No. 867,905. PATENTED OCT. 8, 1907.

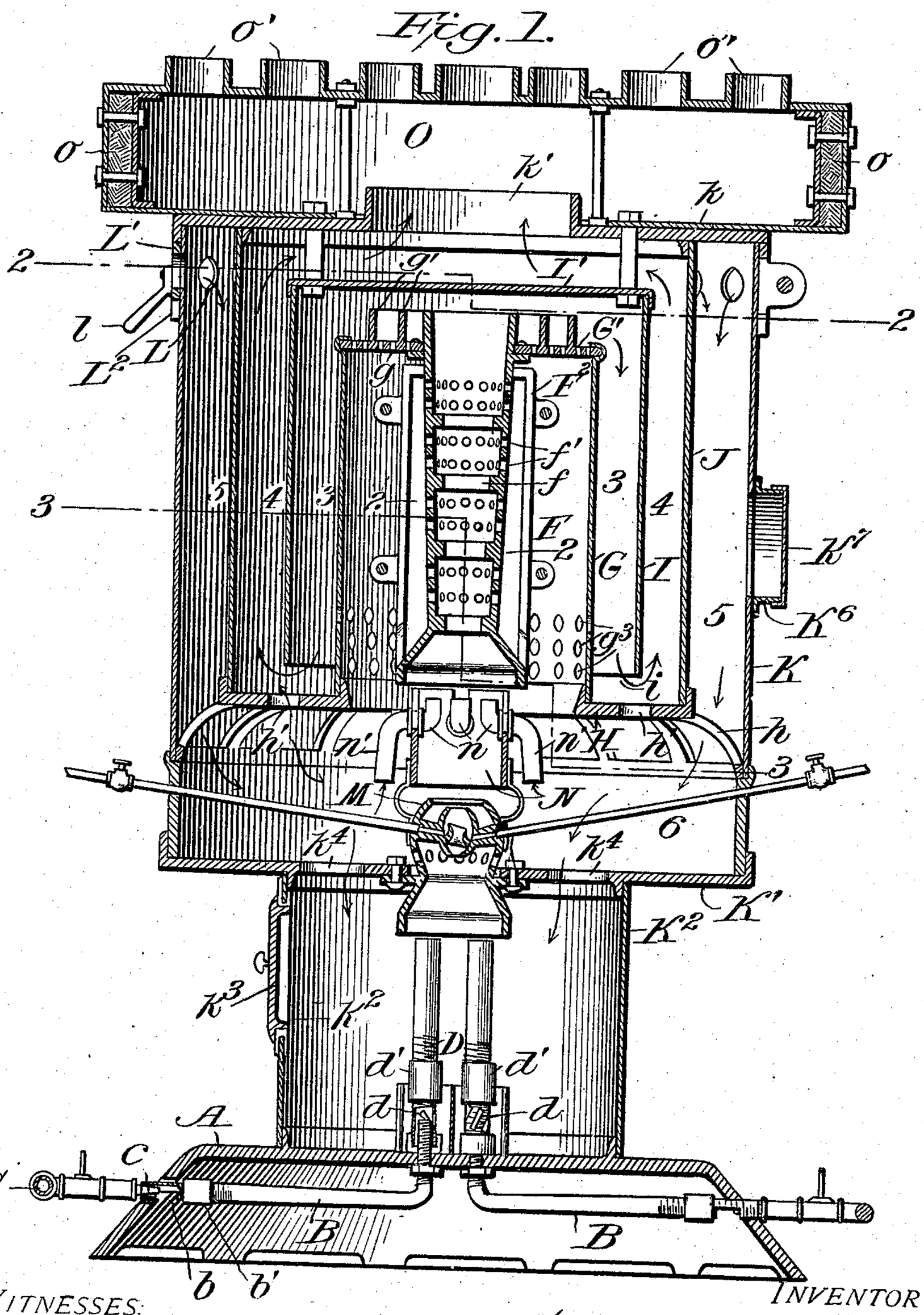
V. W. BLANCHARD

FURNACE.

