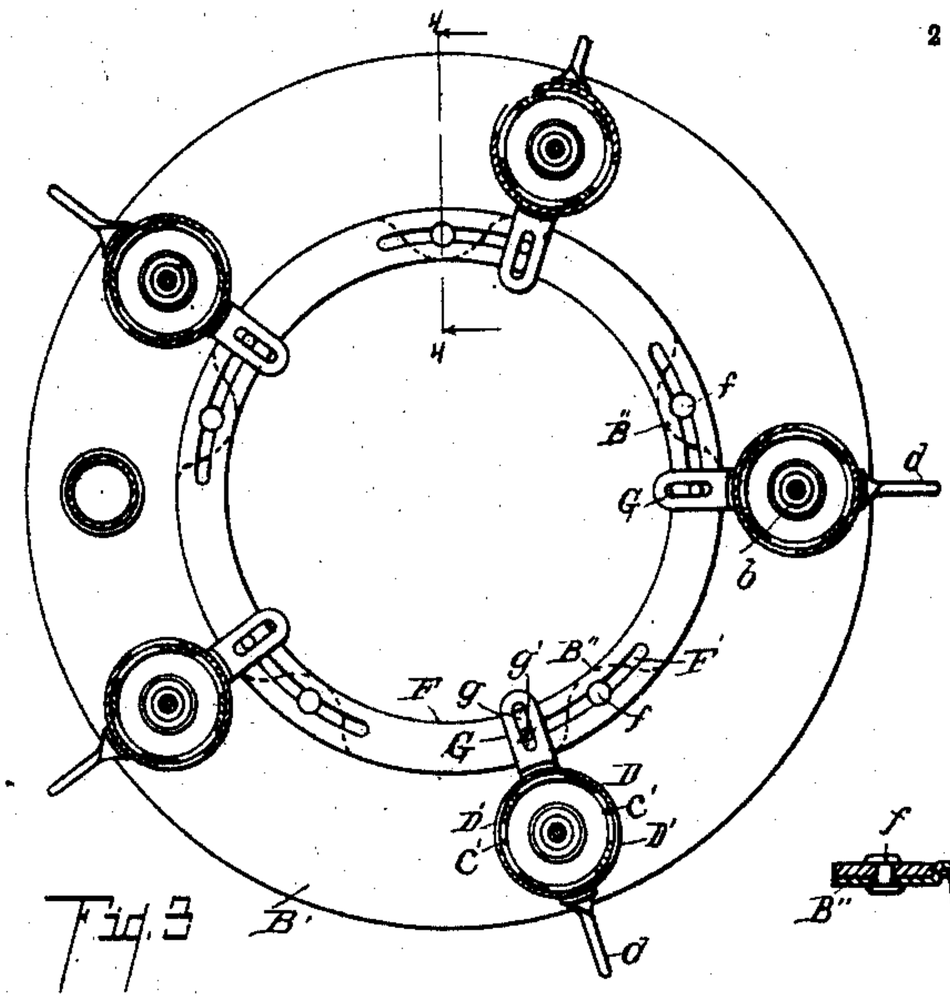

Fig. 3

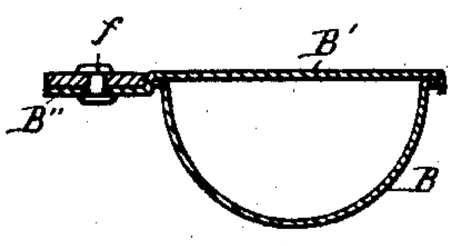

Fig. 4

Witnesses
Otis A. Earl
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UNITED STATES PATENT OFFICE.

HERBERT S. HUMPHREY, OF KALAMAZOO, MICHIGAN, ASSIGNOR TO HUMPHREY COMPANY, OF KALAMAZOO, MICHIGAN.

GAS-BURNER FOR WATER-HEATERS.

No. 907,240. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed April 25, 1904. Serial No. 204,775.

To all whom it may concern:

Be it known that I, HERBERT S. HUMPHREY, a citizen of the United States, residing at the city of Kalamazoo, county of Kalamazoo, State of Michigan, have invented certain new and useful Improvements in Gas-Burners for Water-Heaters, of which the following is a specification.

This invention relates to improvements in gas burners for water heaters.

