F. E. NELSON.

HOT AIR FURNACE.

APPLICATION FILED APR. 13, 1908.

924,815. Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 2.

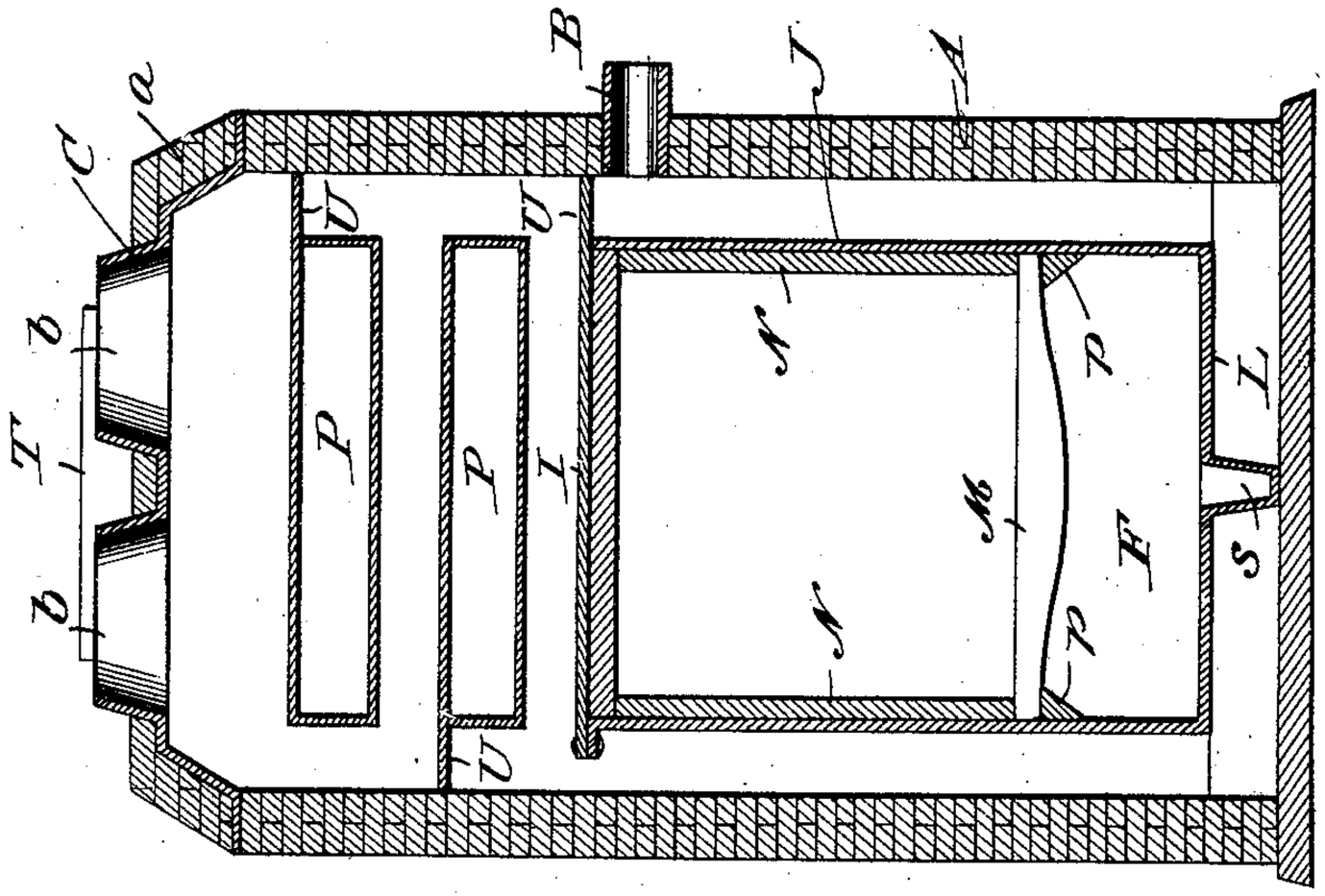
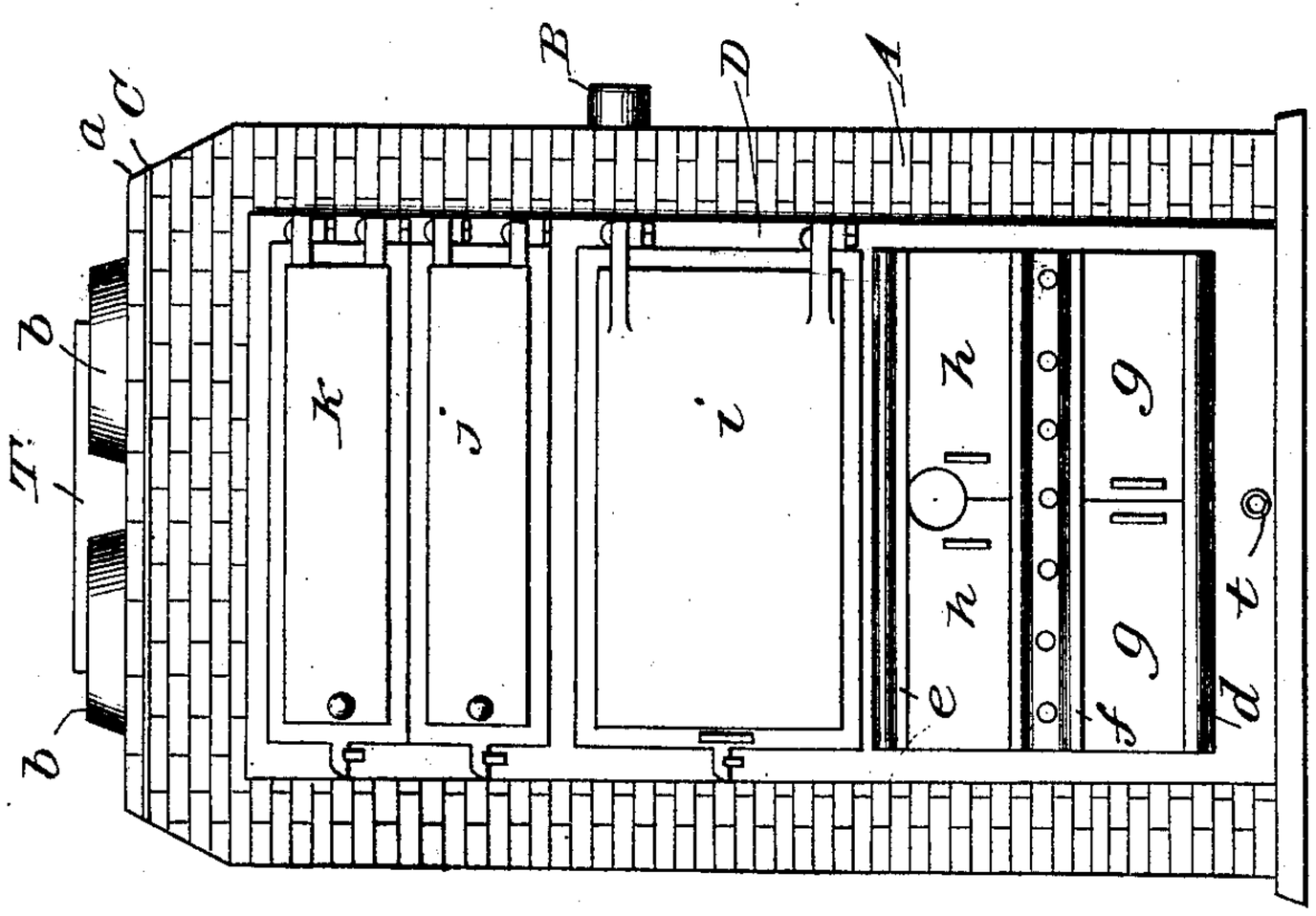