APPLICATION FILED JAN. 22, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

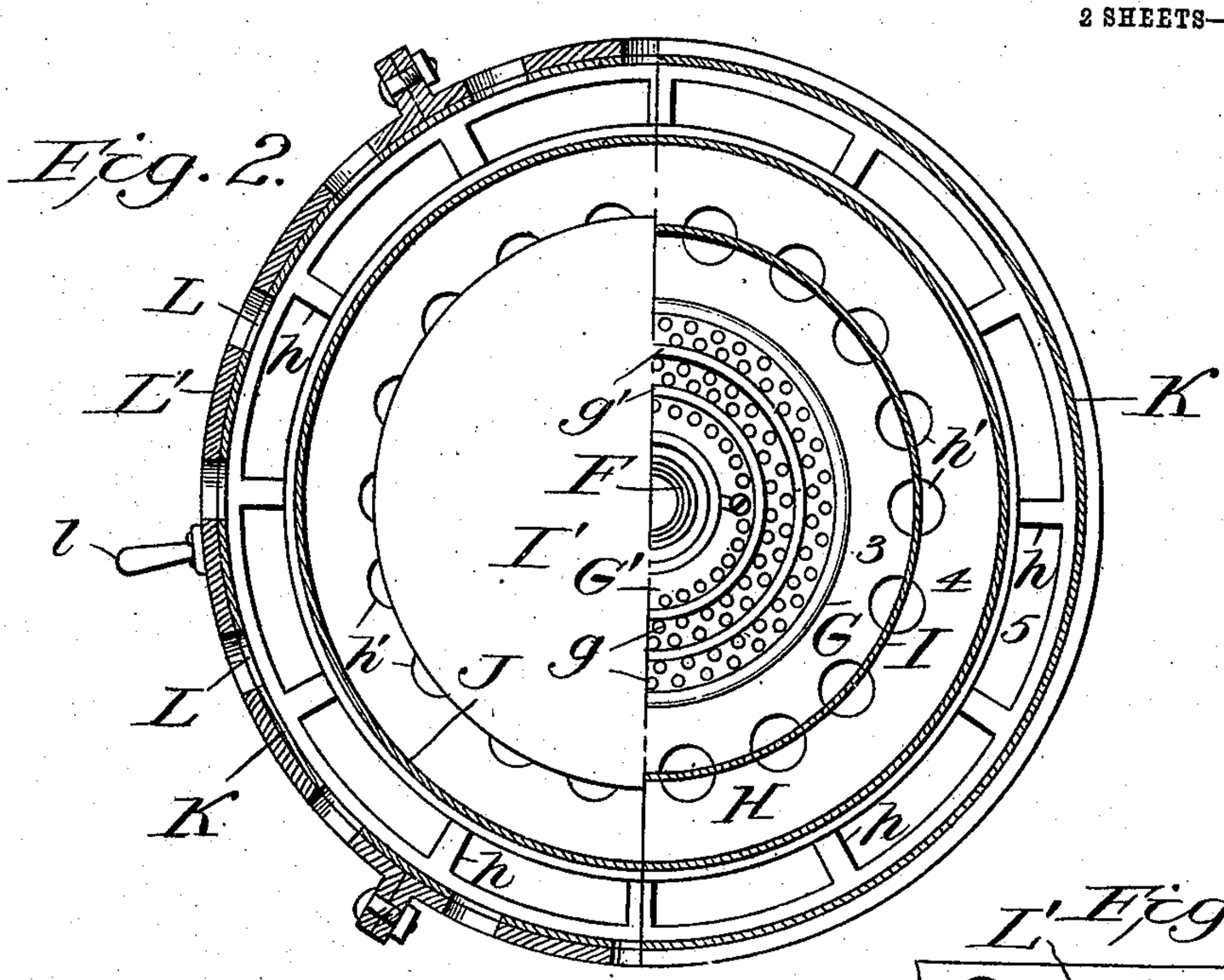