The objects of this invention are: First: to provide an improved water heater in which a group of gas burners is used, in which all the burners may be adjusted at once to regulate the supply of air thereto. Second: to provide an improved means of supporting the burners in a water heater in which a plurality of burners is used. Third: to provide an improved water heater in which the parts are so formed and arranged that they may be made of sheet metal. Fourth: to provide an improved burner construction in which the parts of the burners may be stamped up from sheet metal, and one which is economical to produce and durable and effective in use.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which—

Figure 1 is a plan view of a structure embodying the features of my invention, the gas supply pipe being shown broken off and with the burner tip of one of the burners removed. Fig. 2 is a detail vertical sectional view taken on line 2—2 of Fig. 1. Fig. 3 is a detail horizontal sectional view taken on a line corresponding to line 3—3 of Fig. 2, the base plate of the heater being removed. Fig. 4 is an enlarged detail sectional view through the gas delivery tube.

In the drawing, the sectional views are taken looking in the direction of the little arrows at the ends of the section lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the drawing, the base plate or bottom A is provided with a depressed portion or well A′ at the center. This well A′ is provided with a drip pipe *a′*. A bracket A″ is formed on one side of the base plate for securing the same to the wall or other support. This base plate is preferably stamped from sheet metal. The casing of my improved water heater, with the water coil or reservoir, rests upon this base or bottom, but, as the same forms no part of this invention, it is not here illustrated.

A ring-like gas delivery tube B is provided for the burners. This gas delivery tube is connected to a suitable gas supply pipe as E. The top plate B′ of the gas delivery tube is flat and is provided with threaded openings or sockets *b′* to receive the burner nozzles *c*. The burner nozzles *c* are secured in the lower ends of the burner tubes C. The lower ends of the burner tubes C are turned inwardly and upwardly to embrace the nozzles, which are rigidly secured in position.

The base plate A is provided with suitable openings having upwardly projecting flanges *a* about the same to receive the burner tubes C. The lower ends of the burner tubes C are reduced, forming shoulders at *c″*, which rest on the flanges *a* of the openings through the base plate. The burner tubes C are provided with suitable air ports *c′* at their lower ends, which, when the tubes are arranged through the base plate, open beneath the same. The upper ends of the burner tubes C are flared outwardly at C′ and are provided with outwardly projecting flanges C″ at the top. The flanges C″ on the burner tubes C are notched at *c‴* to receive the lugs *t′* on the burner tips T, which clamp over the flanges C″, thereby retaining the tips in position. The tips T have a depressed central portion T′ and are corrugated, or fluted, radially, thereby forming, when clamped on the flanges C″ of the burner tubes, laterally opening slot-like jet orifices *o*.

Upon the lower ends of the burner tubes C are sleevelike valves D having openings or ports therein which are adapted to be brought into register with the ports or openings *c′* of the burner tubes. By adjusting these valves, the size of the air ports of the burners is regulated. Suitable thumb pieces *d* are provided for manipulating these valves. These valves D are all connected to

a ring F. The ring F is slidably connected to the top plate B′ of the gas delivery tube B, which is provided with inwardly projecting lugs B″ on which the ring rests. Pins *f* project upwardly from the lugs B″ to engage suitable slots as F′ in the ring, so that it is slidably retained in position. The valves D are provided with inwardly projecting arms G which have slots *g* therein. Pins *g′* carried by the ring engage these slots so that the valves are all connected to the ring. Thus connected, when one of the valves is moved, its movement is communicated to the ring which transmits a like movement to the other valves, so that an even adjustment of all is secured.

With the parts of my improved water heater formed and arranged as described, I am enabled to form the same entirely of sheet metal, which forms a very light and economical structure and one which is very readily assembled or disassembled should occasion require. By forming the base plate in this manner, the water heater casing, with its contained parts, can be removed and free access had to the burners. The valves of the burners are easily adjusted to regulate the supply of air. With the base plate formed with the well A′ therein, any water such as arises from condensation and the like, is collected and delivered from the heater. The valves are so protected that they do not come in contact with the moisture within the heater, and thus are not liable to corrode or become obstructed. By my improved construction and arrangement of the burners, the heat is evenly distributed within the casing.

