(No Model.)

H. H. RICE.

HOT AIR FURNACE.

No. 586,062. Patented July 6, 1897.

Fig. 1.

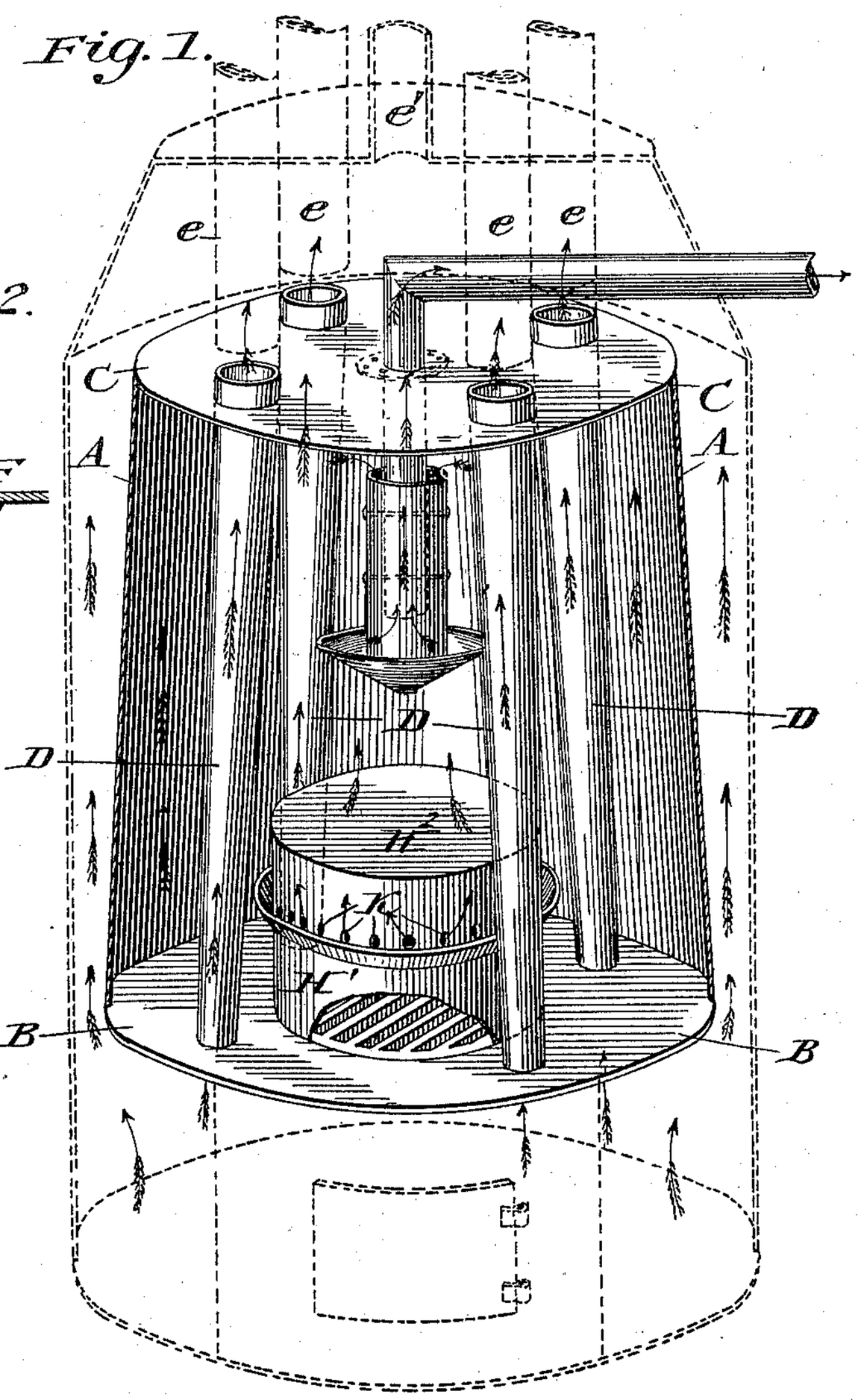


Fig. 2.