Fig. 1.



Witnesses

Phil. E. Barnes.

J. J. Shuchy Jr.

Inventor

F. E. Nelson.

By James J. Shuchy

Attorney

F. E. NELSON.

HOT AIR FURNACE.

APPLICATION FILED APR. 13, 1908.

924,815.

Patented June 15, 1909.

2 SHEETS—SHEET 2.

Fig. 4.

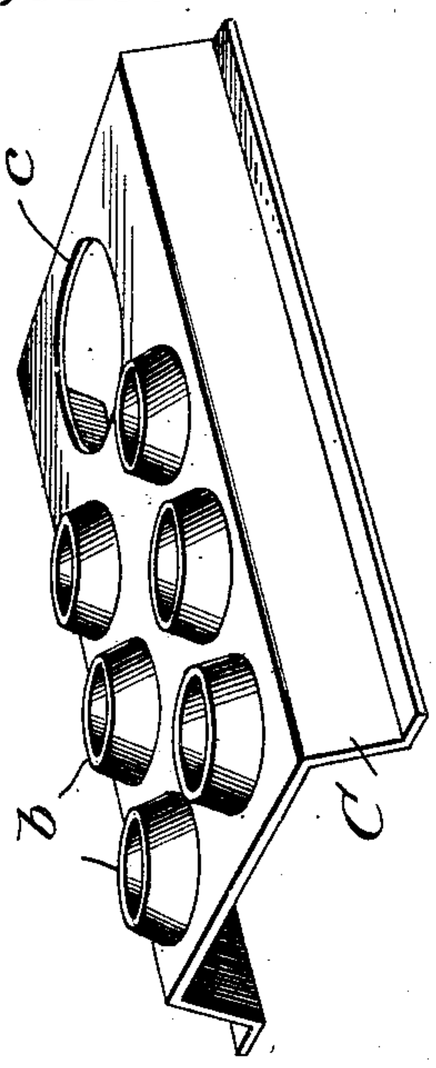


Fig. 5.

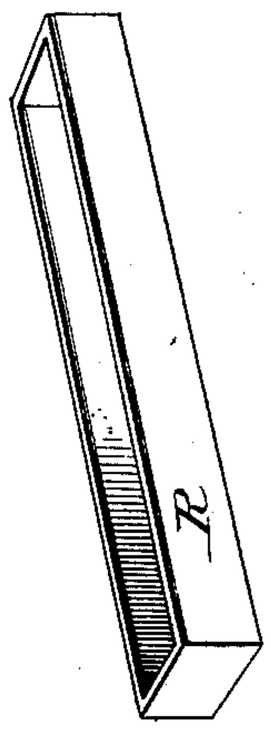


Fig. 6.