I have illustrated and described my improved water heater in the form preferred by me on account of its structural simplicity and the economy with which the parts may be produced and assembled. I am aware, however, that it is capable of very great variation in structural details without departing from my invention.

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

1. The combination of a base plate formed of sheet metal, having openings therethrough with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal, having their upper ends flared outwardly, with outwardly projecting flanges at the top, secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; notches in the flanges of said burner tubes; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; lugs on said tips adapted to engage said notches clamped over said flanges for retaining said tips in position; air ports in said burner tubes; ring-like valves, having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

2. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal, having their upper ends flared outwardly, with outwardly projecting flanges at the top, secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; notches in the flanges of said burner tubes; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions, adapted to coact with the flanges of said burner tubes to form jet orifices; lugs on said tips adapted to engage said notches clamped over said flanges for retaining said tips in position; air ports in said burner tubes; ring-like valves, having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes: a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

3. The combination of a base plate formed of sheet metal having openings therethrough, with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in said gas delivery pipe: burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; burner tips formed of sheet metal, having depressed cen-

tral portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

4. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves, having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

5. The combination of a base plate formed of sheet metal, having openings therethrough with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal, having threaded delivery openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; notches in the flanges of said burner tubes; burner tips formed of sheet metal having depressed central portions and radial corrugations or flutes in their outer portions, adapted to coact with the flanges of said burner tubes to form jet orifices; lugs on said tips adapted to engage said notches clamped over said flanges for retaining said tips in position; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valves, all coacting for the purpose specified.

6. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in said gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; notches in the flanges of said burner tubes; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions, adapted to coact with the flanges of said burner tubes to form jet orifices; lugs on said tips adapted to engage said notches clamped over said flanges for retaining said tips in position; air ports in said burner tubes; ring-like valves, having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valves, all coacting for the purpose specified.

7. The combination of a base plate formed of sheet metal, having openings therethrough with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in said gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valves, all coacting for the purpose specified.

8. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein;

threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valves, all coacting for the purpose specified.

9. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal—having their upper ends flared outwardly, with outwardly projecting flanges at the top—secured to said nozzles, said burner tubes having reduced portions at their lower ends to form shoulders, arranged through said openings in said base plate; burner tips formed of sheet metal, having depressed central portions and radial corrugations or flutes in their outer portions adapted to coact with the flanges of said burner tubes to form jet orifices; air ports in said burner tubes; and ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes, all coacting for the purpose specified.

10. The combination of a base plate formed of sheet metal having openings therethrough, with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in said gas delivery pipe; burner tubes formed of sheet metal secured to said nozzles arranged through said openings in said base plate; suitable burner tips; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

11. The combination of a base plate formed of sheet metal having openings therethrough; a ring-like gas delivery pipe formed of sheet metal, having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in the gas delivery pipe; burner tubes formed of sheet metal secured to said nozzles, arranged through said openings in said base plate; suitable burner tips; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; a ring slidably connected to said gas delivery pipe; inwardly projecting arms on said valves, having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, all coacting for the purpose specified.

12. The combination of a base plate formed of sheet metal having openings therethrough, with upwardly projecting flanges about the same, and having a depressed portion or well at the center; a drip pipe for said well; a ring-like gas delivery pipe formed of sheet metal having threaded openings therein; threaded delivery nozzles adapted to be secured in said openings in said gas delivery pipe; burner tubes formed of sheet metal secured to said nozzles, arranged through said openings in said base plate; suitable burner tips; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valves, all coacting for the purpose specified.

13. The combination of a base plate having openings therethrough; a ring-like gas delivery pipe arranged below said base plate and having threaded openings therein; delivery nozzles threaded into said openings in said gas delivery pipe; burner tubes arranged through said openings in said base plate and secured to said nozzles, said base plate and gas delivery pipe coacting to support and hold said burners in an upright position said burner tubes being adapted to be removed from above said base plate; suitable burner tips; air ports in said burner tubes; ring-like valves having openings therein adapted to be brought into registration with said air ports and sleeved upon said burner tubes; and a slidably supported ring suitably connected to said valve, coacting for the purpose specified.