Fig. 4

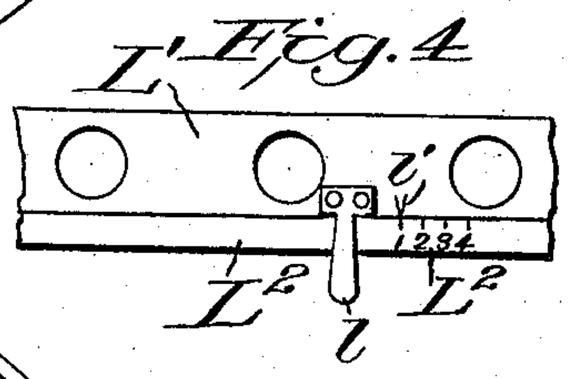
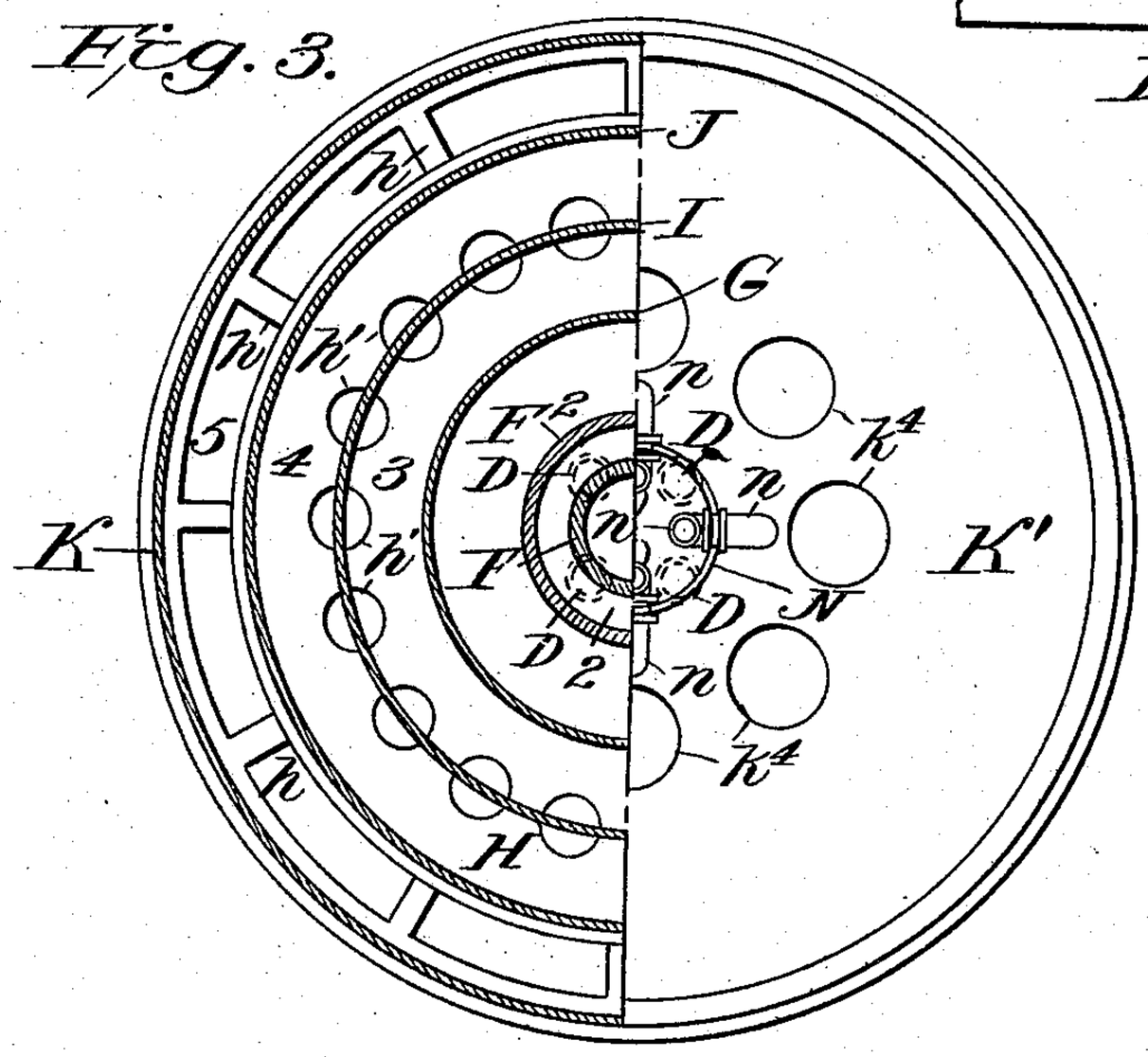


Fig. 3.



