

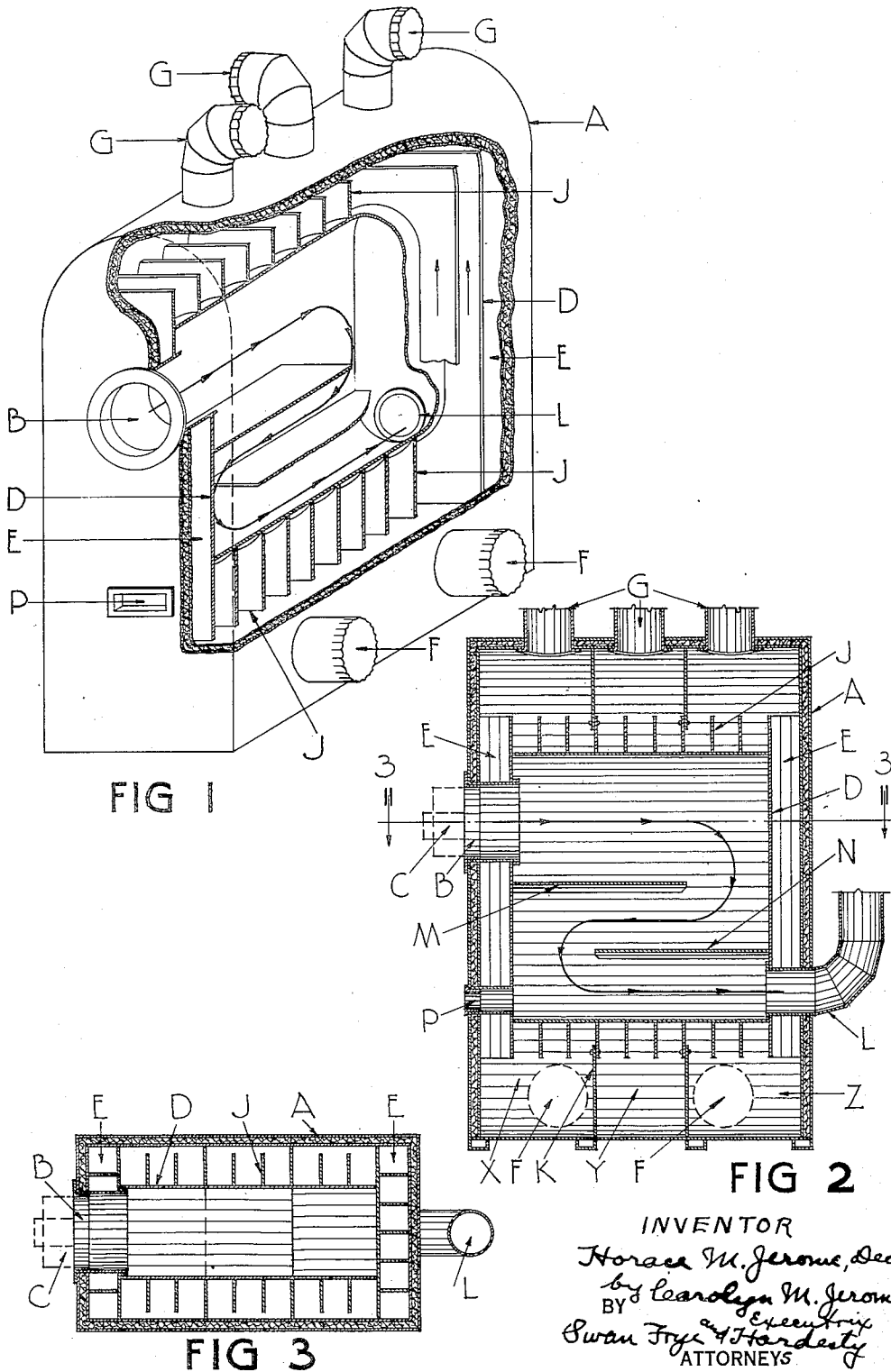
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H. M. JEROME

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AIR HEATING APPARATUS

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INVENTOR

Horace M. Jerome, Dec'd

by Leonard M. Jerome

BY Swan Frye & Hardesty

ATTORNEYS

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AIR HEATING APPARATUS

Horace M. Jerome, deceased, late of Ann Arbor,
Mich., by Carolyn M. Jerome, administratrix,
Ann Arbor, Mich.

