

F. S. LAMSON.
GAS AIR HEATER.

APPLICATION FILED OCT. 15, 1904. RENEWED DEC. 13, 1907.

937,821.

Patented Oct. 26, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

B

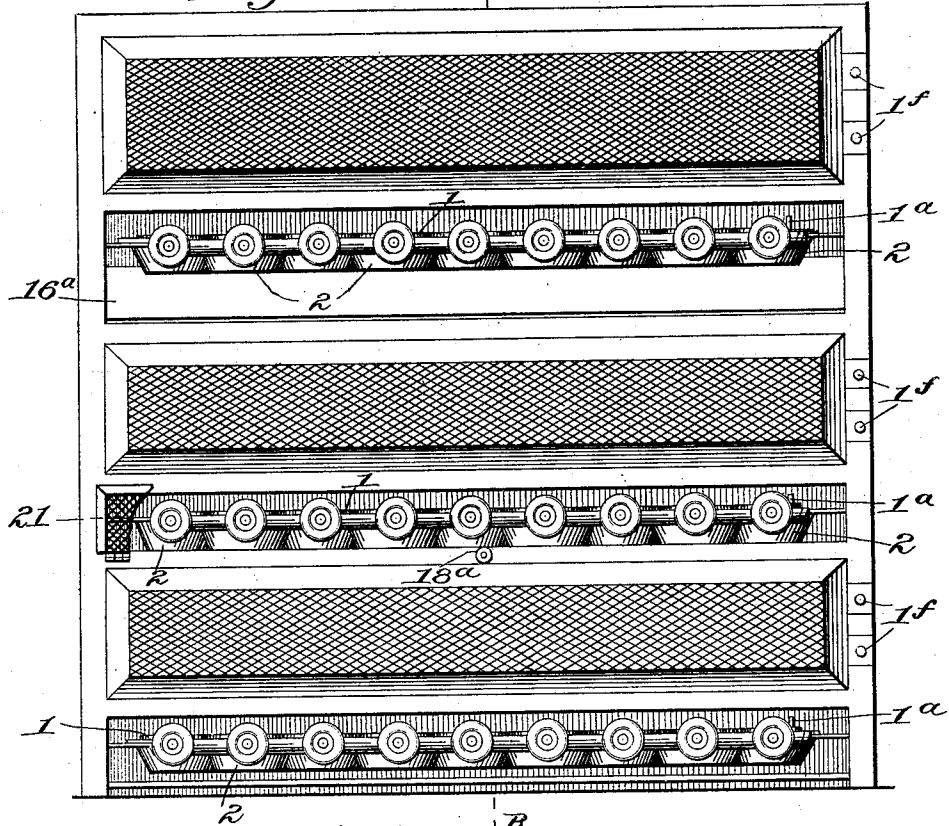
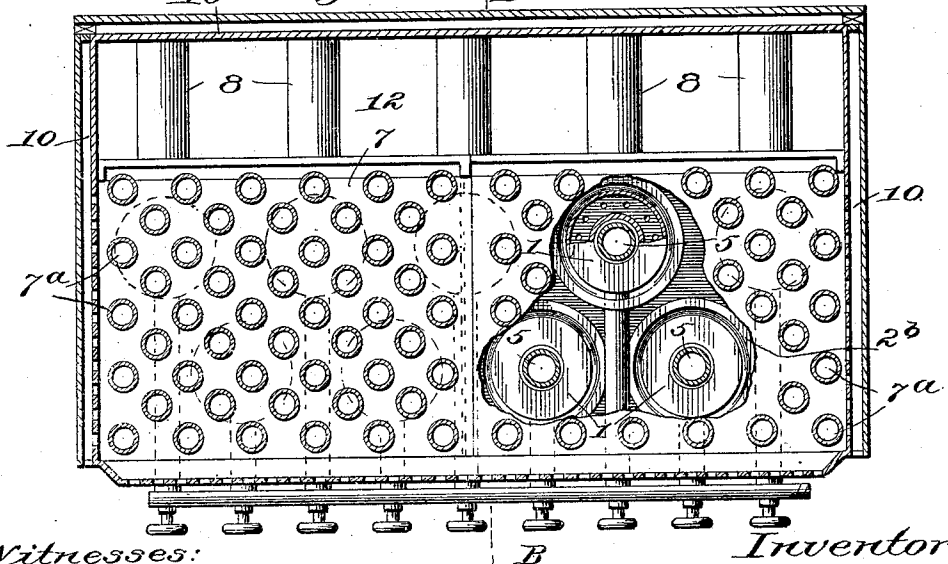


Fig. 2.

