No. 649,193. Patented May 8, 1900.

L. F. BETTS.

HEATING APPARATUS.

(Application filed July 10, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 3.

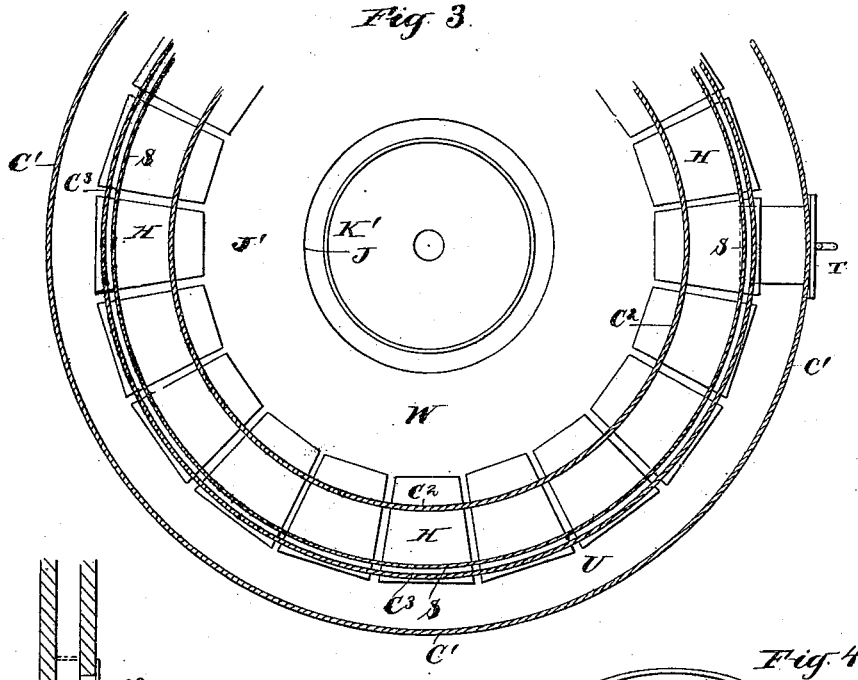


Fig. 1.

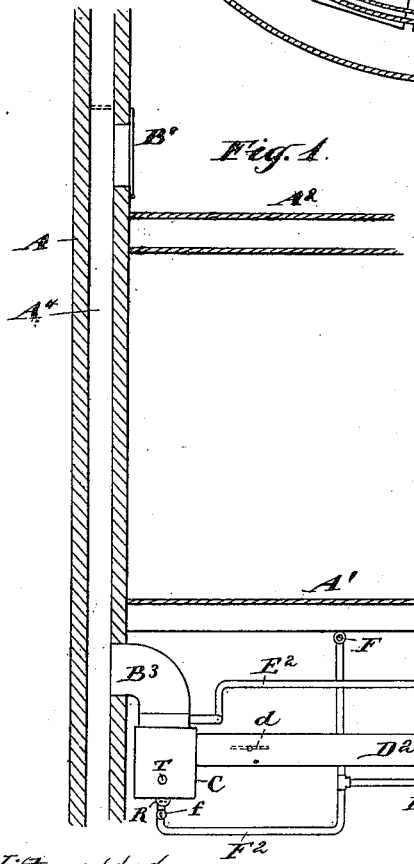
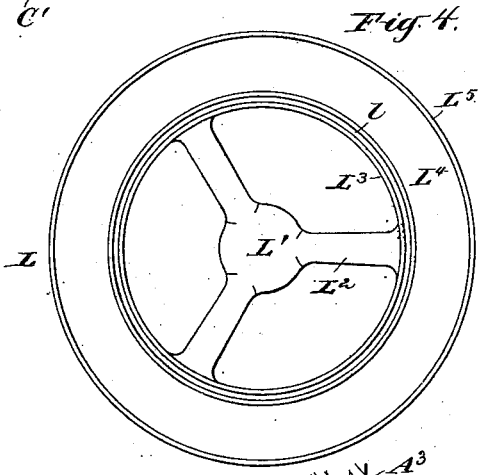


Fig. 4.



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HEATING APPARATUS.