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4 Claims. (Cl. 257—166)

This invention relates to an improved form of heating apparatus, and has for its object an improved organization of parts designed and adapted to extract the maximum possible number of heat units from the products of combustion before these latter are irrevocably and heat-wastefully liberated through a chimney or stack leading to the outside atmosphere. It has nothing to do with the aiding or influencing of the combustion process as such, but rather with the handling of the gases generated therefrom, whether the fuel be solid or liquid, and after the gases of combustion have started on their way from the immediate vicinity of their generation, toward their ultimate escape outlet.

To this end this invention in its preferred form comprises the organization of parts herein shown, having to do with the extraction of the maximum possible number of heat units in the products of combustion, both by the rerouting thereof from their normal escape channel and by the provision of special heat-convection elements appurtenant the walls, within which these initially hot gases are confined, or through which they are being guided toward ultimate escape to the atmosphere. While the invention is particularly directed to the heating of air by the means and in the manner to be described, it will of course be understood that in place of air heating, the heating of another gas could be thereby effected.

In the drawing:

Figure 1 is a perspective of the important and salient parts of my improved apparatus, with a portion of the wall broken away to bring out their relative interior arrangement.

Figure 2 is a side elevational view largely in section, in other words, taken lengthwise of the apparatus as a whole.

Figure 3 is a sectional plan view taken along the line 3—3 of Figure 2, and looking in the direction of the arrows there shown.

In the preferred embodiment of the invention herein illustrated, A represents an outer shell or chamber adapted to be connected, as at B, with a source of combustion products which may be communicated thereto from a relatively distant source through a pipe, as suggested in dotted lines at C, or through the medium of a fuel burner terminal positioned actually in the throat of the aperture B. This inlet aperture B projects not only through the walls of the outer chamber A, but as well through the wall of the interior chamber D, some of whose details, including its preferred method of support within the chamber A and the heat-unit-extracting results thereby obtained, will be dealt with in a later paragraph hereof.

This inner chamber D is spaced at its ends from the walls of the outer chamber A by flue elements E which open at their top and bottom ends re-

spectively into the spaces within the outer chamber A respectively above and below the inner chamber D. Cool air inlet holes, as F, are positioned in the bottom portion of the outer chamber walls and hot air outlets G are located in its top wall.

Spacedly arranged about the side walls of the inner chamber or shell D are a series of fins J, the outer edges of selected ones of which are connected with struts or wall pieces K, the outer ends or edges of which are in turn secured to the inner face of the outer chamber A so as to effect the desired support of the inner chamber D in the spaced relation to the outer chamber which is shown. If, in addition to their function as supporting members for the inner chamber, it be desired that these struts or supports K be made to serve as partitions or space-dividing elements for the otherwise unoccupied space within the inner chamber traversed by them, they may be made of such width as to extend fully thereacross, thus cooperatively with the inner chamber and its projecting fins, dividing the upper and lower spaces within the outer chamber A into a plurality of heat-distribution chambers as X, Y, and Z, so that the radiated heat from the walls of the inner chamber will be equally distributed and restricted in its range of heating influence. Indeed such struts or wall pieces as separate elements might be omitted entirely, in favor of fins of suitably diverse length or radial extent, some of which would reach completely from one chamber wall to another, while others, suitably alternated therewith in arrangement, would extend only a part of the distance between the chamber walls, as shown in Figure 3.

As already stated the heat units, however developed, are introduced into the inner chamber D through the aperture B, or developed in its immediate vicinity. Within the inner chamber D are positioned a pair of baffles or shelves, as M and N, each of which is of lesser length than the inner dimensions of the chamber D, and each of which is terminally supported therewithin at an opposite end of the chamber D from its companion baffle, thus making the course of any products of combustion through the inner chamber D a sinuous one, since the only normally open escape aperture from the chamber D is the flue outlet L which is located at the very bottom of the inner chamber D, and preferably at the opposite end thereof from the inlet aperture B. Two such baffles are shown in the drawing, but it is of course to be understood that a larger number, similarly functioning and positioned relatively to one another could be employed if desired. In any event, the only possible path of travel of the combustion products through the chamber D is a sinuous and downward one, which is of such relative length that a correspondingly large propor-

tion of the surface of the inner chamber D is exposed to the heating influence of the passing stream of combustion products before these pass out through the flue L.

5 Whatever absorption of heat units by the walls of the inner chamber thus takes place is increased and distributed throughout the otherwise unoccupied spaces within the outer chamber A by the action of the fins J which project thereinto, preferably several of them into each of the chambers X, Y, and Z already described. Since the initially cool air entering through the air inlets F of the outer chamber A must traverse either the flues E or some one of the fin-occupied chambers 10 X, Y, or Z before reaching the escape openings G at the top an unusual proportion of heat units are resultantly absorbed by the walls of the inner chamber D and its fins J, and in turn transmitted to the initially cool air whose heating is desired, and which is passing through the outer chamber 15 A as a whole, from the lower air aperture F to the upper outlet vents G.

