Sept. 7, 1954 R. E. MAYO 2,688,476

TOBACCO CURING BARN

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Fig. 1.

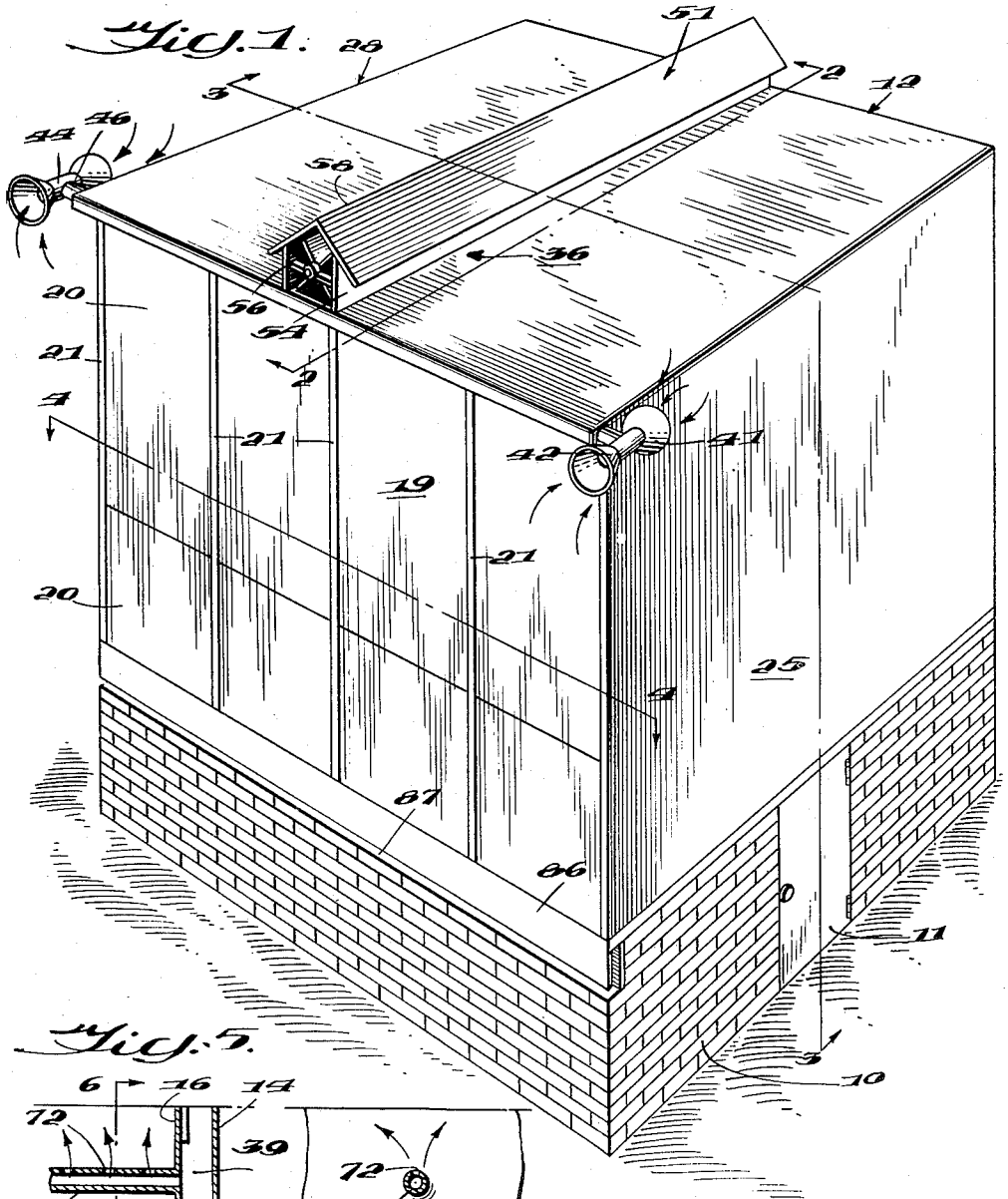


Fig. 5.