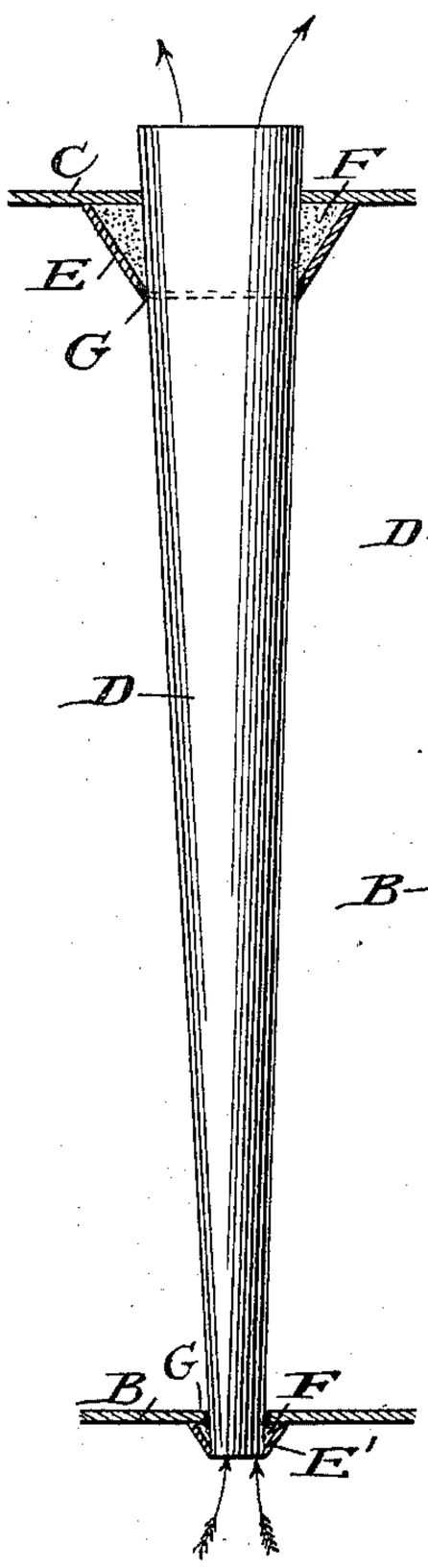
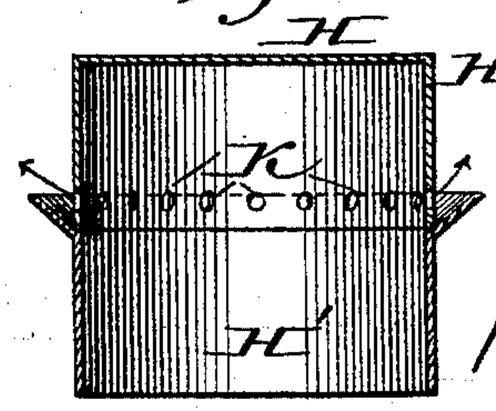


Fig. 4.



Witnesses.

Alex. Scott

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UNITED STATES PATENT OFFICE.

HENRY H. RICE, OF CHESHIRE, CONNECTICUT, ASSIGNOR TO THE TURNER HEATER COMPANY, OF BRISTOL, CONNECTICUT.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 586,062, dated July 6, 1897.

Application filed May 7, 1896. Serial No. 590,643. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. RICE, of Cheshire, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

This invention relates to hot-air furnaces. It is evident that the object of such furnaces, of which a vast number, constructed after a great variety of patterns, are in use, is to heat a number of different apartments in a house by means of a single fire in the furnace or basement. The difficulties to be overcome arise from the fact that the apartments to be warmed are usually on different floors of the house and situated at different distances and in different directions from the furnace. The warmed air will seek the upper rooms in greater volume than the lower, and of rooms on the same floor a great difficulty is encountered in warming those at the greatest distance from the fire. It is well known also that the direction of the wind makes a great difference in the facility of warming different rooms and that it is often next to impossible to warm some room, for which no reason can be assigned. Beyond the discomfort arising from unequally or illy warmed rooms the result is a much larger consumption of coal than the space to be heated demands if the best results could be attained. All having experience with such matters know that the attempt is immediately made to force the warm air into the cold rooms by forcing the fire.

It is the object of my invention to meet said necessities in the most perfect manner, to avoid the difficulties hereinbefore set forth, and to provide a furnace which shall not permit gas to escape into the rooms and which will secure the best and most economical results from the consumption of fuel and at the same time provide a simple, efficient, and economical structure, as will be clearly understood by those skilled in the art from the following descripton and claims.

Reference is to be had to the annexed drawings, and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 is a front elevation of a hot-air furnace embodying my invention, partly in perspective, only the outline of the outside casing being shown. Fig. 2 is a detailed view of a hot-air pipe, showing how the joints are protected when the pipe passes through the top and bottom plates. Fig. 3 is a detailed view of the fire-pot.

For the sake of brevity, clearness, and simplicity I shall not describe in detail those familiar parts which have long been constituents of furnaces of this class, but will assume that their construction is well known and will confine myself to a description of the novel features of my furnace.

The cold-air supply, the ash-pit, the outside casing, and other of the parts common to furnaces of this class may be made as the convenience or taste of the builder may determine.

Within the outside casing I construct a radiating-jacket A, preferably of sheet-steel, which rests upon a base formed of the top of the plate B over the ash-pit and cold-air chamber, and in turn supports the plate C, forming the roof of the combustion-chamber. This jacket completely incloses the combustion-chamber and tapers from base to top, forming a frustum of a cone, and is hereinafter called, in the claims, "heat-radiator." A number of flues D D extend through the combustion-chamber between the fire-pot and heat-radiator, forming the wall of said chamber from the plate B over the cold-air chamber to and through the top plate C, and project into the dome slightly. These pipes taper from the top to base, forming an inverted frustum of a cone. The method of forming the joints where these pipes pass through the plates at top and bottom is illustrated in detail in Fig. 2. A collar is formed in the plate, as at E E′, forming a flaring flange about an inch deep. This is made of a suitable size to fit the pipe, which when the furnace is in process of construction must be passed down through the upper collar until the pipe is firmly engaged by the collars at top and bottom. This collar being flaring—that is, providing an opening of greater diameter at top than at bottom—a space F is provided between the collar and wall of the pipe. The

joint G, I protect by filling with cement, and above this I fill the flaring space F with sand.

