

June 30, 1931.

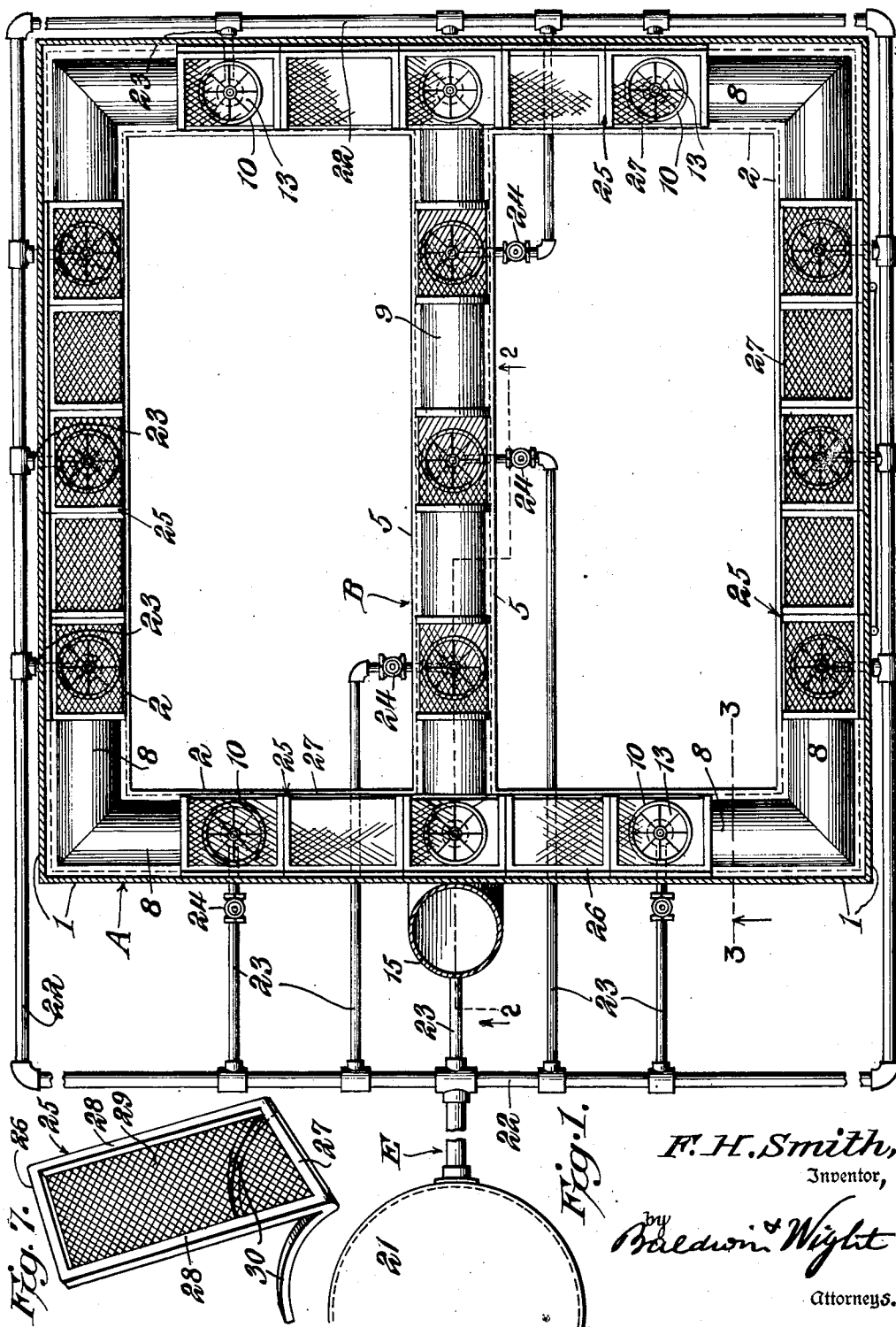
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DRYING HOUSE