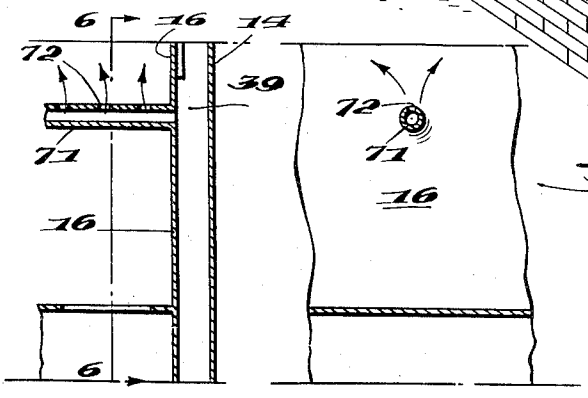


Fig. 6.

INVENTOR.
REUBIN E. MAYO,
BY Floyd P. Blank
ATTORNEY

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TOBACCO CURING BARN

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Fig. 2.

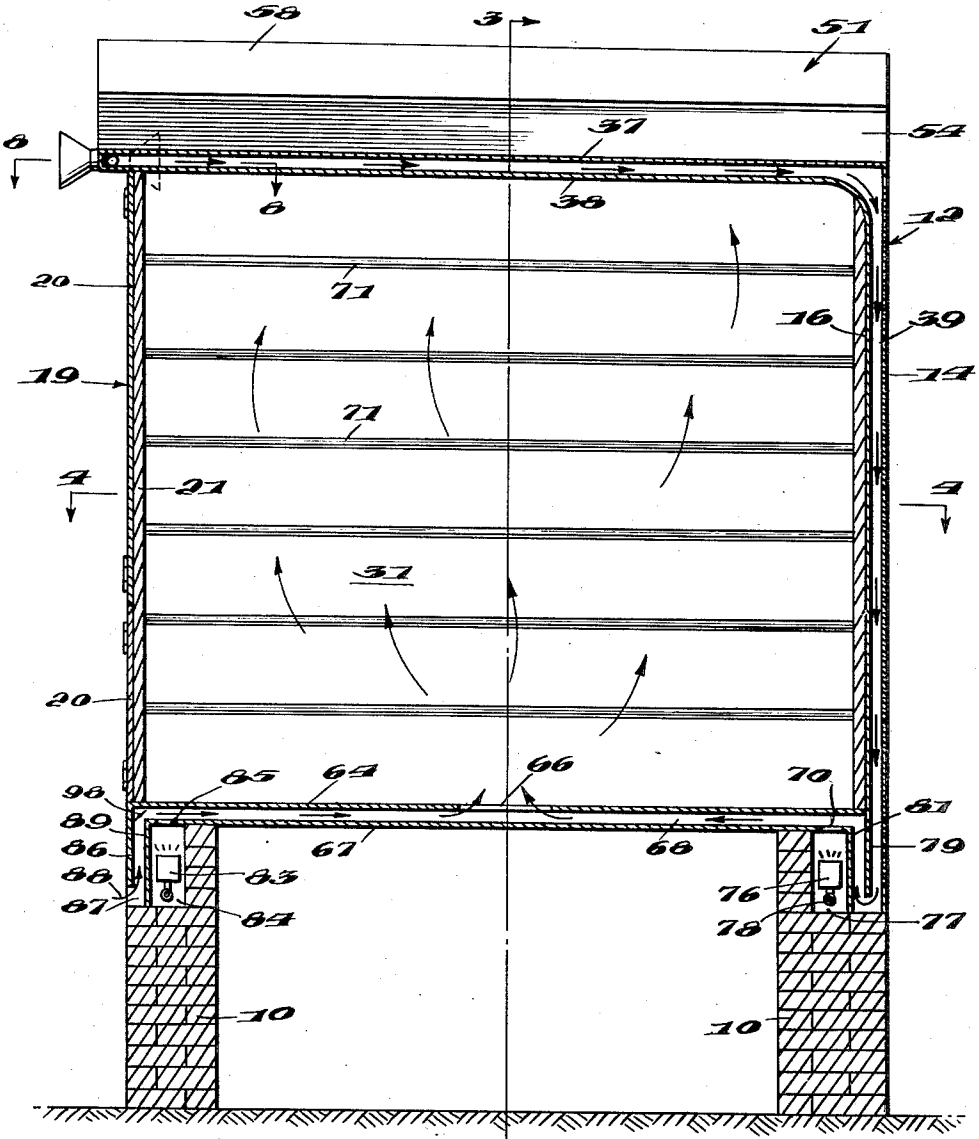
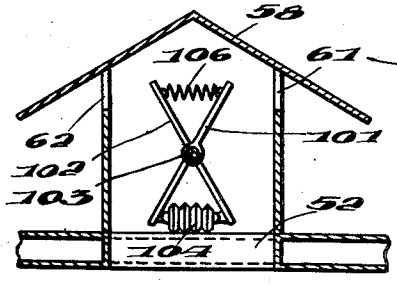