The fire-box H, preferably made of cast-iron, is set above the grate and stands out in the combustion-chamber like a box. This may be made in one or two sections. If in two sections, a flange is provided flaring outward and upward at the top of the lower section H′, into which is inserted the second or upper section H^2. At the base of the upper section are small holes or perforations K. This fire-pot may just as readily be constructed in one piece by casting the two sections together, the flange or collar being an integral part of the structure. The holes permit the heat to escape against the air-pipes and radiating-jacket and at the same time promote the more perfect combustion of the gases. The flange or collar prevents the escape of coals or ashes into the combustion-chamber.

The hot-air pipes passing from the dome to the rooms to be heated are constructed in the ordinary way, except that they are extended down into the dome to within a short distance of the flues extending through the combustion-chamber, say two inches, as *e e*. It is well for the most economical use of this furnace to have one pipe attached directly to the top of the dome, as at *e′*.

From the above description the operation and advantages in use of this furnace become apparent. The cold air enters the cold-air chamber in the base in the usual way. Thence it ascends both between the radiating-jacket A and outside casing and through the hot-air flues D D. From the frustum-of-a-cone construction of the radiating-jacket the air finds greater space as it ascends. Friction is thus diminished and rendered practically *nil* and a free draft of the air as well as a more rapid circulation is provided. The inverted-frustum-of-a-cone construction of the hot-air flues D D promotes the same results in their case. The pipes *e e* being constructed so as to be practical continuations of the hot-air flues D D, the air is forced equally through all pipes into all rooms, warming them to substantially equal temperatures. The open spaces between the ends of the hot-air flues and the hot-air pipes supply the necessary vents, and the crowding hot air in the dome furnishes still more warmed air and aids in promoting a rapid and uniform circulation. The pipe *e′* acts as a kind of safety-valve and regulates the pressure in the other pipes.

The inward slant of the radiating-jacket and outward slant of the flues cause the heat generated in the fire-pot to strike these surfaces more directly, thus multiplying the effect, and this is further aided by the inverted cone over the fire-pot, which diverts the heat directly against the pipes and radiating-jacket. The peculiar construction of the fire-box standing out in the middle of the combustion-chamber with the perforations to aid in promoting the rapid heating of the air in the flues and air-spaces has already been alluded to. I have not intended to limit myself in this matter of measurements or relative sizes of different parts or the proportion which one part may bear to another. Such measurements as I have given I have found effective in an ordinary five-room furnace, but it is obvious that they must be changed to meet the necessary requirements as to number and size of the apartments to be warmed.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all the forms in which it may be made or all modes of its use, what I claim as new, and desire to secure by Letters Patent, is—

1. A hot-air furnace comprising in its construction an outside casing, a combustion-chamber inclosed by a tapering heat-radiator in the form of a frustum of a cone, a fire-box in the center of the combustion-chamber, and hot-air flues, each formed like an inverted frustum of a cone connecting the cold-air chamber below with the dome above and passing through the combustion-chamber between the fire-pot and the heat-radiator, substantially as described.

2. In a hot-air furnace a fire-pot in the center of the combustion-chamber constructed with an outwardly and upwardly projecting flange slightly above the center and with a line of perforations in the fire-box casing within and below the rim of the flange, substantially as described.

3. In the above-described hot-air furnace, the combination of the pipes tapering from top to bottom, the upper and lower plates provided with the tapering collars, cement to close the joints of the pipes, and sand filling the space between the collars and the pipes, all substantially as described.

4. A hot-air furnace comprising in its construction an outside casing, a heat-radiator inclosing a combustion-chamber in the center of which is a fire-box, the tapering flues herein described passing from the cold-air chamber below into the base of the dome, and extending into the same, and hot-air pipes connecting with the apartments to be warmed extending into the dome to within a short distance, and over the mouth, of said tapering flues, substantially as described.

5. A hot-air furnace comprising in its construction an outside casing, a tapering heat-radiator formed like the frustum of a cone with an air-passage between it and the outside casing, inverted tapering flues extending from the top plate of the cold-air chamber through the combustion-chamber between the fire-box and heat-radiator through and a short distance into the dome, warm-air pipes beginning at a short distance above these flues and leading to the apartments to be warmed, a fire-box standing out in the center of the combustion-chamber with perforations slightly above the center, protected by a flange, so

that all heat from the fire is thrown directly against the walls inclosing the passages conveying the cold air which broaden at the top to promote rapid circulation, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 27th day of April, A. D. 1896.

HENRY H. RICE.

Witnesses:
ALICE E. BROWN,
JOHN J. JENNINGS.