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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y.

FURNACE.

No. 867,905. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed January 22, 1906. Serial No. 297,245.

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Furnaces; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel furnace for heating air by means of gaseous fuel, especially designed for heating air in large quantities so that it can be used in the place of the ordinary coal burning air heating furnace, and be located in such position in the building that the hot air supplied therefrom will heat the various apartments by means of pipes in the ordinary manner.

The invention consists in the novel construction of the air heating portion of the furnace combined with the gas burning portions thereof, which latter are so arranged that the gaseous fuel is entirely consumed and deprived of all poisonous odors and gases, (other than carbonic acid gas the resultant of perfect combustion,) which are destroyed, and the resultant gases commingled with large quantities of fresh air and reduced to the proper temperature can be distributed to the various apartments.

The apparatus may be used for heating very large rooms by being located directly therein and the hot air discharged directly from the furnace into such rooms. I have also illustrated in the drawings a means for augmenting the combustion by the introduction of vaporized water and oil, but that feature forms the subject matter of a separate application, and I refer to the claims appended to this description for summaries of the features and combinations of parts for which protection is desired herein.

In said drawings—Figure 1 is a central vertical sectional elevation of the complete furnace. Fig. 2 is a transverse section therethrough on line 2—2, Fig. 1, and Fig. 3 is a like section on the line 3—3, Fig. 1. Fig. 4 is a detail.

Under a base A, of any suitable construction, are located four primary mixing-tubes B to which gas is admitted from pipes C provided with attached jet-heads *c* as described in my application for gas burner Serial No. 297,236, filed January 22, 1906, which enter the receiving ends of tubes B adjacent air inlets *b* in said tubes, the size of which inlets are regulable by sleeves *b'*. The discharge ends of tubes B extend up through center of the base and connect with secondary mixing-tubes D which are provided with air inlets *d* at their lower ends regulable by sleeves *d'*. The gaseous mixtures discharged from the secondary tubes D rise into a burner F which is preferably constructed as described in my application for gas burner, Serial No. 297,240, filed January 22, 1906, said burner being tubular and gradually enlarging in diameter from bottom to top and provided with annular constrictions *f* and lateral perforations *f'*. Said burner is surrounded by a jacket F^2 which forms an air space 2 around the burner. The burner is suspended within a cylinder G and from the top plate G' thereof as shown, said cylinder G being supported at bottom upon an annular casting H, which is in turn supported by brackets *h* upon and within an exterior casing K, which is supported at bottom upon a plate K' mounted on a cylinder K^2 inclosing the secondary tubes D and resting upon the base A, as shown. The cylinder K^2, plate K', and casing K are substantially air-tight so that no air will be admitted to the interior of the furnace except as hereinafter explained.

Surrounding the cylinder G is a second cylinder I of larger diameter supported from the plate I' and having its upper end closed by said plate I' which is imperforate so that the gases rising from the burner are caused to descend in the flue 3 between the cylinders G and I, escaping at the lower end of cylinder I through space *i* in said cylinder I into an ascending flue 4 formed between the outer wall of cylinder I and an inclosing annular partition J resting on plate H at bottom. The space 5 between the cylinder J and the casing K forms an annular descending air flue communicating with the air-chamber 6 between plate H and the plate K'. The top plate or casting *k* of the casing closes the upper end of flue 5 and extends across the upper end of flue 4, and above plate I', and is provided with an outlet opening *k'* for the heated air and gases.