14. The combination of a base plate having openings therethrough; a ring-like gas delivery pipe arranged below said base plate and having threaded openings therein; delivery nozzles threaded into said openings in said gas delivery pipe; burner tubes arranged through said openings in said base plate and secured to said nozzles, said base plate and said gas delivery pipe coacting to

support and hold said burners in an upright position said burner tubes being adapted to be removed from above said base plate; suitable burner tips; air ports in said burner tubes; and ring-like valves having openings therein adapted to be brought into registration with said air ports and sleeved upon said burner tubes, coacting for the purpose specified.

15. The combination of a base plate having openings therethrough; a ring-like gas delivery pipe; burner tubes, having outwardly projecting flanges at the top, arranged through said openings in said base plate; burner tips having radial corrugations or flutes adapted to coact with the flanges of said burner tubes to form jet orifices; air ports for said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; an adjustable ring; inwardly projecting arms on said valves, having longitudinal slots therein; and pins carried by said ring adapted to engage the slots in said arms, for the purpose specified.

16. The combination of a base plate having openings therethrough; a ring-like gas delivery pipe; burner tubes having outwardly projecting flanges at the top, arranged through said openings in said base plate; burner tips having radial corrugations or flutes adapted to coact with the flanges of said burner tubes to form jet orifices; air ports for said burner tubes; ring-like valves having openings therein adapted to be brought into registry with said air ports, sleeved upon said burner tubes; and an adjustable ring suitably connected to said valves, for the purpose specified.

17. The combination with a base plate; a ring-like gas delivery pipe having a plurality of upwardly projecting gas delivery nozzles thereon arranged below said base plate; burners comprising burner tubes and tips, said tubes having air ports at their lower ends, arranged through said base plate to receive said nozzles, the air ports of said tubes being below the said base plate and their tips above the same, the said base plate forming practically a sealed partition between said air ports and said burner tips; ring-like valves for said air ports sleeved upon said burner tubes below said base; an adjusting ring for said valves having slots therein; rests on said gas delivery ring for said valve adjusting ring, said rests having pins thereon arranged in said slots of said rings; sliding arms on said valves; and pins carried by said ring arranged in the slots of said arms, for the purpose specified.

18. The combination with a base plate; a ring-like gas delivery pipe; burners comprising burner tubes and tips, said tubes having air ports at their lower ends, arranged through said base plate, the air ports of said tubes being below said base plate and their tips above the same; ring-like valves for said air ports sleeved upon said burner tubes below said base; an adjusting ring for said valves having slots therein; rests on said gas delivery ring for said valve adjusting ring, said rests having pins thereon arranged in said slots of said rings; sliding arms on said valves; and pins carried by said ring arranged in the slots of said arms, for the purpose specified.

19. The combination with a base plate, of a gas delivery pipe having a plurality of upwardly projecting gas delivery nozzles thereon arranged below said base plate; burners comprising burner tubes and tips, said burner tubes having air ports at their lower ends arranged through said base plate to receive said nozzles, the air ports of said tubes being below said base plate and their tips above the same, the said base plate forming practically a sealed partition between said air ports and said burner tips said base plate and gas delivery pipe coacting to support said burners, the burner tube being detachably connected to the gas delivery pipe and being adapted to be removed from above the base plate; valves for said burner tube air ports arranged below said base; and an adjusting ring to which said valves are connected carried by said gas delivery pipe, for the purpose specified.

20. The combination with a base plate, of a gas delivery pipe; burners comprising burner tubes and tips, said burner tubes having air ports at their lower ends arranged through said base plate, the air ports of said tubes being below said base plate and their tips above the same; sleeve-like valves for said air ports arranged below said base with their lower ends resting upon the said gas delivery pipe and an adjusting ring to which said valves are connected carried by said gas delivery pipe, for the purpose specified.

21. The combination with a base plate of a gas delivery pipe having a plurality of upwardly projecting gas delivery nozzles thereon arranged below said base plate; burners comprising burner tubes and tips, said burner tubes having air ports at their lower ends arranged through said base plate to receive said nozzles, the air ports of said tubes being below said base plate and their tips above the same, the said base plate forming practically a sealed partition between said air ports and said burner tips said base plate and gas delivery pipe coacting to support said burners, the burner tube being detachably connected to the gas delivery pipe and being adapted to be removed from above the base plate; and valves for said burner tube air ports arranged below said base, for the purpose specified.