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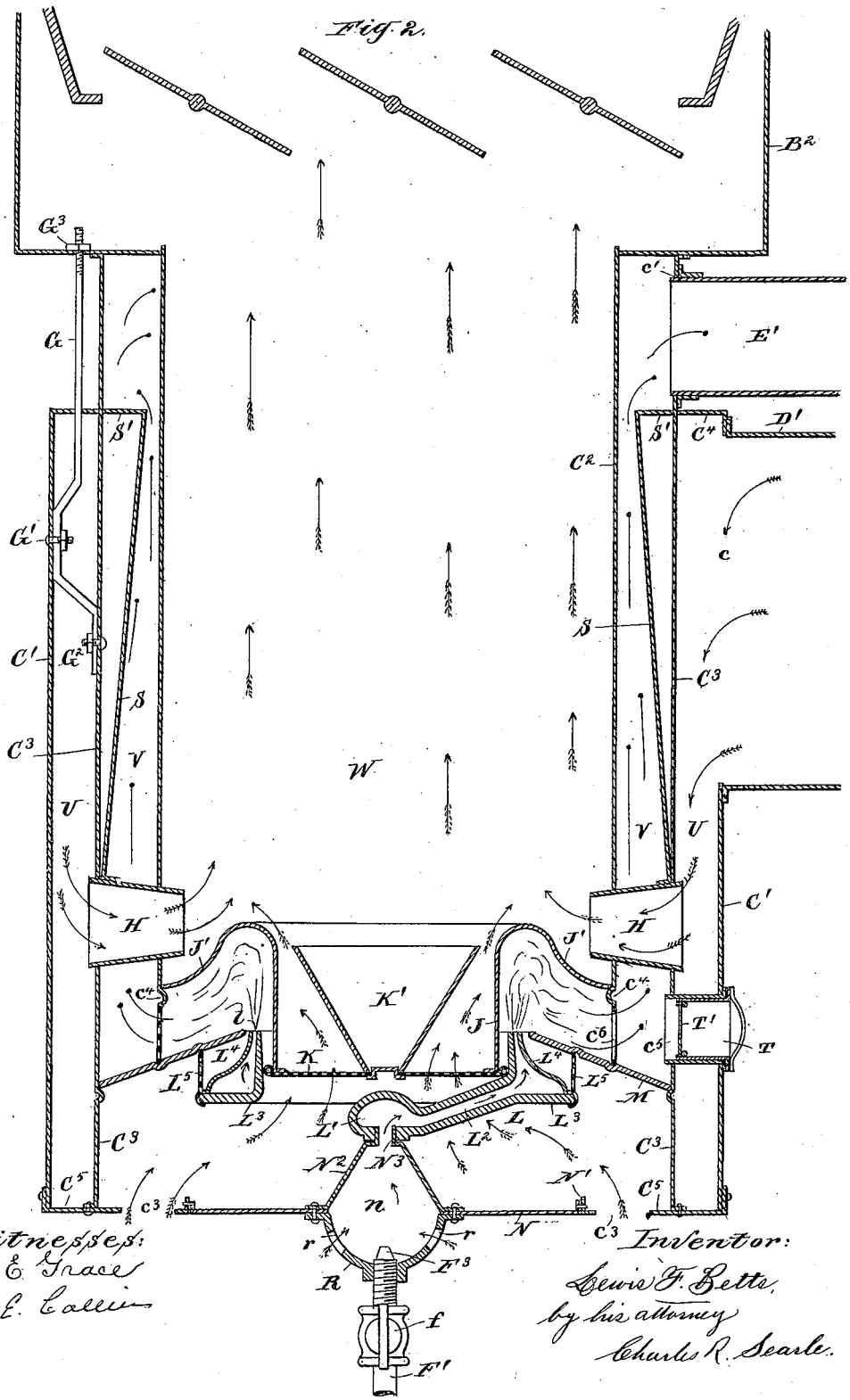
(No Model.) 2 Sheets—Sheet 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

LEWIS F. BETTS, OF NEW YORK, N. Y.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,193, dated May 8, 1900.

Application filed July 10, 1899. Serial No. 723,254. (No model.)

To all whom it may concern:

Be it known that I, LEWIS F. BETTS, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the State of New York, have invented a certain new and useful Improvement in Heating Apparatus, of which the following is a specification.

It is the common practice in house-heating by hot-air furnaces to locate the furnace at the desired point in the basement or cellar, supply cool fresh air from the outside, and lead it when heated by the furnace through pipes of greater or less length to the several registers in the floor above and to flues leading to the upper stories. In this arrangement much of the heat is lost by radiation in the cellar, even though the pipes be clothed in non-conducting wrappings.

The object of this invention is to provide means whereby this loss by radiation may be avoided and also to heat more economically the rooms or apartments to be warmed.

I locate an independent heater as near as practicable to each register or flue, and thus avoid the long traverse of hot-air pipes.

The invention relates to the construction of such heater; and it consists of an open-topped casing adapted to be joined directly to the register or flue, having the passages so arranged as to cause the incoming fresh air to traverse the outgoing products of combustion and to pass over surfaces heated thereby. The products are so inclosed that any danger of their escape into the cellar or apartments is avoided. Each heater is equipped with a burner preferably adapted to use ordinary house-gas, and means are provided for guarding against accident by the escape of gas into the apartments.