Filed Aug. 7, 1929

2 Sheets-Sheet 1



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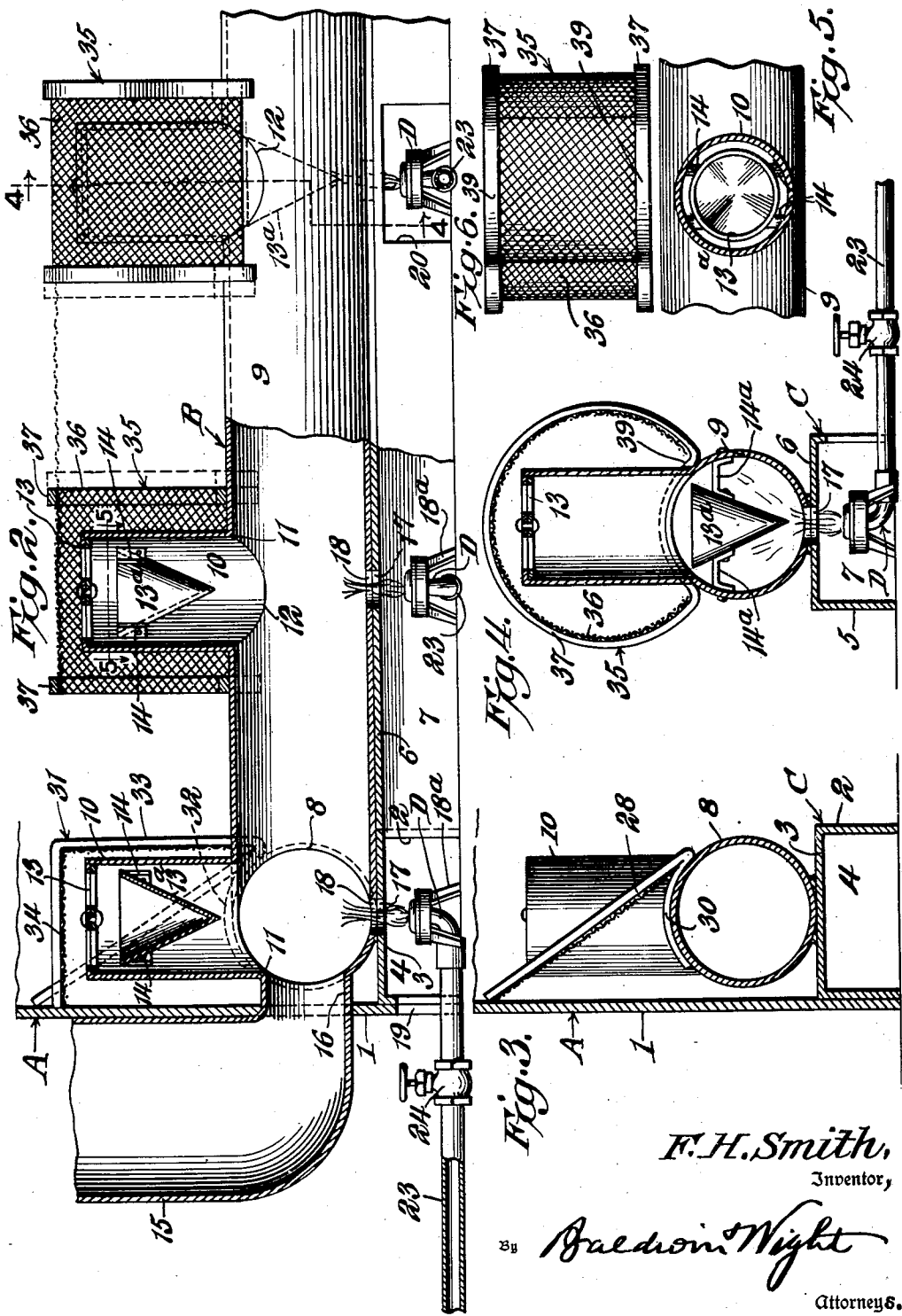
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DRYING HOUSE

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My invention relates to drying houses and more particularly to drying houses which are especially adapted for use in drying or curing tobacco.

