W. J. FREDERICKS.

NON-HEATABLE FURNACE FRONT.

APPLICATION FILED DEC. 9, 1909.

985,336.

Patented Feb. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1

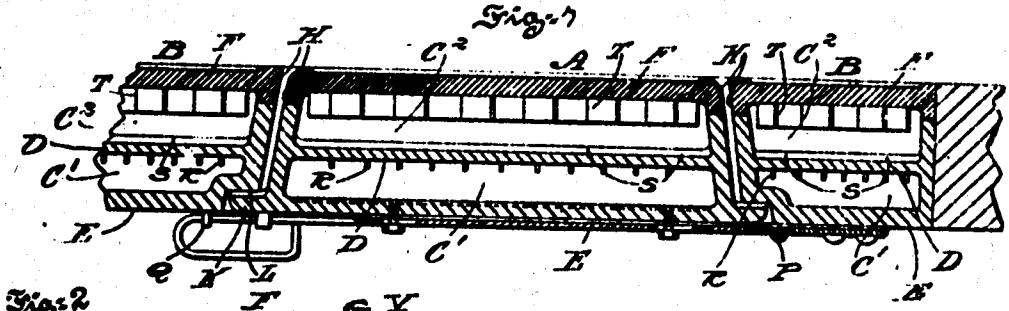


Fig. 2

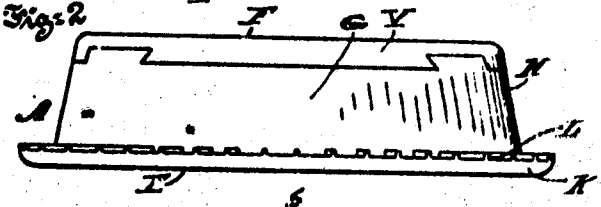


Fig. 3

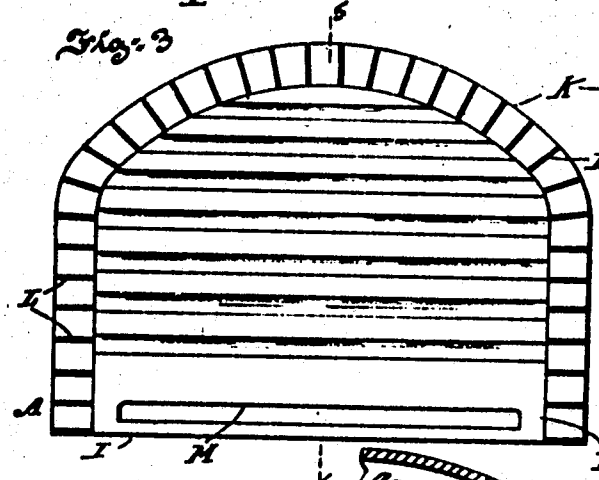


Fig. 4

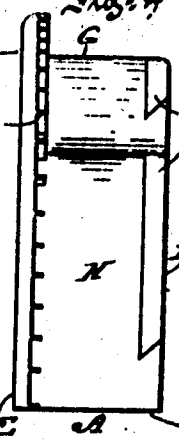


Fig. 5

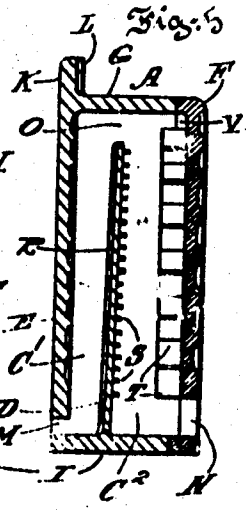
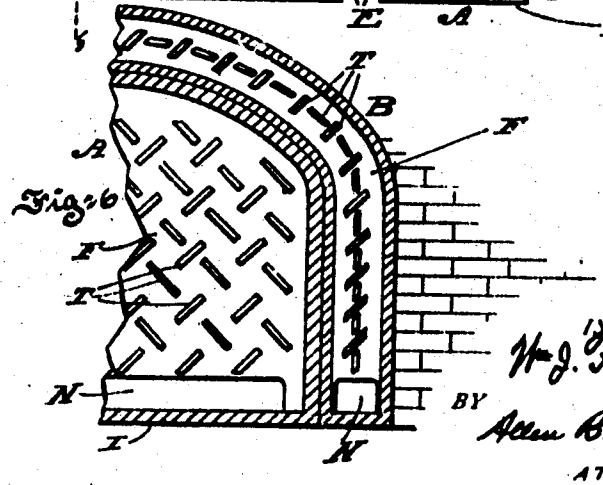


Fig. 6



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2 SHEETS—SHEET 2.

