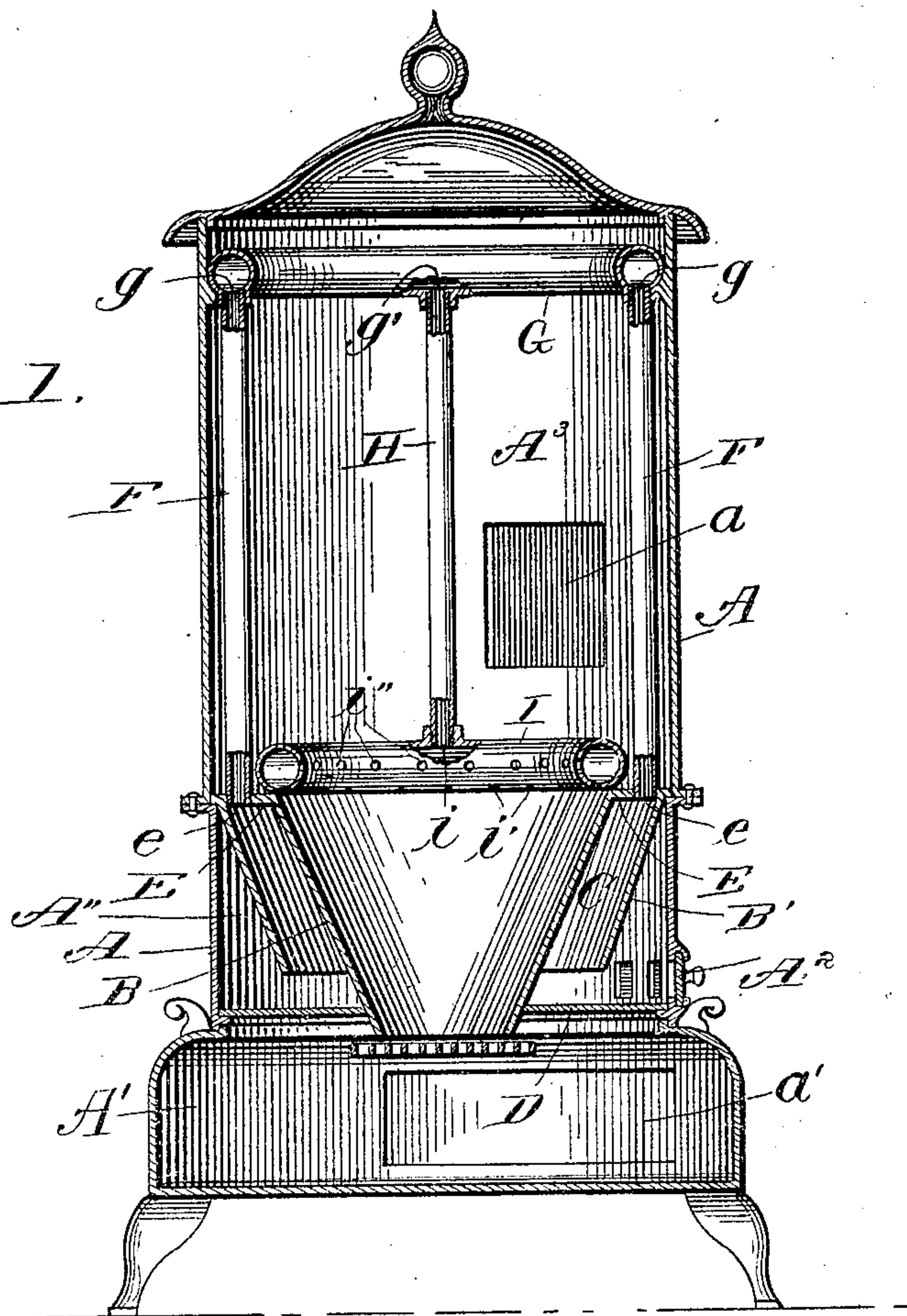


No. 804,097.