5 After tobacco has been harvested it is customary to store the tobacco leaves in a house or barn in which a desired temperature is artificially maintained until the leaves have been dried or cured and thus made ready for use. Most of such drying structures are provided with a flue or plurality of flues which are located within the structure and which are heated by a central heating furnace which may be of either the coal, wood or oil fired variety. In such installations wherein a central furnace is used, the gases passing from the furnace and through the flues become cooled on account of the radiation of the heat from the flue or flues so that flues relatively far removed from the furnace will be cool as compared to those flues which are immediately adjacent the furnace. This inequality of flue temperature tends to produce different drying temperatures in different parts of the drying house. Various different arrangements of flues have been provided with a view to compensating for this inequality of flue temperature in order to maintain an even drying temperature throughout the drying house, but as far as I am aware, none of these arrangements has completely effected the desired result.

According to the present invention this disadvantage is largely overcome through the provision of flues located within the drying house and individual burners for heating the flues which are respectively located at various points within the drying house.

The main object of my invention is to provide an arrangement of flues and burners so positioned with respect to the flues and so controlled in their operation that a practically uniform drying temperature is maintained at all points in the drying house.

Among other objects of the invention is to provide means of the character described which are simple in construction, which require a minimum of attention so as to be economically operated and which are provided with means preventing the material being

dried from coming in contact with the hot flues. Other objects of the invention will become apparent from reading of the following description of the appended claims, and the several views illustrated in the drawings in which

Fig. 1 is a horizontal sectional view taken through a drying house and showing my invention in top plan;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary plan view of a flue showing a heat drum in horizontal section and a heat spreader in top plan;

Fig. 6 is a perspective view of a flue protecting screen, and

Fig. 7 is a bottom plan view of a modified form of screen.

In the drawings my invention is illustrated in connection with a drying house A having four connected vertical walls 1 and a roof not shown.

My invention includes heat-radiating means generally designated B which will later be particularly described, supports C for the heat-radiating means, a plurality of fluid fuel burners D for heating the radiating means and fuel supply means E.

The supporting means C includes, in one instance, four shallow vertical walls 2 located inside of the drying house and extending in parallel spaced relation to the vertical walls 1 thereof, the walls 2 together constituting a marginal flue supporting wall. A plurality of marginal top walls 3, respectively disposed between the upper edges of the walls 2 and the adjacent side walls 1 conjointly form with the walls 2 and 1 and with the ground, a marginal air chamber 4. The flue supporting means also includes a pair of spaced parallel shallow walls 5 which extend transversely through the central portion of the house, and which have their opposite ends connected to opposed marginal wall portions, and a transverse top wall 6 which connects the top edges of the spaced walls 5 conjointly

forming therewith and with the ground a transverse air chamber 7.

The heat radiating means B includes a plurality of connected flue sections 8 respectively extending adjacent to and inside of the walls 1 of the house and supported on the top walls 3 of the flue supports. These individual flue sections together constitute a marginal flue which extends completely around the inside of the drying house. For heating the central portion of the house, I provide a transverse flue 9 which is supported on the transverse top wall 6 and which extends across the interior of the house intermediate two opposite walls thereof, the opposite ends of the transverse flue being connected to opposed parallel marginal flue sections and being arranged to communicate therewith. Obviously the number of transverse flues may be increased in order to provide adequate heat radiating surface for larger buildings.

In order to increase the available radiating surface without taking up valuable floor space I provide a plurality of cylindrical heat drums 10 supported on the flues and coaxially disposed relative to spaced upper openings 11 formed in the flues 8 and 9.

The heat drums 10 are open at their bottom ends to communicate with the interior of the underlying flue through the medium of the associated openings 11 and have their side walls cut as at 12 so as to fit over and embrace a portion of the surface of the flue. The upper end of each of the heat drums is adapted to be opened or closed through the medium of a damper 13 mounted therein and which may be of any suitable type, but which in the present instance is illustrated as being of the rotatable multiple segmental blade type. Heated air and gases in the flues 8 and 9 will rise into the several heat drums 10 through the openings 11 in the flues, the drums being thus heated. In order to prevent the hot gases or air from passing directly up through the heat drums when the dampers are open, and from heating the top of the heat drums more than the sides thereof when the dampers are closed, I provide each drum with a heat spreader 13a which comprises an inverted conical body arranged coaxially with the associated upper opening 11 in the flue and which has its base portion circumferentially spaced from the adjacent vertical walls of the drum. Brackets 14 secured to the inside of the heat drum serve to support the heat spreader in position.