The plate H is provided with perforations *h'* beneath the lower edge of cylinder I to admit air into the gases passing from flue 3 into flue 4.

The plate K' is provided with apertures k^4 through which air can descend into the cylinder K^2 to supply air to the burner and mixing-tubes D.

Access can be had to tubes D through an opening in said cylinder k^2 which is closed by a door k^3 when the apparatus is in operation.

Air is admitted into the upper end of flue 5 through openings L in the upper end of cylinder K, which openings are closable by means of an annular valve L' having perforations corresponding in size to openings L and which can be all brought more or less into register therewith, so as to open or close the openings and regulate the amount of air admitted in the flue 5. The valve L' may be supported on a band L^2 attached to the casing K, as shown, and is provided with a handle *l* by which it is operated, and with a pointer *l'* which is arranged opposite a numbered scale on the band L^2 (see Fig. 4) so that the proper adjustment of the band can be visually determined according to the number of mixing-tubes D in operation; being fully opened when all the mixing-tubes are in operation, and more or less closed if one or more of the tubes are not used.

As shown, the casing K is provided with an opening in its side surrounded by a collar K^6 closed by a cap K^7 which can be removed, if it is desired to admit air from the exterior of the building and a cold air duct such as are commonly employed in hot air furnaces connected to collar K^6.

As shown in the drawings, an oil and water vaporizing head M is interposed between the tubes D and burner F so as to supply vaporized oil and water to the burning gases to augment combustion and lessen the quantity of gas consumed to produce a given heat. As this oil and water vaporizer forms the subject matter of a separate application it is unnecessary to describe the same in detail herein.

Above the vaporizer M and between the burner and the tubes D is a collar N through which the heated gases pass. This collar is provided with a series of inwardly and upwardly bent elbow tubes *n* connected with downwardly bent pipe elbows *n'* outside the collar N. These tubes form an excellent air heating device and supply jets of air drawn from the chamber 6 directly into the rising current of burning gases before the latter enter the combustion chamber or burner F.

Above the casing K is an air distributing chamber O which may be made of sheet metal and is supported upon the top plate *k* and receives the heated products delivered through the outlet *k'*. Preferably the side walls of this distributing chamber are lined with asbestos or other non-conducting backing, as shown at *o*. In the roof of this distributing chamber are a series of distributing outlets surrounded by collars *o'* to which the radiator pipes (not shown) may be connected to conduct the hot air to the different apartments in the building.

Operation. The gas and air admitted into tubes B are commingled therein and discharged into tubes D, receiving a fresh supply of air through the ports *d*. The combustible mixture is discharged from the tubes D upwardly through the vaporizer M (if the same be used) into the burner, or combustion chamber F, wherein all the oxidizable elements of the fuel gas are consumed. As the current of gases ascends through the burner from the tubes D they are additionally supplied with air admitted through the vaporizer and through the jet-tubes *n*, and through the spaces between the collar and vaporizer, and burner; for at every point where the current of gases passes across an open space more or less air will be drawn thereinto. In passing through the combustion chamber F the gases are subjected to numerous jets of hot air issuing thereinto from the perforations *f'*. The hot current of gases impinges against the plate I', overlying the burner, which quickly becomes heated to a very high temperature and raises the temperature in the surrounding chambers accordingly. The gases are deflected by the plate I' radially over the burner toward the flues 3 and in passing over the top plate G' of the burner the gases are commingled with jets of air issuing through perforations *g* in the top plate. Said top plate is provided with annular projections *g'* which become intensely heated and aid materially in trapping heavier combustible non-consumed elements and until they are completely oxidized. The resultant products of combustion at a very high temperature descend through the flues 3 to the flues 4, and as they reach the lower end of flues 3 they are commingled with fresh jets of air issuing laterally thereinto through perforations g^3 in the lower end of cylinder G, and as they pass under cylinder I into flues 4 they meet additional jets of warm air entering through the perforations *h'* in plate H. As the gases ascend in flue 4 their temperature is reduced by the conductivity of the walls of partition J which is surrounded by the cool air descending in flues 5. The descending current of fresh cold air passing the ascending current of hot gases and air, reduces the temperature of the latter to the desired extent, so that the mixture of gas and air enters the distributing chamber O at a temperature of about 200 degrees, which temperature is further reduced to the proper extent in the passage of the hot air and gases from the distributing chamber to the register.