Fig. 7.



INVENTOR.
REUBIN E. MAYO,
BY Cleyd P. Blank
ATTORNEY

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TOBACCO CURING BARN

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Fig. 3.

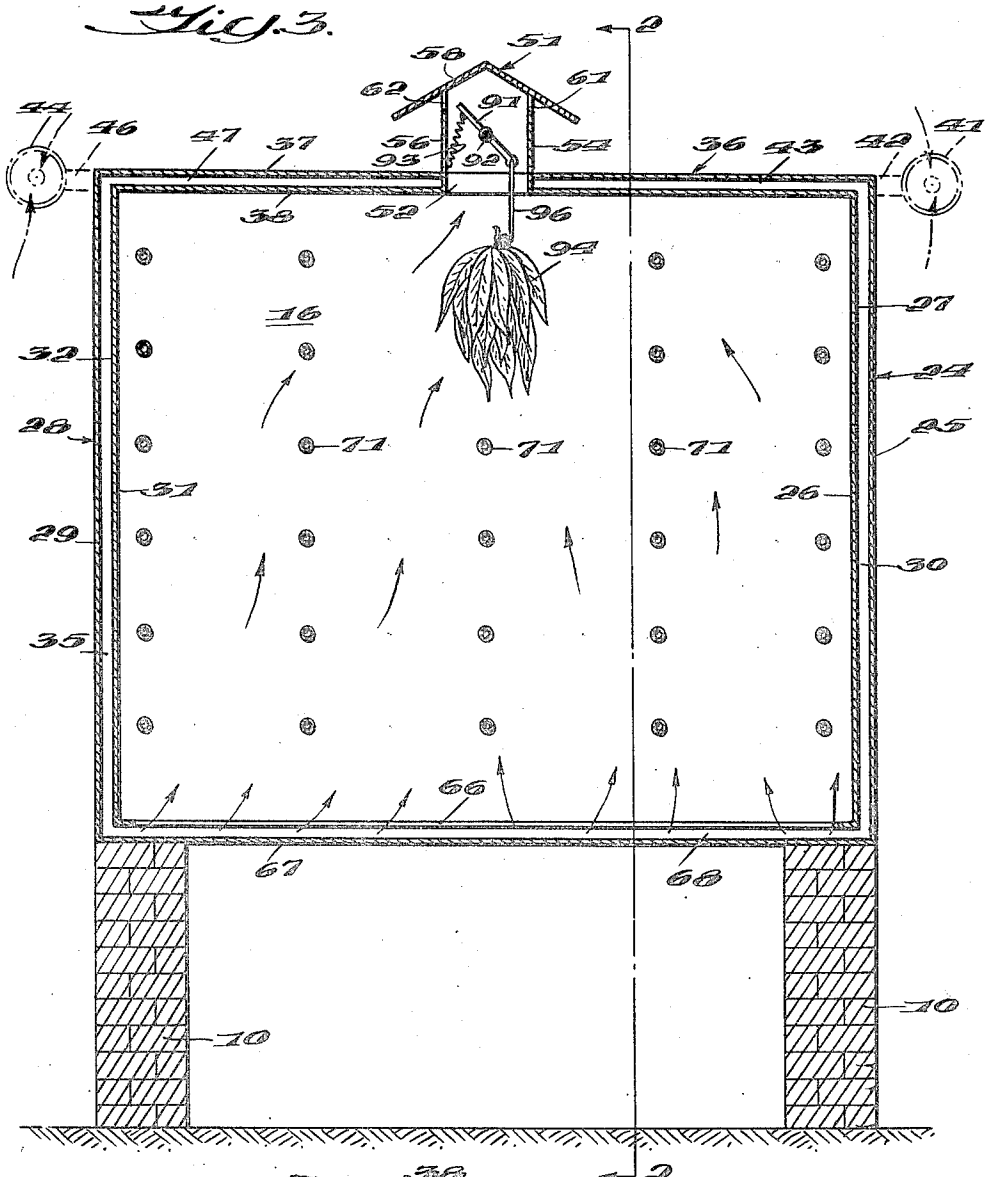
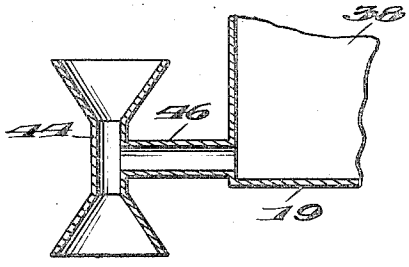