B
B



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2 SHEETS—SHEET 2.

Fig. 3.

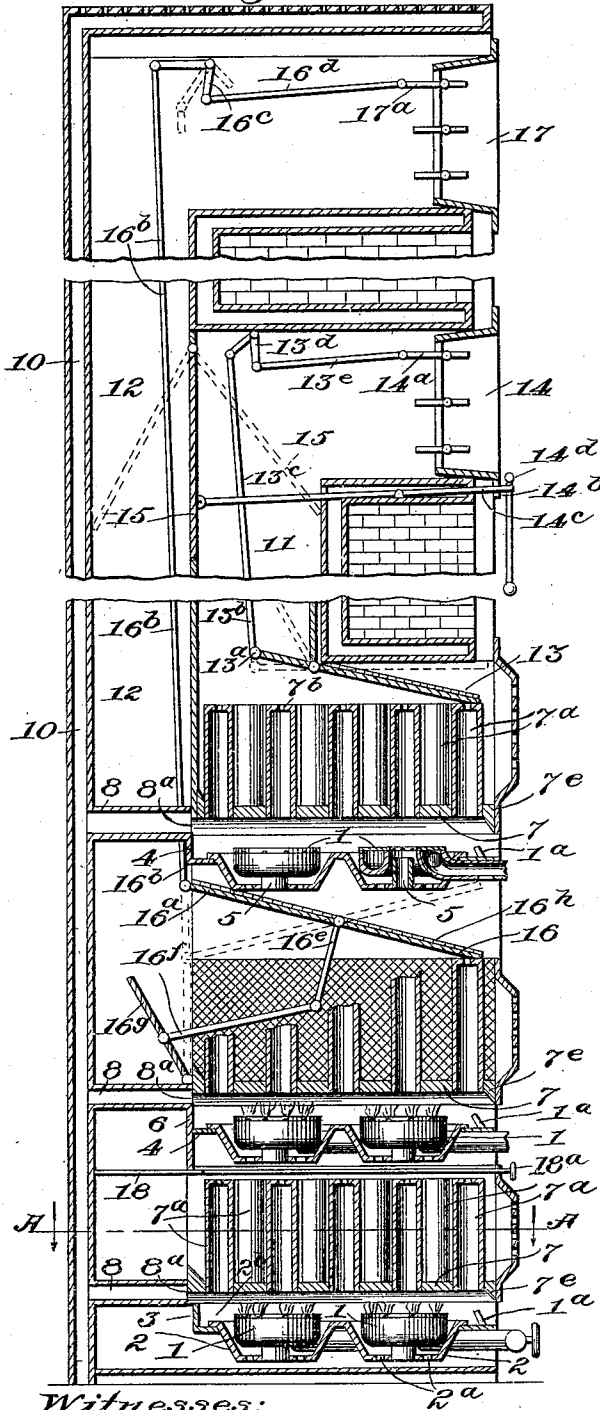


Fig. 5.

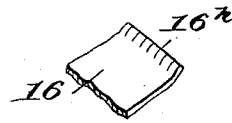


Fig. 6.

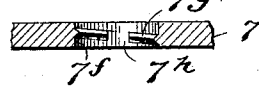
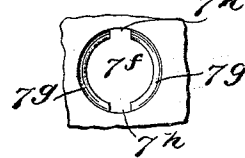


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANKLIN S. LAMSON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO COSMOS CONSTRUCTION COMPANY, INC., OF WASHINGTON, DISTRICT OF COLUMBIA.

GAS AIR-HEATER.

937,821.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Original application filed May 2, 1904, Serial No. 206,032. Divided and this application filed October 15, 1904, Serial No. 228,568. Renewed December 13, 1907. Serial No. 406,324.

To all whom it may concern:

Be it known that I, FRANKLIN S. LAMSON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a new and Improved Gas Air-Heater, of which the following is a specification.

My invention relates to an improved apparatus for heating air.

As stated, in part, in my application Serial No. 206,032, filed May 2d, 1904, of which the matter herein formed part, the objects of my invention are, first, to provide a direct-acting heat-receiving-and-conveying-to-the-air medium for the super-heat furnished by my improved gas-burner (claimed in the above-named application), which will be capable of indefinite extension and adaptation in area and heating power; second, to provide means for connecting a number of heaters so as to form an air-heating furnace of any desired power; third, to provide means for changing the delivery of heated air, so as to unite or separate the heating power of two or more heaters; fourth, to provide automatic connection between the shifting devices and the register mechanism, so that the opening or closing of the register will cause entrance or diversion of the heated air; fifth, to provide means for the escape of the products of combustion, thereby enabling ventilation, and for causing such products to pass into jackets which envelop the hot-air flues, thereby preventing loss of heat from such flues.