It will be observed that the resultant gases of combustion are commingled with large quantities of fresh air which is heated by such products and with the resultant mixture is discharged into the living rooms. Owing to the perfect combustion of the gaseous elements in this furnace by the employment of the burner shown (which burner forms the subject matter of other applications) the products contain no more deleterious element than carbonic acid gas and are by no means as injurious to health as are the products from the ordinary gas stoves commonly used in living rooms,—but owing to the great quantity of fresh air commingled with the resultant gases there is an ample supply of unconsumed oxygen in the air to prevent any possible injury to health, or lassitude on the part of occupants of the rooms into which the combined air and gases are discharged.

In this furnace every heat unit derived from the combustion is utilized, and there is absolutely no waste, and a large volume of heated air is produced with a small expenditure of fuel; and as the burners are completely incased in fresh air chambers there is no loss by radiation of heat.

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

1. In a gas burning air heating furnace, the combination of a tubular burner provided with perforated walls, and means for supplying combustible gases to said burner, a cylinder inclosing said burner, a second cylinder surrounding the first cylinder and closed at its upper end and forming a descending flue for the products of combustion, an ascending flue surrounding the descending flue and communicating therewith at its lower end, means for admitting fresh air into the descending current of gases, and an outlet for the gases and air above the second cylinder.

2. In a gas burning air heating furnace, the combination of a tubular burner provided with perforated walls, means for supplying combustible gases to said burner, a cylinder surrounding said burner and inclosing an air heating space surrounding said burner and communicating with the perforations thereof, a second cylinder surrounding the first cylinder and closed at its upper end and forming a descending flue for the products of combustion, an ascending flue surrounding the descending flue and communicating therewith at its lower end, means for admitting fresh air into the descending current of gases and an outlet for the gases and air above the second cylinder.

3. The combination of a burner, means for supplying gaseous mixtures to said burner, a cylinder surrounding the burner, an inverted cup shaped cylinder inclosing the first cylinder and forming a descending flue exterior thereto, an annular partition surrounding the second cylinder

forming an ascending flue exterior thereto, means for admitting air into the descending current of gases and into the gases as they ascend into the flue; with a casing inclosing the burner and flues, means for admitting air into said casing, and a distributing chamber above the casing into which the mixed air and gases are discharged.

4. The combination of a casing, an annular casting supported in the casing, an annular partition in the casing supported on said casting, an inverted cup shaped member supported within the partition above the casting, a second cylinder within said cup shaped member, provided with apertures in its lower end, an apertured plate inclosing the upper end of said second cylinder, and a tubular burner suspended from said plate, provided with perforations in its walls.

5. The combination of a base, a cylinder supported thereon, a casing mounted on the cylinder, an annular casting supported in the casing above the cylinder, an annular partition in the casing supported on said casting, an inverted cup shaped member supported within the partition above the casting, a second cylinder within said cup shaped member, provided with apertures in its lower end, and a burner in said second cylinder; with an air heating jacket surrounding the burner, mixing tubes within the first mentioned cylinder adapted to discharge into said burner, and a distributing chamber on top of the casing into which the commingled gases and hot air are discharged.

6. The combination of a casing, an annular casting supported in the casing, an annular partition in the casing supported on said casting, an inverted cup shaped member supported within the partition above the casting, a second cylinder within said cup shaped member, provided with apertures in its lower end, an apertured plate inclosing the upper end of said second cylinder, and a tubular burner suspended from said plate, provided with perforations in its walls, an air heating jacket surrounding the burner, mixing tubes adapted to discharge into said burner, and a distributing chamber on top of the casing into which the commingled gases and hot air are discharged.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

In presence of—
JAMES R. MANSFIELD,
L. E. WITHAM.