Fig. 8.



INVENTOR.
REUBIN E. MAYO,
BY Lloyd P. Shank
ATTORNEY

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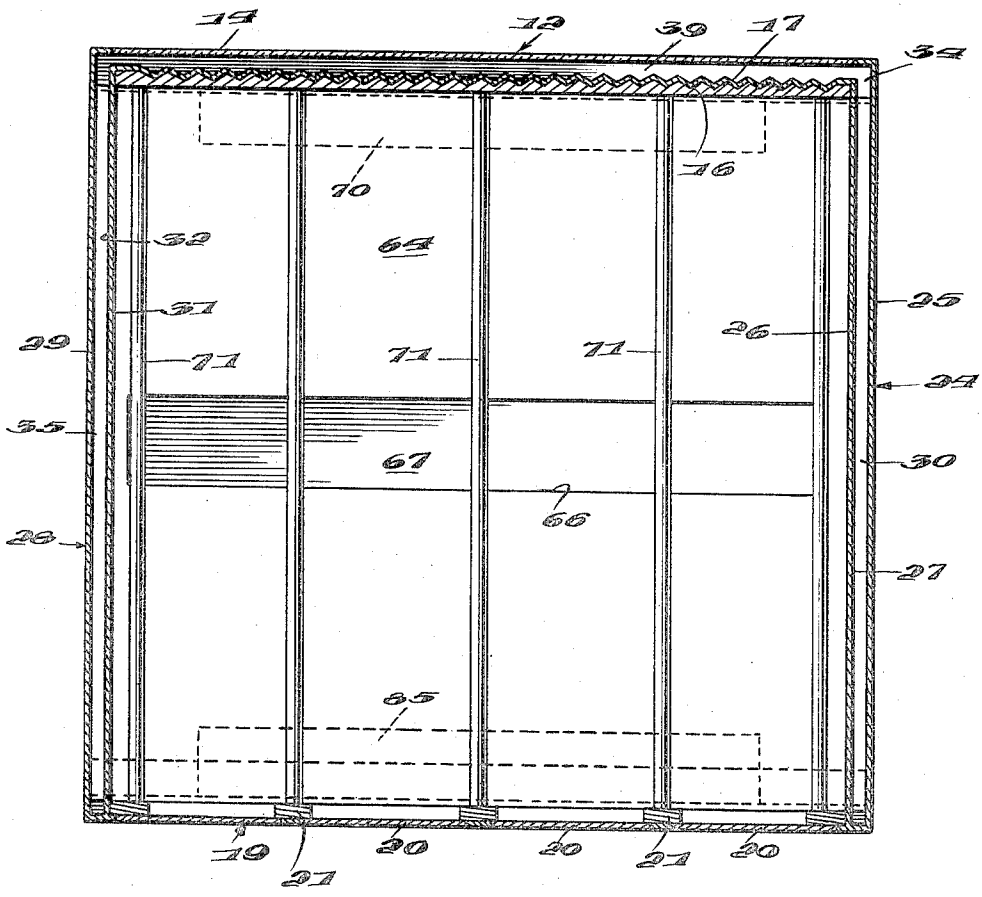