In the accompanying drawings, 2 sheets, Figure 1 is a front elevation of a fireplace-heater embodying my invention, with portions broken away to show interior devices; Fig. 2, a horizontal section on the line A A, lower section of Fig. 3; Fig. 3, a vertical section on the line B B, Figs. 1 and 2; Figs. 4, 5, 6 and 7 show details of devices described.

Similar figures refer to similar parts in the several views.

In this invention the kind of burner used may be the ordinary blue-flame gas hot-plate, or range, burner, but the more powerful and economical superheating burner is much preferable.

Above the burners 1 (and their superheating devices 2, 4 and 5), Figs. 1 to 3, metal plates 7 are placed to receive the heat therefrom, and radiate or convey it directly to

the air. Being placed directly over, and near to, the burner-flames, it serves to so confine and control the heat that the burners 1, placed between the plates above and the casings 2 beneath, become heated to redness. These radiator, or heater, plates are to be adapted in surface area to the amount of heat to be received from any given series of burners, and to be conveyed to the air without injuring its quality by overheating. To accomplish this purpose each plate is provided with hollow cylindrical projections 7^a, adapted in surface area as described, and arranged in "staggered" order, as shown in Fig. 2, which causes the air continually to impinge against, or pass near, such projections, while being drawn in to take the place of the rising heated air. A small opening 7^b, in the top of each projection, allows a slow passage of a part of the inclosed air, while the heat is being communicated to the radiator projection. When desired these openings 7^b may be omitted, when all of the vitiated air will pass through the ventilation pipes 8. (See Fig. 3.)

When desired each heater-plate 7 may be provided at its respective ends or sides with a socket 7^c and tenon 7^d, adapted each to the other, whereby a series of any number of heater-plates may be detachably connected to form a furnace of any desired heating power. In Figs. 1 to 3 a fireplace-heater is shown, consisting of three pairs (on three levels) of heater-plates 7; each pair of such plates being connected by socket 7^c and tenon 7^d, as shown in Fig. 4. Beneath each pair of plates a heating battery is placed, consisting of nine burners 1, each with its perforated cup-casing 2, and air-tube 5; the metal diaphragm 4, connecting the cup-casings, is extended to the heater-frame on all sides, as shown, and, in connection with the heater-plate-bottom and its three flanges 7^e, forms the burner-chamber; from said burner-chamber the air vitiated by combustion passes into ventilation-pipes 8 through the openings 8^a at the rear of the burner-chamber, as shown in Fig. 3. From the ventilation-pipes 8 the hot vitiated air passes into the double inclosing-jacket 10, which surrounds the flues 11, 12 which conduct the hot pure air to rooms above; this inclosing-jacket 10 is provided, at its upper extremity, with perforations sufficient in area to permit the gradual escape of the

vitiated air after having parted with much of its heat in its slow upward passage, the hot inclosing-jacket serving to prevent loss of heat, by radiation, from the hot-air flues within. The area of such perforations is adapted to the requirements of the heating-battery used in any particular instance, and when desired the escape of such vitiated air may be regulated by a draft-regulator of ordinary form, such as a centrally-pivoted plate having a series of openings which may coincide more or less with a like series of openings in the device to which said plate may be pivoted.

As shown in Fig. 3, the upper heater of the three is provided with a metal apron 13, which extends the full width of its chamber, and is pivoted and set at an inclination to the horizontal, so that the hot air rising from the heater-plate will be directed upward into, and through, the flue 11, and register 14, to a room above. This pivoted apron 13 is provided with a leaf 13^a which is attached to and forms part of said apron, as shown, its function being to close or open flue 11 when the apron 13 is raised or lowered; the operative lever 13^b, attached to the pivoted apron, is connected by link 13^c, lever 13^d, and link 13^e, with the register-leaf 14^a, so that when the register 14 is closed the apron 13 is shifted to a horizontal position, and its leaf 13^a closes flue 11, thereby preventing the upward passage of the heated air, which air will then pass out through the open-work front into the lower room. When the shifting apron is inclined, and the hot air is passing up through flue 11, the supply of air to be heated passes into the heater, through the open-work front, from the lower room; when the register 14 is closed, and the shifting-apron raised, the supply-air passes in through the open-work at either or both ends, or the lower margin, being automatically self-regulating. As shown in Fig. 3, also, the face-plate of register 14 is provided at its lower margin with an opening 14^b, through which the jointed drop-handle 14^c passes to, and is attached to, the pivoted, pendent, hot-air-deflecting leaf 15. The function of this leaf is to deflect the hot air from either flue, 11 or 12, into the other, so as to combine the heating power of two batteries in either one of the two rooms with which said flues 11 and 12 are connected. The mode of operation is as follows: with the leaf 15 pendent, as shown in full lines, it serves to form part of the division between the flues 11 and 12, and the drop-handle 14^c has one section pendent; if the drop-handle be drawn in so as to have two sections pendent, leaf 15 closes flue 11 above the leaf, and the hot air rising in flue 11 is deflected into flue 12, passing to the upper room; if the drop-handle be raised to the horizontal and pushed in to the limit,