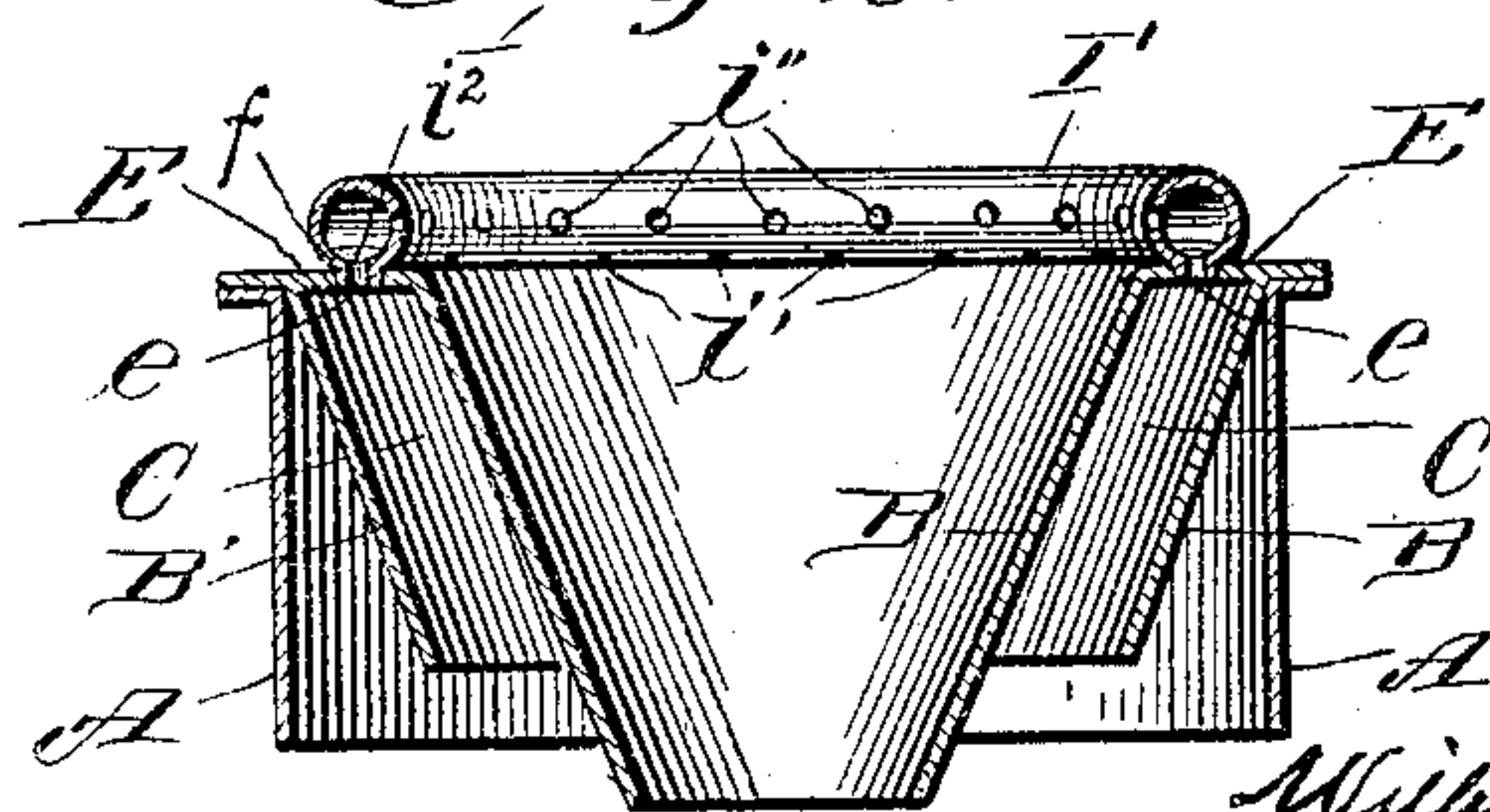
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W. H. BURNS.  
STOVE AND FURNACE.  
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*Fig. 1.*



*Fig. 2.*



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## STOVE AND FURNACE.

No. 804,097.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed July 20, 1903. Serial No. 166,325.

*To all whom it may concern:*

Be it known that I, WILLIAM HENRY BURNS, a citizen of the United States, residing at Naperville, in the county of Dupage and State of Illinois, have invented certain new and useful Improvements in Stoves and Furnaces, of which the following is a specification.

The present invention is equally applicable to stoves and furnaces of either large or small size and relates to the means for heating the air used to support combustion before it is admitted to the combustion-chamber or fire-box. Its object is to provide simple means of inexpensive and at the same time efficient construction by which the air is heated to the desired temperature and discharged into the fire-box or combustion-chamber above the grate, the draft or circulation of air through the various passages of the system being produced and maintained automatically.

To these ends the invention consists in the features of novelty that are hereinafter described with reference to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a sectional elevation of a stove embodying the invention in its preferred form. Fig. 2 is a sectional elevation of the fire-pot and other parts going to make up the system of chambers and passages through which the air circulates and in which it is heated, this being a modification suitable for use in stoves and furnaces of small size.

The invention has nothing whatever to do with the construction of the outer shell of the stove or furnace so long as it meets the requirements hereinafter described. It may be of any construction and provided with suitable doors for the admission of fuel, removal of ashes, draft, &c., a suitable outlet for the products of combustion, and other features that are customary or desirable.

In the drawings I have shown a shell A, provided with a door *a* for the admission of fuel, and a door *a'*, opening into the ash-pit A'.