Fig. 4.

INVENTOR.
REUBIN E. MAYO,
BY Roger P. Clark
ATTORNEY

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UNITED STATES PATENT OFFICE

2,688,476

TOBACCO CURING BARN

Reubin E. Mayo, Farmville, N. C.

Application October 10, 1950, Serial No. 189,350

3 Claims. (Cl. 263—19)

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The present invention relates to drying houses for treating vegetable matter and more specifically pertains to the structure of a barn for curing tobacco wherein heat is supplied to the interior of the structure and the building is so constructed as to utilize radiant energy for supplementing the heat within the building. This application relates to a drying house which represents improvements over my copending application, Serial Number 673,591, filed May 31, 1946, now Patent No. 2,529,621.

One of the objects of the present invention is to provide a building structure within which green leaf tobacco may be stored and the building is so constructed that radiant energy from the sun is utilized to preheat the incoming air which is employed in association with open type burners to reduce the amount of fuel required for providing a given amount of heat within the building for curing tobacco.

Another object of the invention resides in forming at least one side wall of the drying house so as to be transparent for admitting radiant energy from the sun and the invention includes the provision of a heat absorbing surface in back of and spaced from the transparent wall to provide a passage through which outside air is guided into the barn whereby the incoming air is preheated prior to moving into the presence of the burners or into the presence of the tobacco being cured within the building.

A more detailed object of the invention resides in providing means within the building for supporting tobacco therein wherein a part of the rack structure is formed of tubular members which are in open communication with the preheating passage for the incoming air so that such preheated air may escape from apertures in the tubular rack structure to further promote circulation within the barn.

Another object of the invention is to provide a building structure for curing tobacco so constructed as to provide a passage for outside air entering the building with at least one wall so constructed as to provide for preheating the incoming air and for guiding the heated air into the presence of burners so that the fresh air may mingle with the products of combustion and thereafter rise and circulate through the building in which the tobacco is being cured.

Other objects and features of the invention will be more apparent to those skilled in the art of curing tobacco as the present disclosure proceeds and upon consideration of the following detailed description taken in connection with the

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accompanying drawings wherein an exemplary embodiment of the building is disclosed along with a plurality of arrangements for controlling the escape gases or air from the drying house.

In the drawings:

Fig. 1 is a perspective view of a building exhibiting the invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1 and 2—2 of Fig. 3.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2 and on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 1 and 4—4 of Fig. 2.

Fig. 5 is an enlarged fragmentary sectional view of a portion of the building along the south wall and adjacent the associated row of burners.

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged fragmentary sectional view of a portion of the structure showing a modified damper control for venting the barn.

Fig. 8 is a fragmentary sectional view taken on the line 8—8 of Fig. 2.

Referring to the drawings there is shown at 10 a base for the building which may take any suitable form and in the embodiment illustrated a brick footing wall is provided. The wall 10 may be provided with a door 11 so that access may be gained to the space under the floor of the barn.

The building may be constructed of any suitable material and the south wall 12 is formed of a double wall structure with an outer panel 14 formed of some transparent material, such as glass. The inner panel or partition 16 may be formed of suitable material, such as corrugated metal with the undulations extending in a vertical direction as will be apparent upon a consideration of Figs. 2 and 4. The surface 17 of the corrugated panel is preferably black or coated with some black substance so as to increase the ability of this partition wall to absorb radiant energy from the sun. The radiant energy waves pass through the transparent panel 14 and are absorbed by the black wall panel 16. The corrugations increase the surface area of the panel 17. A passage 39 is provided between the panels 14 and 16.