The heater is simple in construction, easily controlled and operated, and is peculiarly economical and efficient.

The accompanying drawings form a part of this specification and show the invention as I propose to carry it out in practice.

Figure 1 is a sectional view of a portion of a building, on a small scale, showing the heating apparatus in elevation. Fig. 2 is on a larger scale, showing a vertical section through the burner and adjacent portions of the heater. Fig. 3 is a horizontal section on the line 3 3 in Fig. 2. Fig. 4 is a plan view of the main portion of the burner detached.

Similar letters of reference indicate the same parts in all the figures where they appear.

A A are the walls of a building, and A′ A^2 the first and second floors, respectively.

A^3 is a chimney-flue leading, as usually, above the roof, and A^4 is a heating-flue leading to the apartments in the upper stories.

B is a register located in the first floor, as usual, and B′ is an ordinary wall-register on the floor above.

C C are the heaters, attached to the register-box B^2 of the floor-register B and to the elbow B^3, leading to the upper register B′. Cool fresh air is inducted through a cold-air box D, from which it is distributed through the branches D′ D^2, controlled by dampers *d*, to the heaters C, and E is a pipe of sufficient diameter to conduct the products of combustion received from the heaters through the branches E′ E^2 into the chimney-flue A^3.

F is a main gas-pipe having branches F′ F^2 leading to the several burners, each controlled by a cock *f*. An independent heater is thus located as close to its register as practicable, and the supply of gas and cool air is conveyed to each, while the spent gases are led away to the chimney through systems of pipes and conduits, so that there is but little loss by radiation.

The construction of the heater is shown in Figs. 2, 3, and 4. It consists of the outer casing C′, having the opening *c*, receiving the branch D′, an inner wall C^2, within which the heated air ascends, and an intermediate annular partition C^3, dividing the space between the casing C′ and wall C^2 and having the opening *c*′, receiving the pipe E′, leading to the chimney. The inner wall extends upwardly a short distance into the register-box B^2, and the intermediate partition abuts against the under face of the latter, the whole being suspended by three or more carriers G, bolted to the intermediate partitions C^3 and casing C′ at G′ and G^2, extending through the bottom of the box and secured by nuts G^3, as shown. The outer casing C′ terminates just below the pipe E′ and is closed by a horizontal deck C^4, reaching inward to the intermediate partition. The carriers G extend through the deck

and stand outside the partition. The space below is closed by the annular horizontal floor C^5, having a large central opening and a series of smaller holes c^3 surrounding it.

H H are short tapered tubes or thimbles arranged in a horizontal series close together near the lower portion of the heater and extending across the space or annular passage V and communicating between the passage U and the interior W of the inner wall C^2. Below these thimbles is an annular casting J, having a curved drooping flange J′, by which it is supported upon a bead c^4, formed on the inner face of the wall C^2. The lower end of the casting is closed by a perforated plate K, carrying an inverted cone or spreader K′, of sheet metal. The plate K rests upon the burner L, which is an open spider-frame casting consisting of the central cell or hollow boss L′ and radial tubular arms L^2, opening into an annular L-shaped flange L^3, carrying a conical sheet-metal hood L^4, spun over the edge of the horizontal part of the flange L^3 and reaching nearly to the upper edge of the vertical portion, leaving a narrow annular space *l* between itself and the latter. Outside the hood is a vertical wall L^5, of perforated sheet metal, also carried by the flange and extending upward to the under face of a flat conical plate M, extending inwardly from the intermediate partition C^3 nearly to the upper edge of the hood and supporting the lower edge of the inner wall C′. The plate M rests on a bead in the partition C^3 and closes the lower portion of the interior. The large opening is closed by a circular plate N, of sheet metal, secured to the floor C^5 by a bayonet-joint at N′ and carrying a closed cone N^2, which supports the burner L and communicates through the nipple N^3 with the interior of the boss L′. Below the cone is a hemispherical casting R, having openings *r*, and receives the centrally-located gas-inlet F^3 and the cock *f*, controlling the flow of gas from the branch F′ and forming with the cone N^2 a mixing-chamber *n*.

The operation may be described as follows: Gas is admitted through the inlet F^3 and mingles with the proper quantity of air entering through the holes *r* in the mixing-chamber *n* to form a heat-producing flame, passes through the arms L^2 to the interior of the hood, and issues at the annular opening *l*, where it is ignited by a match thrust through the opening c^5, and produces an intense heating-flame analogous to that of a Bunsen burner beneath and around the casting J J′, heating the latter and the adjacent surfaces. The products of combustion pass upward in the annular passage V, as shown by the blunt arrows in Fig. 2, and escape to the chimney through the pipe E′. Fresh air entering from the branch D′ flows downward, as indicated by the arrows, in the annular passage U and through the thimbles H, bathed in the hot gases, and is projected inwardly against the hot casting J J′ and passes upward in the large open passage W to the register with practically all of the heat absorbed during its traverse.