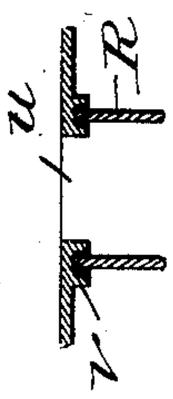
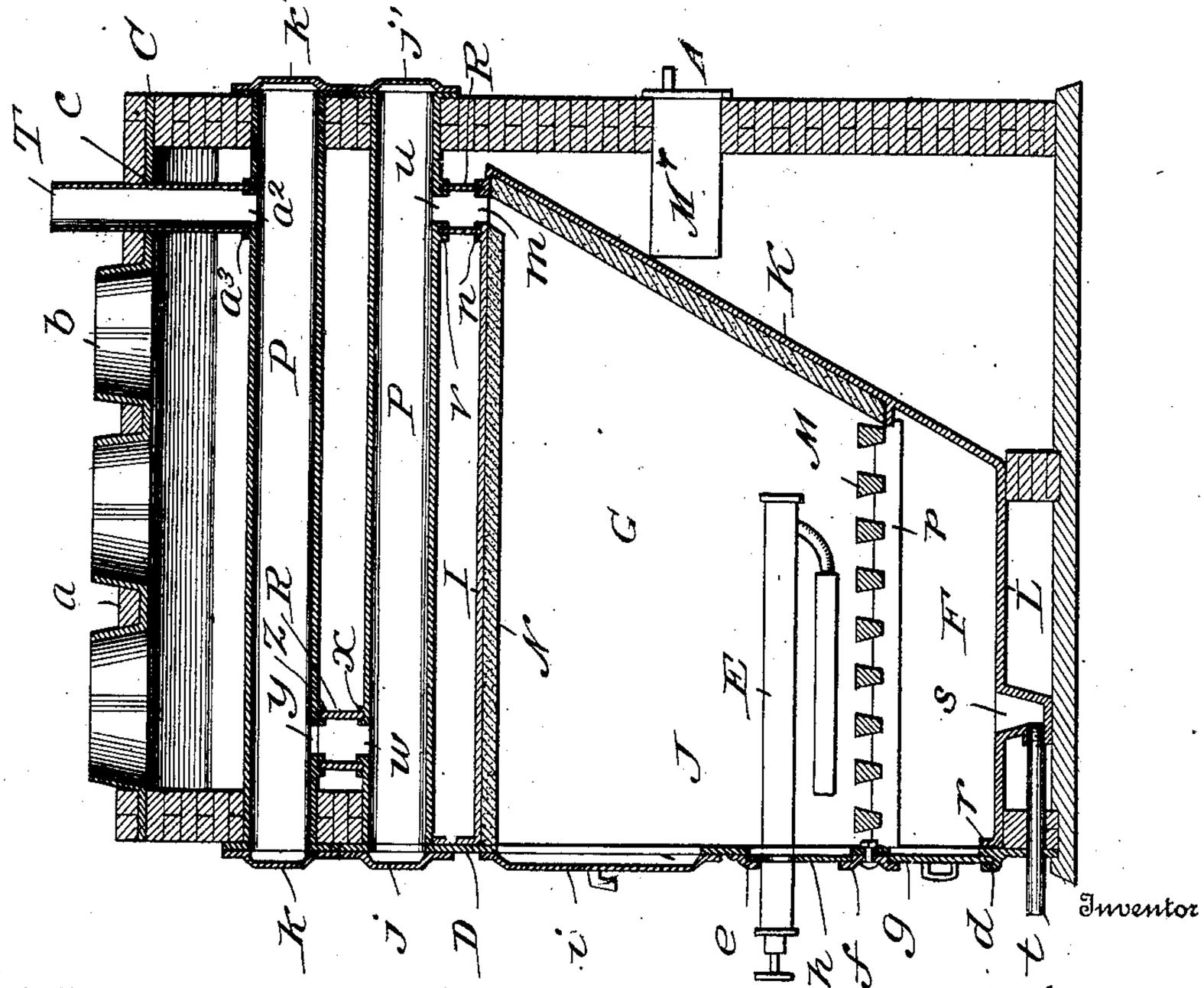


Fig. 2.



Witnesses

Phil. E. Barnes.

F. J. Sheehy

Inventor

F. E. Nelson.

By James J. Sheehy

Attorney

UNITED STATES PATENT OFFICE.

FRANK E. NELSON, OF LOS ANGELES, CALIFORNIA.

HOT-AIR FURNACE.

No. 924,815. Specification of Letters Patent. Patented June 15, 1909.

Application filed April 13, 1908. Serial No. 426,711.

To all whom it may concern:

Be it known that I, FRANK E. NELSON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

My invention relates to hot air furnaces, and one of its objects is the provision of a furnace constructed with a view to burning refuse soft coal and hydrocarbon, and this in such manner that no danger of explosion is incurred and leakage of hydrocarbon from the furnace is precluded.

Another object of the invention is the provision of a hot air furnace embodying such a construction that the products of combustion radiate practically all of their heat before the same are discharged from the furnace and the said heat is used to the best advantage in raising the temperature of fresh air conducted through the furnace to the apartments to be heated.

Another object is the provision of a hot air furnace embodying a simple and practical construction whereby the number of radiating flues and the capacity of the furnace as a whole may be conveniently increased as occasion demands.