A chimney or smoke stack 15 located exteriorly of the drying house and having a horizontal portion 16 extending through one of the walls 1 thereof is arranged to communicate with the adjacent marginal flue section 8. Since all of the marginal flue sections 8 and the transverse flue section 9 are interconnected so as to constitute a continuous flue, the chimney 15 serves as an outlet for

the gases from all of the several flue sections after the gases have given up their available heat through radiation from the several flues. Although it is preferable that the flues be disposed in a substantially horizontal plane, they may be inclined slightly upwardly toward the point of connection between the flues and the chimney in order to promote the circulation of air through the flues and out through the chimney. Obviously the particular kind of chimney used is not important and in some instances no chimney is required, it only being necessary that some outlet be provided for the gases in the flues.

As hereinbefore stated, it is desirable that the several flue sections be heated at individual points variously located within the drying house. To this end I provide a plurality of fluid fuel burners D disposed within the air chambers 4 and 7 and positioned directly under openings 17 in the top walls 3 and 6 of the air chambers, the openings 17 registering respectively with lower flue openings 18 which are disposed in vertical alignment with the upper flue openings 11. The burners may be supported in any suitable manner and for the purposes of illustration I have shown each as being supported upon stool 18a.

In some cases it is desirable that the heat spreaders 13a be positioned in a manner to provide for the deflection of heat from the burners D longitudinally through the flues instead of permitting the heat to rise directly into the heat drums. In parts of the drying house where this arrangement is desired, the heat spreaders are positioned within the flues and each is supported directly above a burner D by means of brackets 14a as shown in Figure 4. By virtue of this arrangement, the hot gases and air rising from the burners will impinge upon the conical surfaces of the heat spreaders and thus be deflected horizontally through the flues.

For supplying air to the air chamber 4 for promoting combustion of the fuel I provide the vertical walls 1 with a plurality of openings 19 respectively located adjacent the burners D. Similar openings 20 in the transverse walls 5 provide means for introducing air to the transverse air chamber 7.

The means E for supplying fuel to the burners includes a supply tank 21, a supply pipe 22 connected to the tank and extending adjacent to each wall 1 of the drying house and a plurality of branch pipes 23 all of which have one of their ends connected to the supply pipe and have their opposite ends respectively connected to the burners D. Each branch pipe is provided with a valve 24 for controlling the flow of fuel to the associated burner independently of the flow of fuel to the other burners. Because of lack of space on the drawings, some of the valves are

not shown in Figure 1. In order that the burners which are located far from the tank be assured of as high a pressure supply as those located close to the tank it is desirable that the supply pipe be of somewhat greater cross section than the branch pipes. It is to be understood that the arrangement of piping shown herein may be modified in various ways in order to adapt the installation to local conditions. In some cases it may be desirable to provide several supply tanks each connected to a group of burners, and in other cases it may be desirable to provide each burner with a separate tank. Either liquid or gaseous fluid fuel may be used and any kind of burner suitable for use with the particular fluid available may be employed. Although the illustrative piping arrangement shown and described herein includes a separate valve 24 for each burner, it is to be understood that it may be desirable to use burners on which means other than a valve are provided for controlling the heat generated by the burner and that the word "valve" in the claims is intended to include any means associated with a burner for controlling the heat generated by the burner.