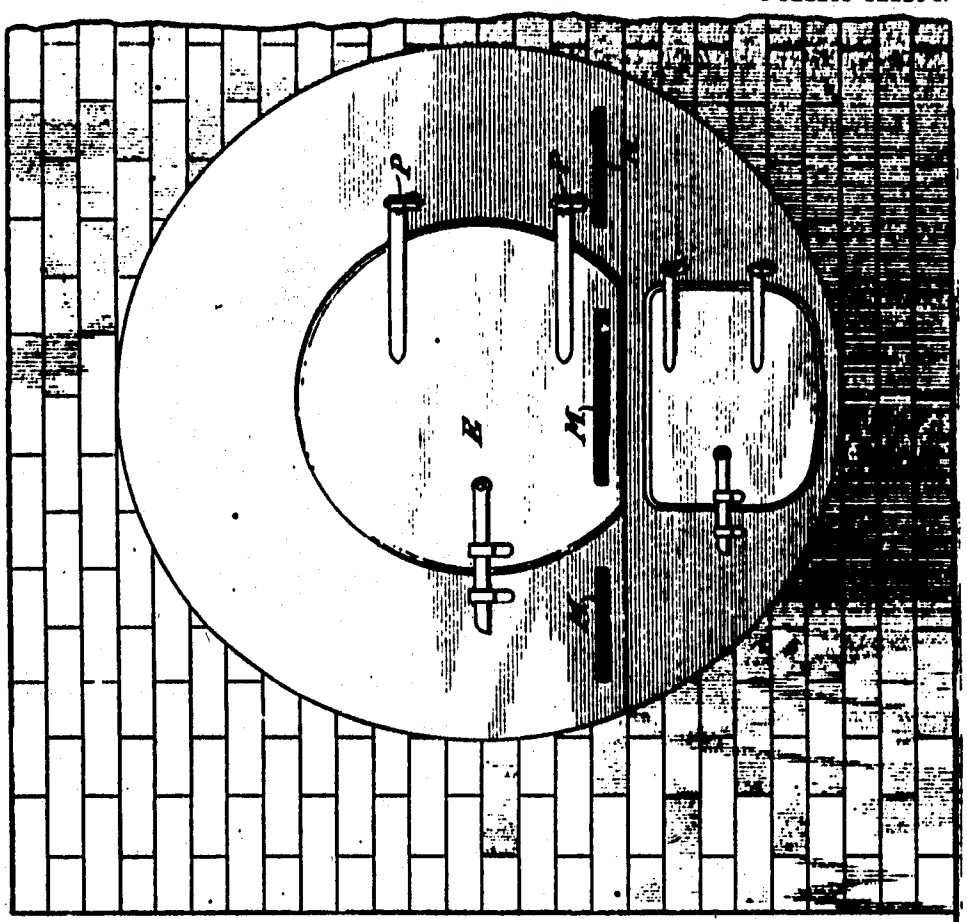

Fig. 7.

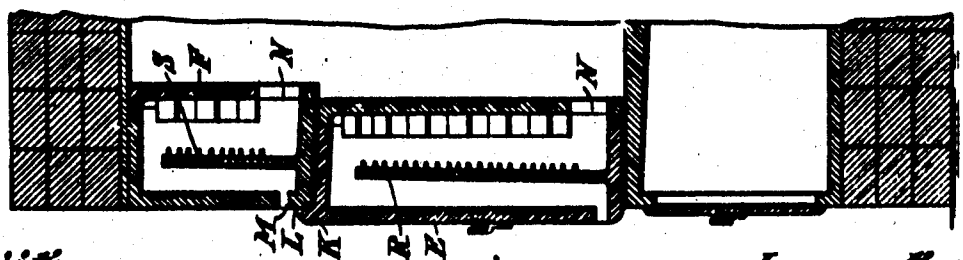

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM J. FREDERICKS, OF PHILADELPHIA, PENNSYLVANIA.

NON-HEATABLE FURNACE-FRONT.

985,336. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed December 9, 1909. Serial No. 532,265.

To all whom it may concern

Be it known that I, WILLIAM J. FREDERICKS, a citizen of the United States, residing at No. 2335 East Susquehanna avenue, in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Non-Heatable Furnace-Fronts, Used for Confining Heat, of which the following is a specification.

My invention relates to improvements in doors, door-jambs and casements for furnaces, stoves, heaters, fire-boxes and heat-generators generally, and particularly those producing high degrees of temperature.