Other objects and advantages of the invention will be fully understood from the following description and claim when the same are read in connection with the drawings, accompanying and forming part of this specification, in which:

Figure 1 is a front elevation of a furnace constituting a practical embodiment of my invention. Fig. 2 is a vertical cross-section of the same. Fig. 3 is a vertical section taken through the longitudinal center of the furnace. Fig. 4 is a perspective view of the furnace dome. Fig. 5 is a perspective view of one of the unions employed in effecting connection between the radiating flues of the furnace and between the uppermost of said flues and the uptake or smoke pipe. Fig. 6 is an enlarged, detail section of a portion of one of said connections.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which:

A is the casing of my novel furnace, which is built quite thick, of fire-brick or other suitable material, with a view of reducing to a minimum the radiation of heat from the exterior of the furnace.

B is a fresh-air supply pipe extending through one side wall of the casing A.

C is a metallic dome arranged on and closing the top of the casing A, and D is a metallic frame partly closing the front of said casing. The dome C is preferably of the shape illustrated to support fire-brick or other refractory material *a* designed to lessen radiation of heat from the casing top, and is provided with two longitudinal rows of collars *b* and an end opening *c;* the collars *b* being for the connection of hot-air pipes (not shown), and the end opening *c* for the passage of the smoke uptake, or pipe presently described. The described arrangement of the collars *b* and opening *c* is obviously advantageous inasmuch as it admits of the dome being reversed when it is necessary for the said smoke-uptake to be arranged adjacent to the front of the furnace, as sometimes occurs when the number of radiating flues is increased, as presently described. The front frame D is bolted to or otherwise suitably fixed with respect to the casing A, and has lower and upper flanges *d* and *e* and a duplex flange *f* arranged intermediate the flanges *d* and *e;* the said flanges being bolted or otherwise fixed upon the face of the frame.

As shown in Figs. 1 and 3, the frame D is equipped with two slidable, draft-controlling doors *g* held between the flange *d* and the lower member of the duplex flange *f*, two slidable doors *h* arranged between the upper flange *e* and the upper member of the duplex flange *f*, a hinged fuel door *i* arranged above the doors *h*, and a suitable number of hinged, clean-out doors *j* and *k* located above the fuel door. The doors *g* are adapted to be slid apart to a greater or less extent, to admit air, and the doors *h* have their inner ends shaped to receive between them a hydrocarbon burner E, which hydrocarbon burner may be of any approved construction and is arranged in the fire-box at a point immediately above the grate, as shown in Fig. 3. It will also be observed in this connection that the inner ends of the doors *h* snugly fit about the portion of said burner which extends forward from the front of the furnace.

As shown in Figs. 2 and 3 of the drawings,

the ash pit F and the fire-box G of my novel furnace are formed by the front frame D in combination with a metallic frame arranged in the casing A and bolted or otherwise fixed to the said frame D. The said metallic frame comprises a top wall I having an opening *m* which extends almost its full width and is surrounded by an upwardly extending, grooved flange *n*, side walls J having inwardly-extending ledges *p*, Fig. 2, an upwardly and rearwardly inclined rear wall K, and a bottom wall L. The said walls I, J, K and L are cast in one piece or otherwise fixed with respect to each other, air-tight so as to avoid any possibility of gas, smoke or odor passing from the fire-box into the air space leading to air pipes *b*. The bottom wall L is provided with a front flange *r* to prevent the escape of excess hydrocarbon and is also provided with a depression *s* which is designed to receive the excess hydrocarbon and is provided with a pipe *t* for conveying the same to a suitable point of discharge. In this way it will be apparent that hydrocarbon dripping or overflowing from an oil-burner is conducted out of the furnace and is prevented from gathering in an unsightly and dangerous puddle in front of or being retained inside the furnace. This will be appreciated as an important feature when it is remembered that the feeds to oil burners always leak when the burner is not in operation, and that they often overflow while in operation, and that my improved mode of disposing of the leakage and overflowed oil not only reduces the danger of fire and explosion to a minimum but obviates the dissemination of vapor and odor from the oil through a house.