22. The combination with a ring-like gas delivery pipe having a plurality of gas delivery nozzles thereon; burners comprising burner tubes and tips, said burner tubes having air ports at their lower ends; ring-like valves for said air ports sleeved upon said burner tubes; an adjusting ring for said valves having slots therein; rests on said gas delivery ring for said valve adjusting ring, said rests having pins thereon arranged in said slots of said rings; slotted arms on said valve; and pins carried by said ring arranged in the said slots of said arms, for the purpose specified.

23. In a water heater, the combination of a base plate of general convex form, having a central well or depression therein, said base plate having a plurality of openings therein and being flanged upwardly about said openings; and burners comprising burner tubes having reduced portions at their lower ends, said reduced portions being adapted to fit said flanged openings.

24. In a water heater, the combination with a base plate having a central well or depressed portion and an inwardly inclined portion surrounding said depressed portion said inwardly inclined portion having a plurality of openings therein with upwardly projecting flanges about said openings; and burners comprising burner tubes having reduced portions at their lower ends adapted to fit into said flanged openings, for the purpose specified.

25. In a water heater, the combination of a base plate of general convex form, having a central well or depression therein, said base plate having a plurality of openings therein and being flanged upwardly about said openings; and burners comprising burner tubes arranged through said flanged openings.

26. In a water heater, the combination with a base plate having a central well or depressed portion and an inwardly inclined portion surrounding said depressed portion, said inwardly inclined portion having a plurality of openings therein with upwardly projecting flanges about said openings; and burners comprising burner tubes arranged through said flanged openings, for the purpose specified.

27. In a water heater, the combination of a base plate of general convex form, having a central well or depression therein, said base plate having a plurality of openings therein grouped about said well; and burners comprising burner tubes having reduced portions at their lower ends, said reduced portions being adapted to fit and close said openings.

28. In a water heater, the combination with a base plate having a central well or depressed portion and an inwardly inclined portion surrounding said depressed portion, said inwardly inclined portion having a plurality of openings therein; and burners comprising burner tubes having reduced portions at their lower ends adapted to fit into said openings, for the purpose specified.

29. In a water heater, the combination of a base plate of general convex form, having a central well or depression therein, said base plate having a plurality of openings therein grouped about said well; and burners comprising burner tubes arranged through said openings and adapted to close the same.

30. In a water heater, the combination with a base plate having a central well or depressed portion and an inwardly-inclined portion surrounding said depressed portion, said inwardly inclined portion having a plurality of openings therein; and burners comprising burner tubes arranged through said openings, for the purpose specified.

31. In a water heater, the combination with a base plate, of general convex form having a plurality of openings therein; a ring-like gas delivery pipe arranged below said base plate; burners comprising burner tubes arranged through said openings in said plate and detachably connected to said gas delivery ring said burners being adapted to be removed from above said base plate, said plate and ring coacting to support said burners in an upright position.

32. In a water heater, the combination of a base plate of general convex form having a central well or depression therein, said base plate having a plurality of openings; a gas delivery ring arranged below said base plate; a plurality of burners arranged through said openings in said base plate connected to said gas delivery ring; and a drip pipe for said well arranged through said gas delivery ring.

33. In a water heater, the combination of a base plate having an opening therein; a gas delivery pipe arranged below said base plate; a delivery nozzle for said gas delivery pipe; a burner comprising a burner tube and tip, said burner tube having air inlet openings in its lower end and being arranged through the said base plate to receive said gas delivery nozzle, said gas delivery pipe and base plate coacting to support said burner in an upright position; and a sleeve-like valve sleeved upon said burner tube, said valve being arranged to rest on said gas delivery pipe.

34. In a water heater, the combination of a base plate having an opening therein; a gas delivery pipe arranged below said base plate; a delivery nozzle for said gas delivery pipe; and a burner comprising a burner tube and tip, said burner tube having air inlet openings in its lower end and being ar-

ranged through the said base plate to receive said gas delivery nozzle, said gas delivery pipe and base plate coacting to support said burner in an upright position, said burner tubes being adapted to be removed from above said base plate.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

HERBERT S. HUMPHREY. [L. S.]

Witnesses:
ADELAIDE T. ADAMS,
OTIS A. EARL.