B is the fire-pot, which is preferably of tapering or frusto-conical form and is preferably supported by an annular flange E, which extends outward from its top and rests upon a shoulder on the base of the shell. Within the base is an annular diaphragm D, which contacts at its inner margin with the lower portion of the fire-pot and at its outer margin rests upon a shoulder on the base. This diaphragm forms the top wall or ceiling of the ash-pit A', and, together with the fire-pot, its

supporting-flange E, and the surrounding portion of the base, forms a chamber A'', which is closed excepting for valved openings A<sup>2</sup>, through which air in regulated quantities may be admitted to it, and openings *e*, through which air may escape from it, as hereinafter described. Within the chamber A'' is an apron B', which is frusto-conical and at the top joins the annular flange E, whence it proceeds downward parallel with the fire-pot B, terminating a short distance above the diaphragm D, so that air admitted through the openings A<sup>2</sup> may pass it and enter the annular space C between its inner face and the outer face of the ash-pit. The air in passing upward through the space C becomes highly heated and escapes through the openings *e*, any desired number of which may be provided. In the preferred form of the invention I have shown two of these openings, into each of which is fitted the lower end of a tube F, the upper end of which is fitted into an opening *g* in an annular chamber G, located in the upper portion of the combustion-chamber A<sup>3</sup>. This chamber G has also any desired number of openings *g'*, into each of which is fitted the upper end of a tube H, the lower end of which is fitted into an opening *i* in an annular chamber I, which rests upon and is supported by the top of the chamber A''. The chambers G and I may be cast of metal or each may be made of a piece of iron pipe bent into the form of a ring and having its ends united or otherwise closed.

In the preferred form of the invention the air upon leaving the openings *e* passes upward through the tubes F into the chamber G, thence downward through the tubes H into the chamber I, and thence through perforations into the combustion-chamber, where it serves to support combustion. Preferably some of these perforations *i'* are presented downward and inward, so as to discharge the heated air downward into the fire-pot and directly against the burning fuel therein, while others, *i''*, are directed inward horizontally, so as to discharge the heated air into the volume of burning gas rising from the bed of fuel.

In the simpler form of the invention the vertical tubes F and H and the upper annular chamber G are dispensed with and the perforated annular chamber (which in Fig. 2 is lettered I' for the sake of distinction) has in its under side openings *i'*, from which proceed short tubes *f*, that enter the openings *e* of the flange E.



In practice the doors of the ash-pit are kept closed while the fire is burning, so that the air to support combustion is supplied wholly above the grate, the quantity supplied being controllable by means of valves of the openings A<sup>2</sup>. The point at which the heated air is discharged into the combustion-chamber being considerably above the point at which the principal heating is done, the circulation of air, following the laws of gravitation, will be wholly automatic. The difference in the height of the ascending and descending currents of heated air, even in the form of the invention shown in Fig. 1, will be sufficient to produce and maintain the necessary circulation; but the circulation is still further aided by the chimney-draft.

The advantage in the use of the apron B' is that it forces the incoming air into immediate contact with the outer face of the fire-pot, and in addition thereto it acts as a shield for protecting the base of the stove or furnace from the intense heat radiated from the fire-pot. It will be observed that this air-heating chamber is without any communication with the ash-pit. This makes it possible to keep the ash-pit closed while the fire is burning and to use an overshot draft only.

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

1. In a stove or furnace the combination of a shell having a base, a fire-pot within the base, said fire-pot having at its top an annular flange extending outward and meeting the shell, said annular flange having openings for the passage of air upward through it, an annular chamber above the flange, said annular chamber having openings for the admission of air

and openings for the discharge of air and tubes for conducting air from the openings in the annular flange to the openings in the annular chamber, substantially as described.

2. In a device of the class described, the combination of a fire-pot, a chamber surrounding the fire-pot, an annular chamber resting upon the top of the first chamber and having perforations for discharging air into the combustion-chamber, a third chamber located above the second chamber, tubes connecting the first and third chambers, and tubes connecting the second and third chambers, substantially as described.

3. In a stove or furnace the combination with a shell of a base, a fire-pot located within the base and having at its top an annular flange, the base being provided with an internal shoulder upon which said flange rests, an annular diaphragm extending from the lower portion of the fire-pot to contact with the base, the base, the diaphragm, the fire-pot and the annular flange forming together a chamber, an apron located in said chamber and surrounding the fire-pot, the annular flange being provided between the apron and fire-pot with openings for the upward passage of air, an annular chamber located above the annular flange and having openings for the inlet and outlet of air and tubes for conducting air from the openings of the annular flange to the inlet-openings of the annular chamber, substantially as described.

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Witnesses:

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