In order to prevent material being dried from falling between the walls 1 and the marginal flue 8, and to prevent the material from falling upon the flue 8 I provide a screen 25 adapted to be positioned over the flue and to cover the space intervening between the flue and the walls 1. This screen includes a frame having an upper end piece 26, a lower end piece 27, side pieces 28 which connect the upper and lower end pieces and a wire screen body portion 29 connected to the frame, and a pair of spaced feet 30 which extend from the bottom of the screen and which are curved to conform to a portion of the flue 8, as illustrated in Figure 3. When the screen is positioned as shown in Fig. 3 the upper end piece 26 contacts with and rests against the wall 1, the body portion 29 extends downwardly and inwardly across the flue, and the curved feet 30 rest upon the flue and prevent the screen from moving either downwardly or horizontally with respect to the flue. It is to be understood that these screens are to be employed only in such places as experience may show the protection afforded by the screens is needed, and that in some cases it may not be necessary to use the screens at all.

For covering those of the heat drums which are positioned on the marginal flue 8, I provide screens 31 having feet 32 similar to the feet on the screen 25 described above, but each in addition having a vertical portion 23 and a substantially horizontal portion 34 which extends over the associated drum and rests against the adjacent wall 1.

For preventing material from falling upon the transverse flue 9 or upon the heat drums positioned thereon, I provide a plurality of

screens 35 each of which consists of an arcuate top portion 36 of wire mesh screen, perforated metal or the like, supported upon a pair of spaced arcuate convex bands 36, which are formed at their lower portions with concavely arcuate spaced feet 39 adapted to be positioned upon the flue 9 on opposite sides of the heat drum.

From the foregoing it will be apparent that a drying house constructed in accordance with my invention possesses features making possible the attainment of more even drying temperatures than has been possible of attainment in drying houses heretofore provided. The novel arrangement of flues and heat drums specified in the claims defining my invention makes possible an extremely flexible control of the temperature in different parts of a drying house in which my invention is used so that changing atmospheric conditions may be easily compensated for to maintain practically ideal drying conditions. Where high winds or other disturbances cause the temperature in any particular part of the drying house to drop, the resulting change in the drying conditions can be readily corrected by increasing the rate of fuel supply to the burners in that part of the house, or by using additional burners.

I claim as my invention:—

1. In a drying house, the combination with a substantially horizontal flue extending adjacent to and inside of the walls of said house; of a plurality of spaced openings in the bottom of said flue; a fluid fuel burner positioned under each of said openings; and means for supplying fluid fuel to said burners.

2. In a drying house, the combination with a substantially horizontal flue extending adjacent to and inside of the walls of said house, of a plurality of spaced openings in the bottom of said flue; a fluid fuel burner positioned under each of said openings; means for supplying fluid fuel to said burners; and means for controlling the flow of fuel to said burners independently of one another.

3. In a drying house, the combination with a substantially horizontal flue extending adjacent to and inside of the walls of said house; of a plurality of spaced openings in the bottom of said flue; a fluid fuel burner positioned under each of said openings; means for supplying fluid fuel to said burners; a supply pipe connected to said supply means and extending adjacent to the walls of said house; a plurality of branch pipes, said pipes being all connected to said supply pipe and being respectively connected to said burners; and a valve in each of said branch pipes.

4. In a drying house, the combination with a substantially horizontal marginal flue extending adjacent to and inside of the walls of said house; of a transverse flue extending across the house intermediate two opposite

walls thereof and having both of its opposite ends arranged to communicate with said marginal flue; a plurality of spaced openings in the bottom of said flues; a fluid fuel burner positioned under each of said openings; and means for supplying fluid fuel to said burners.

5. In a drying house, the combination with a substantially horizontal marginal flue extending adjacent to and inside of the walls of said house; of a transverse flue extending across the house intermediate two opposite walls thereof and having both of its opposite ends arranged to communicate with said marginal flue; a plurality of spaced openings in the bottom of said flues; a fluid fuel burner positioned under each of said openings; means for supplying fluid fuel to said burners; and means for controlling the flow of fuel to said burners independently of one another.

6. In a drying house, the combination with a shallow vertical marginal wall located inside of the house and extending in parallel spaced relation to the walls thereof; of a horizontal marginal top wall connecting the top of said shallow vertical wall to the adjacent house walls to conjointly form an air chamber therewith; a flue supported on said top wall and extending adjacent to and inside of the walls of said house; a plurality of spaced openings in said top wall, a plurality of openings in the bottom of said flue respectively registering with the openings in said top wall; a fluid fuel burner positioned under each of said openings; and means for supplying fuel to said burners.