It will be observed that the passage W is jacketed by the passage V, containing the hot products of combustion and extending nearly the whole length.

S is a conical annular partition introduced into the passage V and serving to hold back or check the too-rapid escape of the hot gases and also to insulate against radiation outwardly. The partition S is supported upon the thimbles H and is decked at S′, as shown.

A limited quantity of air is admitted from the cellar through the openings c^3 in the bottom C^5 and flows upwardly through the spaces between the arms L^2 and thence through the perforations in the plate K and is forced by the spreader K′ against the inner surface of the casting J and is there heated and passes upward, with the hot fresh air entering through the thimbles, and passes to the register. Its function is to cool the lower part of the burner and prevent dangerous transmission of heat to the gas-inlet pipe. The perforated wall L^5 serves as a safety device to confine the flame and prevent its reaching the space below the burner or the air surrounding the heater.

The lighting-opening c^5 is closed by a removable plug T, having a window T′, of mica, at the inner end opposite the hole c^6 and through which the burner may be lighted and the condition of the flame observed.

By turning the plate N to free the bayonet-joint the burner may be lowered through the opening and removed for cleaning and again replaced. To facilitate this operation, I prefer to make the connection from the branch F′ to the cock *f* of flexible tubing.

I attach importance to the fact that the air from the cold-air box is compelled to pass through the hot products of combustion rising in the passage V, and it will also be noticed that the construction is such that with only a moderate draft in the chimney-flue any gas escaping unconsumed from the burner through accident or by carelessly opening the cock without lighting the burner will be drawn away without entering the passage W and passing to the apartment.

Modifications may be made in the forms and proportions without departing from the principle of the invention or sacrificing its advantages.

The heater may be equipped with a burner using kerosene or other hydrocarbon and the manner of connecting to the register or flue may be varied.

I do not in this application claim the general system of house-heating above set forth, such being made the subject-matter of a separate application for patent, filed May 11, 1899, Serial No. 716,356.

I claim—

1. The heater described, consisting of an annular casing inclosing the fresh-air-supply passages and a central open-topped hot-air-delivery passage, and a space between them

through which the hot products of combustion are led, in combination with a series of passages traversing said combustion-space and bathed in the hot products, leading from said fresh-air passage to said hot-air passage, a casting J closing the lower end of the latter, and supported by the same, a perforated plate forming the bottom of said casting and carrying a cone-spreader and a burner located below said casting, the whole adapted to be attached directly to a register box or flue, substantially as and for the purposes herein specified.

2. The casing C′, inner wall C^2 and partition C^3, the fresh-air-supply pipe D, D′, entering said casing, and the pipe E, E′, leading from said partition, in combination with a casting J at the lower end of said wall, a conical partition between said inner wall and partition, a heating-burner located below said casting, and a series of passages extending through said partition and wall and bathed in the products of combustion from said burner, all arranged to serve with a register as herein specified.

3. The casing C′ and partition C^3 forming the annular passage U for incoming fresh air, the inner wall C^2 adapted to extend into a register-box B^2 and forming a passage W for the heated air, opening directly into said box, and the casting J J′, closing the lower end of said passage, the annular passage V formed by the space between said partition and wall and serving for the products of combustion, a conical partition in the said passage V and a series of thimbles H leading from said fresh-air passage through the combustion-passage to said heated-air passage, in combination with a heating-burner located at the lower end of said heated-air passage and separated therefrom by said casting, and the conical plate M serving with the latter to form a space within which the gases from said burner are confined and led to said combustion-passage, all substantially as and for the purposes herein specified.

4. The combination of the casing C′, inner wall C^2, intermediate partition C^3, register-box B^2, rods secured to the adjacent faces of the casing and partition and connecting the same with the register-box, the horizontally-disposed thimbles extending through openings in the inner wall and partition, the casting at the lower end of the inner wall, the conical partition in the space between the inner wall and intermediate partition and a bottom to the casing supporting a burner, all substantially as specified.

5. The combination of the casing, the inner wall, the intermediate partition, the register-box, rods secured to the same and to the casing and partition, horizontally-disposed thimbles extending through openings in the inner wall and partition, the casting at the lower end of the inner wall, the conical partition in the space between the inner wall and intermediate partition, a bottom to the casing, a perforated horizontal bottom plate, the cone-spreader within the casting supported by said plate, the plate M having opening through which said casting extends, and a burner supported by said bottom and extending between said casting and plate M all substantially as and for the purpose specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

LEWIS F. BETTS.

Witnesses:
C. A. HAWK,
CHARLES R. SEARLE.