Objects of my invention are: To provide doors and casements for the purpose above stated that will, by reason of an influx of external air, remain comparatively cool, regardless of the temperature within and will not, by reason of the proper flow of air through the respective divisions or chambers, appreciably burn out, thereby not only eliminating the necessity of the massive construction and thickness of doors and casements now in use and reducing the cost of manufacture and the labor in operating but greatly reducing renewal expenses and inconvenience attendant thereto necessary at the present time. Said air from without, while flowing through said chambers of my invention, absorbs and conserves the heat that would radiate and escape through the ordinary door and casement and returns the same to the fire, making the front of the fire proportionately hotter, at the same time introducing strong drafts of heated air and oxygen that will, by more readily and more perfectly combining with the gases and smoke, produce more perfect combustion, thereby not only intensifying the heat and increasing the temperature of the objects to be heated by contact, but making a higher and more even degree of temperature throughout the heated portion; for the same reason, will diminish the escape of smoke with its resulting nuisances and consequently is a source of economy in fuel.

A further object is to provide apparatus, for the purposes set forth, so constructed that the parts injured by accident or use may be quickly and readily replaced.

Other objects will appear hereinafter.

The invention consists of improvements hereinafter described and claimed, and illustrated in the accompanying drawing in which—

Figure 1 is a horizontal section of the entire device: Fig. 2, is a top view of the door of the device: Fig. 3, is a drawing showing the interior side of the front face of the door: Fig. 4, is a side view of the door: Fig. 5, is a vertical section of the door in plane "5—5" of Fig. 3: Fig. 6, is a partial view of the interior face of that portion of the door and its casement exposed to the fire. Figs. 7 and 8 in the accompanying drawing illustrate in a specific case an application of my invention.

The accompanying drawing is given for illustrative purposes, but not to limit my invention, and similar letters refer to similar parts throughout the several views.

My device comprises a box-like door "A", shown in the several figures, and casements "B", therefor, shown only in Fig. 1 and Fig. 6, each comprising two or more chambers "C," and "C," shown in Fig. 1 and Fig. 5 formed by one or more lateral longitudinal partitions "D", shown in Fig. 1 and Fig. 5, front or external face "E", shown in all of the figures with the exception of Fig. 6, the back or "liner" "F", shown in all the figures with the exception of Fig. 3, the top "G": bottom "I" both shown in Fig. 5 and the sides "H" shown in Fig. 1.

The front face "E" is provided with a flange "K" which overlaps the edges of casement "B" and upon which are numerous small radiating ribs "L," Figs. 2, 3 and 4, which prevent the door "A" from closing tightly against the face of the casement "B" thereby allowing slight air currents to flow between, preventing the flange "K" from becoming heated. The inner side of said face "E" is corrugated, as shown in Fig. 3, presenting more cooling surface and causing the currents of air passing through the chamber "C," to intermingle more readily. Said currents are admitted from the surrounding air into chamber "C," through the opening "M." Figs. 3 and 5. Said opening "M" is located across the lower portion of said face "E" and is of size proportioned to meet the requirements as the case may be. The external side of the said front "E," Fig. 1, is provided with hinges "P" and fastenings "Q." The said face "E", the bottom "I", the top "G", the sides "H" and the

partition "D" are preferably cast in one piece. Said partition are attached to the sides and also alternately attached to the bottom "I" or to the top "G". The form of my device shown in the accompanying drawing, Fig. 5, having only two chambers, "C_1" and "C_2", but one partition "D" is required, and this is attached to the bottom "I" and sides "H" so that air passes through the entire chamber "C_1" before entering the chamber "C_2", which it does through the opening "O" between the upper part of said partition "D" and top "G". Said opening "O" over the partition "D" is of a size proportional to that of inlet "M." Said partition "D" is constructed at an oblique angle with the bottom "I" so that the chamber "C_1" is larger at the top than at the bottom and the chamber "C_2" is larger at the bottom than at the top, thereby preventing the tendency to back draft and also allowing for the expansion of the air as it becomes more and more heated in passing farther and farther into the respective chambers and until liberated into the fire through discharge "N." The air entering said opening "M", Fig. 5, is of practically atmospheric temperature and grows hotter and hotter as it passes up through the chamber "C_1" and is still more heated after passing through the opening "O" over "D" and by the time it has passed down through the chamber "C_2" and reached the opening "N" in the "liner" "F" through which it passes into the fire its temperature will be far above the kindling point of smoke, gases and fuel. Said openings "M," "N" and "O" are apportioned as to size, "M", with or without adjustable damper being the smallest and "N" being the largest, so that the inflow, at "M", of the continuous air current be unchecked and its velocity at the outlet "N" will be increased almost to a blast by reason of its being expanded by the heat. Said partition "D" is provided with numerous longitudinal ribs "R", Fig. 5, on one face and horizontal ribs "S", Fig. 5, on the other face for the purpose of insuring against change of shape or position.