The ash pit F and the fire-box G are separated by grate bars M arranged on ledges *p*. The top wall I is lined with refractory material N as are also the upper portions of the side walls J and the back wall K; the side and back sections of refractory material preferably resting on the ledges *p* as shown.

Arranged above the fire-box and one above the other are a suitable number of spaced, radiating flues or conductors P for smoke, flames and other products of combustion. Two of said flues are illustrated, and it will be noticed that they are secured at their ends in the casing A, and that their forward ends are controlled by the doors *j* and *k* while their rear ends are controlled by doors *j'* and *k'*, Fig. 3, in order that they may be readily cleared of collected soot and the like at intervals in the use of the furnace. The lower flue P is provided in its lower wall with an opening *u* which is alined with the opening *m* of the fire-box wall I and is surrounded by a depending, grooved flange *v*, and said flue is connected with the fire-box G through the medium of a union R, the edges of which are sealed by fire-putty or the like in the grooves of the flanges *n* and *v*, as shown. The lower flue P is provided in its upper wall adjacent to the front of the furnace with an opening *w* surrounded by a grooved flange *x*, and the upper flue P is provided in its lower wall above the opening *w* with an opening *y* having a depending grooved flange *z*. These openings *w* and *y* are connected in the same manner as the openings *m* and *u*—*i. e.*, through a union R, the edges of which are sealed by fire putty in the grooves of the flanges *x* and *y*. Adjacent to the rear end of the furnace the top radiating flue P is provided in its upper side with an opening a^2 surrounded by an upwardly extending, grooved flange a^3 in which is seated and sealed by fire putty the lower end of the uptake or smoke pipe T which may be connected with a chimney or the like. At this point attention is directed to the fact that the unions R and the flues P are interchangeable, and that in order to increase the capacity of the furnaces other radiating flues P may be arranged above the two illustrated, and, when necessary, the uptake or smoke pipe T may be arranged adjacent to the front end of the furnace instead of near the rear end thereof. When other flues P are added, the casing A will obviously be increased in height and the dome C raised to accommodate such additional flues, and shortened when the number of flues are decreased. By adding radiating flues P as stated, practically all of the heat of the products of combustion may be utilized to heat the fresh air conducted through the furnace, precedent to the passage of said products of combustion up the pipe T.

The fresh air to be heated and supplied to apartments, is conducted into the furnace through the pipe B, and is caused by walls or plates U to take a tortuous course around the fire box and between the radiating flues P before it passes from the furnace through the collars *b*, with the result that it is highly heated before it leaves the furnace.

It will be noticed that the fire-box G of my novel furnace is quite large in proportion to the size of the furnace, and hence chunks and roots of wood, paper, straw and analogous or soft coal may be conveniently burned in the fire-box; also, that access may be readily gained to the interior of the fire-box for repairs or other purposes.

In clearing the radiating flues of collected soot, the soot may be pushed through the medium of a suitable device to the openings in the bottoms of the flues, when the soot will drop through said openings and eventually find its way from one to the other to the fire-box and ash pit from whence it may be expeditiously and easily removed or burned.

In addition to the practical advantages

hereinbefore ascribed to my novel furnace, the said furnace is advantageous because of its simplicity and cheapness, and the facility with which it may be built and kept in repair.

The construction herein shown and described constitutes the best embodiment of my invention known to me, but it is obvious that in the future practice of the invention such changes or modifications may be made as fairly fall within the scope of my invention as claimed. For instance a water box M^r may when desired be slidably mounted in the back wall of the casing A, Fig. 3.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

A furnace comprising a fire box, a grate forming the bottom of the fire box and adapted to support refuse therein, an ash pit disposed below the grate and having a bottom in which is a depression to receive excess hydrocarbon and also having a conduit leading from said depression to a point outside the furnace, horizontally slidable doors mounted in the front of the fire box and having meeting recesses in their inner ends, and a hydrocarbon burner extending between the doors and snugly occupying the recesses in the inner ends thereof and arranged a slight distance above the grate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK E. NELSON.

Witnesses:

HARLEY E. RIGGINS,

RUBEN S. SCHMIDT.