the leaf 15 closes flue 12 above the leaf, and the hot air rising in flue 12 is diverted into flue 11, and passes through register 14 into its room. The face-plate of register 14 is also provided with a friction-spring 14^a attached thereto just over the drop-handle-opening 14^b in such manner as to cause pressure to bear on said drop-handle sufficient to prevent movement of the leaf, and hold in any position of partial deflection. The middle heater is also provided with a metal pivoted shifting-apron 16, lever-arm 16^a, link 16^b, lever 16^c, and link 16^d connected to leaf 17^a of the register 17; attached to apron 16 is also the lever-arm 16^e, connected by link 16^f to the pivoted supplementary shifting-leaf 16^g, as shown, whereby the closing of the register 17 operates also to close shifting-aprons 16, 16^g, preventing the hot air from passing into flue 12, and causing it to pass out into the lower room. The air-supply for the middle heater is also operative as above described for the upper heater. The lower heater is intended primarily to heat the room in which it is placed, but, when desired, the sliding valve 18, to which the handle 18^a is attached, can be drawn forward, when the hot air from the lower heater will pass up into flue 12. It will thus be seen that the heating power of a series of powerful heaters can be operated and controlled separately or together, to any desired extent.

For facility of lighting the burners, and controlling the amount of heat as desired, each battery of the heater is provided with a pilot-flame burner 1^a, Figs. 1 and 3, which is operatively connected, in usual manner, with an electric battery (not shown), and push-buttons 1^b, for lighting and extinguishing said flame; the burner 1 nearest to said pilot-flame will light therefrom when its gas-supply valve is opened, and each succeeding burner 1, in its battery, will light from its precedent flame, respectively, as its valve is opened. The number of burners to be used, and the amount of flame desired, is regulated by said valves in usual manner. After the first burner 1 shall have been lighted, the pilot-flame can be extinguished. The stem of each burner 1 is provided with a gas-tight collar 1^c at the place where it passes through the cup-casing 2, in order that the "flash-back" to the mixer may be prevented.

For facility, and ease of operation, the different deflecting-aprons and devices are pivoted on knife-edge, or other anti-friction, bearings; and each set of deflecting devices is so balanced (by means of proportioned weights), as to be easily operative by the means provided. Where the moving edges of said aprons are liable to create friction by brushing against chamber sides, such edges are provided with automatic spring contact-keeping devices, which, with slight pressure,

are easily moved over such surfaces, and keep close joints, thereby enabling complete diversion of the hot air from one place to another. (See Fig. 5, which shows a portion of an apron edge 16, having spring fingers 16^a.) A hinged open-work drop-door 21 (see Fig. 1, left side) covers, and protects, each row of gas-valve handles.

It is evident that increase of surface area of a flat heater-plate can not keep pace with increase of heating power, being limited by the objections of lateral bulk, weight, and cost; a similar plate with radiator-projections, the length of which can be increased, enables the adaptation of radiating surface to increased heating power to any desired extent. To enable such adaptation each radiator-projection 7^a has screw-threads cut on its lower end, and, as shown in detail Figs. 6 and 7, each corresponding hole 7^b in the heater-plate 7, has a single screw-thread 7^c (which has parts 7^d cut out to facilitate the making of the plate), into which its radiator-projection is firmly screwed. It is also evident that in the adaptation of such projections to the requirement that the heat is to be conveyed to the air without injuring its quality by overheating, the diameter of the projections should—(within practical limits) be relatively small, that is to say, numerous projections of small diameter, not few projections of large diameter. Since, in pipes, the ratio of exterior heating surface to interior contents of heated air is greater as the diameter decreases, the contents of $\frac{3}{4}$ " pipe per lineal inch is about .518 of a cubic inch; that of $\frac{1}{2}$ " pipe is about .062 of a cubic inch. One cubic inch of hot-air content of $\frac{3}{4}$ " pipe has about 6 and $\frac{1}{4}$ square inches of radiating surface, while an equal content of $\frac{1}{2}$ " pipe has 21 and $\frac{1}{4}$ square inches of radiating surface.