The interior face of "liner" "F", shown in all the figures, with the exception of Fig. 3, is horizontally corrugated on the side exposed to the fire and is conspicuously provided with staggered projections "T" on the interior face. Said projections "T" extend well out into the chamber "C_2" for the twofold purpose of rapidly disposing of the heat radiating against and conducted through the "liner" "F" and of intensifying the heat of the air passing through "C_2" on the way to the fire through the opening "N." Said projections "T" are omitted near the top to permit the "liner" "F" to be lifted straight up to assemble and to release the dovetailed interlocking fastenings.

The construction of the "liner" shown in the accompanying drawing is such that it may be firmly held in its place by gravity and readily removed by lifting up and out. This is accomplished by dove-tailed projections "V", Figs. 2 and 4, on the inner face of the "liner" "F" at its top, bottom and sides; the bottom "I", the top "G" and sides "H" being properly cut out to admit and retain said dove-tailed projections "V". Said door "A" and casement "B" may be of any form to meet requirements and may be used jointly or separately, though it is preferable to have the door "A" of uniform shape and size and to have its surrounding casements "B" of varying sizes and forms to fit the furnaces and openings to which my device is applied.

The above described device, entirely automatic in its action, is simple, durable and comparatively inexpensive to manufacture and possesses the commercial value of being applicable to existing types of furnace-door openings, etc., without in any way interfering with the ordinary draft or requiring alteration to the said door openings to accommodate the said types. Experienced operators or mechanics are not necessary to the operation, installation or repair of the device, the same being a source of economy as well as of safety and comfort, as will be evident from the fact that, radiation from heat within being prevented, the external surfaces of the device remain constantly cool, thereby not only removing all danger of injury from burning by coming in contact with said surfaces whether accidentally or otherwise, but also greatly reducing the very high temperature in front of furnaces and in their corresponding apartments, due to present loss of heat radiation from the furnace, making a paradoxically cool fire-room.

It will be obvious to those skilled in the art to which my invention relates that modification may be made in details without departing from the spirit thereof, hence I do not limit myself to the precise mode of construction, but

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent is—

1. A furnace front comprising a door and casement each consisting of a plurality of circulatory chambers, said chambers being formed by vertical partitions so relatively located and tilted that the size of each said chambers constantly increases from its entrance to its exit portion, said door having its flanges provided with radiating ribs which prevent it from fitting tightly against said casement, said door and casement each provided with orifices connecting said circulatory chambers, said orifices proportionately increased in size from the external to

the internal face of said furnace front, said orifices arranged alternately at top and bottom of said circulatory chambers; and the walls of said chambers provided with corrugations, ribs and staggered projections, substantially as described and for the purposes set forth.

2. In a furnace front, comprising a door and casements, used separately or in combination, each comprising relatively proportioned, (so as to permit expansion of continuous air current,) circulatory chambers connected alternately at top and bottom by likewise proportioned orifices, said door and casements each constructed in two pieces, one piece comprising a front face, sides, top, bottom and partition, the innost edges of said sides, top and bottom having trapezoidal indentures to receive and retain the corresponding dove-tailed projection on the "liner," the remaining piece, said "liner" having its exterior face horizontally corrugated and its interior face provided with staggered projections extending into the adjacent chamber, substantially as described and for the purposes named.

3. In a furnace front comprising a door and its casements, each having face, back, inclosing top, bottom and sides with longitudinal partition forming inner chambers, said face having a slot extending entirely across the lower portion between said inclosing sides, said partition terminating short of the top forming a properly proportioned opening to admit flow of air into second chamber, the furnace front having a back ("liner") having slot at bottom properly proportioned with respect to the others, the relative size of said chambers increasing from entrance to exit by slanting said partition, the front face of said door being extended beyond the said sides and top forming a flange, said flange provided with transverse ribs to hold it at a distance from the face of said casements, substantially as set forth and for the uses specified.

4. A furnace door, for the purposes designated, comprising two castings having inlet, outlet and connected circulatory chambers, dove-tailed fastenings projected at the top, sides and bottom of the inner face of said casting, which forms the "liner," and corresponding trapezoidal indentures in said casting comprising remaining portions of my invention and having inner face of flange of said door providing with means for preventing air tight closing, substantially as described.

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