In order to keep the approaches to the flue outlet L adequately clear of soot and other precipitated combustion products provision is made for convenient access thereto through the medium of the aperture P which is located generally on the level of the lowermost space unit of the inner chamber D which is generally on a level with and substantially in line with the inner end of the flue outlet L. Similar access apertures may, if desired, be provided through the walls of the inner and outer chambers just above the levels of the baffle or shelf members.

20 It will thus be seen that this construction affords in effect a suspended heat conduit of unusual degree of elongation proportionate to its cubic measurements, spacedly suspended within an outer air-transmitting chamber in such a way as to afford a maximum of heat absorptive opportunities to which the presence of the fins about the outer surface of the inner chamber and of the chambering partition and supporting elements H materially add to. And it will also be obvious that although the down-draft arrangement of the parts relating particularly to the inner chamber D is of superior advantage as regards the extraction of as many heat units as possible from the products of combustion, it would be entirely possible to position the combustion products inlet near the bottom of the inner chamber and the flue outlet, corresponding in function to the flue L near the top of the chamber. Similarly with the aid of a fan or equivalent pneumatic apparatus the entering cool air could be introduced within the outer chamber A at the top, and its withdrawal, when heated, effected through apertures at or near the bottom of said chamber; in other words, in such case the parts G shown in 30 Figures 1 and 2 would be the air inlet and the heated air would emerge from the chamber A through the outlet apertures F.

What is claimed is:

1. In a heating apparatus, the combination, 35 with an outer housing, of a chamber for guiding the travel of combustion products, with inlet and outlet passages located at relatively remote points in the walls thereof, a plurality of baffle members supported from opposite ends of said combustion products chamber in such positions 40 relatively to one another as to force gases passing therethrough from the inlet passage to the

outlet passage to traverse a sinuous course, heat-conducting fins arranged in spaced relation about the outer surface of the walls of said combustion products chamber, and means connected with the outer edges of certain of said fins whereby said combustion chamber and its connected parts are supported in spaced relation to said outer housing, whereby the interchange of heat units between the several parts traversed by combustion gases is facilitated. 80

2. In a heating apparatus, in combination with an external shell provided with flue openings, an internal shell provided with gas inlet and outlet apertures registering with selected ones of the flue openings in the outer shell, a plurality of baffle members spacedly positioned within said internal shell, whereby the possible path of travel of gases therethrough is rendered sinuous, a plurality of spacedly located fin members forming cooperatively with the wall of the internal shell a series of partially enclosed pockets about the outer periphery of said internal shell, and means adapted for attachment to certain of said fins and to the interior surface of the external shell whereby the internal shell and its associated parts are supported in desired spaced relation within and with respect to the external shell. 85 90 95 100

3. In a heating apparatus, in combination with an exterior shell member provided with inlet and outlet flue apertures, an interior shell member provided with apertures adapted to register with certain of the flue apertures in the exterior shell member, baffle members spacedly positioned within said interior shell member, whereby, in cooperation with the walls of and apertures in said member, there is constituted a sinuous downwardly-directed path for the gases of combustion introduced therinto, a plurality of fin elements spacedly positioned about the periphery of said interior shell member, whereby a plurality of open-ended air pockets is created immediately about those portions of the outer wall surface of said inner shell, and means structurally associated with the outer edges of certain of said fin members and with the exterior shell member whereby said inner shell member and its associated parts are held in spaced relation to the latter. 105 110 115 120

4. In a heating apparatus, the combination of an outer shell provided with flue inlet and outlet apertures, an inner shell having apertures which register with certain of those in the outer shell, a series of fins spacedly positioned relatively to one another about the exterior of said inner shell and cooperatively with the walls thereof forming a plurality of heat distributing chambers, means connecting the outer edges of certain of said fins with the wall of the outer shell whereby the inner shell and its attached parts is supported in desired spaced position within said outer shell thereby constituting cooperatively with the outer shell a chamber into which said fins project, and horizontally disposed baffle members interposed between the inlet and outlet apertures in said inner shell, whereby the possible path of travel of the products of combustion therethrough is rendered sinuous. 125 130 135 140 145

CAROLYN M. JEROME,
Administratrix of the Estate of Horace M. Jerome,
Deceased. 150