What I claim is—

1. The combination of a plurality of heaters, a heat-distributing or utilizing means common to said heaters, and means for governing the flow of all or any portion of the heat of each of said heaters to said heat-distributing means, and additional heat-distributing means for each of said heaters.

2. An air-heater comprising an extensible heater-plate formed of a plurality of removable sections, in combination with a plurality of removable burners, said burners corresponding to said removable sections, whereby the heating capacity of said heater may be varied, and means for distributing or utilizing the heat from said heater.

3. An air-heater comprising an extensible heater-plate formed of a plurality of tenon-and-socket-edge sections, in combination with a plurality of removable burners, said burners corresponding to said removable sections, whereby the heating capacity of said heater may be varied, and means for dis-

tributing or utilizing the heat from said heater.

4. In combination, a heating device provided with an outlet and an open-work front, and an air-delivery shifting-apron, said apron being so arranged that when in one position air is permitted to enter said open-work front and discharge through said outlet, and when in the other position air is permitted to both enter and discharge through said open-work front.

5. In combination, a heating device provided with an open-work front, an outlet and an air-delivery shifting-apron, and a register in communication with said outlet, the means of said communication between register and outlet being so constructed and arranged as to permit the passage to said register of the air delivered to said outlet.

6. In combination, a heating device provided with an open-work front, an outlet and an air-delivery shifting-apron, and a register operatively connected with said shifting-apron, said register, apron and operative connections being so arranged that the opening of the register will shift the apron so as to cause the flow of air to said outlet, and the closing of the register will re-shift the apron and cause the discharge of the air through the open-work front.

7. In combination, a heating device provided with an open-work front, an outlet and an air-delivery shifting-apron, and a supplementary leaf operatively connected to said shifting-apron, by which means the area of said outlet may be varied, said leaf and apron being so connected and arranged as to act in unison.

8. In combination, a plurality of heating devices each of which is provided with inlet and outlet openings, a shifting-apron and a register with a flue connection to said outlet, an adjoining flue or flues, and a deflecting leaf with its operative handle, said leaf being so arranged that when in one position it forms part of a partition between said adjoining flues, in another position it deflects an air-current—partly or entirely—from one flue to a second (adjoining) flue, in a third position it deflects the air-current—partly or entirely—from the second to the first-named of said adjoining flues.

9. The combination of flues 11 and 12, a deflecting-leaf 15 situated between, and adapted to govern the flow of heat from either to the other of, said flues, a heating device for each flue, an additional heating device for one of said flues, and means for governing the flow of heat from each of said heating devices to its respective flue.

10. The combination of two flues, a deflecting-leaf situated between, and adapted to govern the flow of heat from either to the other of, said flues, a heating device for each of said flues, a shifting-apron for gov-

erning the flow of heat from each of said heating devices to its respective flue, an additional heating device for one of said flues, and a damper for governing the flow of heat from said heating device to said flue.

11. The combination with a heating device provided with a burner-chamber and its hot-air flue, of a heated-air jacket which incloses said flue and is spaced therefrom, and which is provided with perforations at or near its top for gradual escape of its inclosed air, and means of communication between the said jacket and the said burner-chamber.

12. The combination with a heating device provided with a burner-chamber and its hot-air flue, of a heated-air jacket which incloses said flue and is spaced therefrom, and which is provided with perforations at or near its top for gradual escape of its inclosed air, and ventilation-pipes which connect the burner-chamber of said heating device with said jacket, and permit the passage of the products of combustion thereto.

13. The combination of a heating device provided with an outlet and an open front, said open front adapted to receive air and discharge heated air, and means for causing the heated air to pass through said outlet or through said open front, a battery of

burners—including a pilot-flame burner, and a hinged open-work closure for said open front, by which access may be had to said burners.

14. The combination of an air-heater provided with an air-inlet and an air-outlet, and a burner, said heater comprising a heater-plate and a plurality of hollow radiating-studs projecting therefrom, said studs being in open communication with said burner's inclosure, and so arranged with respect to said inlet and outlet openings as to cause the air to flow into contact therewith.

15. The combination with a superheating burner or burners of a heater-plate provided with hollow heat-radiating studs, the diameters of which studs are limited, within practical limits, by the requirement that they shall have the largest available ratio of heat-radiating surface to the interior cubic content of such studs, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANKLIN S. LAMSON.

Witnesses:

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PERRY B. TURPIN.