7. In a drying house, the combination with a shallow vertical marginal wall located inside of the house and extending in parallel spaced relation to the walls thereof; of a horizontal marginal top wall connecting the top of said shallow vertical wall to the adjacent house walls to conjointly form a marginal air chamber therewith; a pair of spaced parallel shallow walls extending transversely across said house and having their opposite ends connected to said shallow marginal walls; a transverse top wall connecting the tops of said parallel transverse walls to conjointly form an air chamber which communicates at both of its ends with said marginal air chamber; a marginal flue supported on said marginal top wall and extending therealong; a transverse flue supported above and extending along said transverse top wall and having its opposite ends arranged to communicate with said marginal flue; a plurality of openings in said top walls; a plurality of openings in the bottom of said flues respectively registering with the openings in said top walls; a fluid fuel burner positioned under each of said openings; and means for supplying fuel to said burners.

8. In a drying house, the combination with

a substantially horizontal flue disposed within said house; of a plurality of spaced lower openings in the bottom of said flue; a plurality of spaced upper openings in the top of said flue, the upper and lower openings being respectively in vertical alinement; a fluid fuel burner positioned under each of said lower openings; a plurality of heat drums positioned over the respective upper openings in said flue; means for supplying fluid fuel to each of said burners; and means for controlling the flow of fuel to said burners independently of one another.

9. In a drying house, the combination with a substantially horizontal flue disposed within said house; of a plurality of spaced lower openings in the bottom of said flue; a plurality of spaced upper openings in the top of said flue, the upper and lower openings being respectively in vertical alinement; a fluid fuel burner positioned under each of said lower openings; a plurality of heat drums positioned over the respective upper openings in said flue; a damper in the top of each of said heat drums; a heat spreader mounted inside of each drum comprising an inverted conical body disposed coaxially with the associated upper flue opening and having its base portion spaced from the walls of the drum; and means for supplying fluid fuel to said burners.

10. In a drying house the combination with a substantially horizontal flue extending adjacent to and inside the walls of said house; of means for heating said flue; and means for preventing material being dried in the house from falling between a wall of the house and said flue comprising a screen having its upper end contacting with said wall, said screen extending downwardly and inwardly across said flue, and a foot on said screen for supporting the latter on the flue, said foot being shaped to conform to a portion of the surface of the flue and extending partially around the flue.

11. In a drying house, the combination with a substantially horizontal flue of an opening in the top of the flue, a heat drum positioned on top of the flue and over said opening; means for heating said flue and said heat drum; and means for preventing material being dried from contacting with said heat drum comprising a screen positioned over said heat drum and having spaced parallel feet extending transversely of said flue and supported thereon respectively on opposite sides of the heat drum, the shape of said feet conforming to the shape of a portion of said flue.

12. In a drying house, the combination with a shallow vertical marginal wall located inside of the house and extending in parallel spaced relation to the walls thereof; of a horizontal marginal top wall connecting the top of said shallow vertical wall to the adja-

cent house walls to conjointly form an air chamber therewith; a flue supported on said top wall and extending adjacent to and inside of the walls of said house; a plurality of spaced openings in said top wall, a plurality of openings in the bottom of said flue respectively registering with the openings in said top wall; a fluid fuel burner positioned under each of said openings; a plurality of openings in one of the vertical walls of said air chamber for admitting air thereto, said openings being respectively located adjacent said burners; and means for supplying fuel to said burners.

13. In a drying house, the combination with a substantially horizontal flue disposed within said house; of a plurality of spaced lower openings in the bottom of said flue; a fluid fuel burner positioned under each of said lower openings; a heat spreader mounted inside of said flue comprising an inverted conical body disposed coaxially with the associated lower flue opening; and means for supplying fluid fuel to said burners.

In testimony whereof, I have hereunto subscribed my name.

FORREST H. SMITH.