The north wall of the building is represented generally at 19. This wall may be formed of a plurality of removable doors 20 as shown in Figs. 1 and 4. These doors are for the purpose of opening a side of the building to permit the tobacco to be moved into the barn. The north wall 19 may be otherwise constructed in the form of a

permanent wall structure and provided with at least one access opening and a door therefor. When this wall structure is formed of a plurality of doors 20, a series of vertical posts or supports are employed as indicated at 21. These uprights 21 may be arranged in any desirable spacing so as to provide support for the tiers or racks which extend through the barn for supporting the tobacco. The north wall 19 may be formed of opaque material and is not relied on as means for receiving or storing radiant energy from the sun.

The west wall 24 of the building may also be of a double panel construction as shown in Fig. 3. The outer panel 25 may be formed of any suitable material and may be transparent. The inner partition 26 may be provided with a black surface 27. A passage 30 is provided between the panels 25 and 26 and the space is in open communication with the passage 39 as indicated at 34 in Fig. 4. The east wall 28 may be similarly constructed and provided with an outer panel 29 which may also be formed of transparent material so as to admit radiant energy from the sun. The inner panel 31 for the east wall may be formed of any suitable material or coated with a black substance for absorbing heat. This surface is indicated at 32. A passage 35 is provided between the panels 29 and 31 which is in open communication with the space 39 as shown in Fig. 4.

The top of the building is closed by means of a roof which may advantageously be substantially flat as shown at 36. The roof is of a double panel construction provided with the top roof section 37 and the lower roof panel 38. The upper surface of the roof is formed of some black metal or coated with a black material so as to more efficiently absorb the radiant energy from the sun. A space 43 is provided between the roof sections 37 and 38 and this space is in open communication with the space 39 between panels of the south wall 12 and the space 43 is also in communication with the passage 30. The invention includes means for directing outside air into the space 43 and such means may take the form of a double cone assembly as shown at 41 in Figs. 1 and 3. The outside air is collected in the double cone structure as it moves in one or more directions and the outside air is guided by a tube 42 into the space 43 between the top roof section 37 and the roof section 38. A similar double cone structure 44 may be provided at the other side of the building for directing air through a tube 46 to a space 47 between the two roof sections at the other side of the building. This space 47 is in open communication with the passage 39 in the south wall and the space 47 is also in open communication with the space 35 provided within the east wall 28.

A vent structure for the building is shown generally at 51 which extends across the top of the building. A slot 52 is provided in the roof through which the products of combustion and air may escape from the tobacco curing chamber within the barn. The vent structure includes side walls 54 and 56 which are so constructed as to close the space between the top roof section 37 and the lower roof section 38. A ridge type roof 58 is provided for covering the slot 52 to prevent rain or the like from passing into the building and the roof 58 is supported on the side walls 54 and 56. Openings 61 and 62 are provided under the roof 58 for the escape of gases and air passing upwardly through the slot 52.

A main floor for the building is shown at 64 which is supported in any suitable manner (not shown) on the foundation wall 10. An elongated slot or aperture 66 is provided in the floor 64 which extends substantially from the east wall to the west wall as will be apparent from a consideration of Fig. 4. A sub-floor 67 is provided under the main floor 64 which provides a space 68 therebetween as shown in Figs. 2 and 3.

The building is provided with means for storing tobacco therein and such supporting means may take the form of hollow tubes 71 which extend from the south wall 12 to the north wall 19 and provide a tier arrangement for supporting hands or sticks of tobacco. The tubes 71 may be supported at one end by the studs or uprights 21 and the other ends of the pipes or tubes 71 may be secured to the wall panel 16. The ends of the tubes or pipes 71 adjacent the south wall 12 are in open communication with the passage 39 as shown in Fig. 5. A series of orifices or apertures 72 may be provided in the pipes or tubes 72. Thus the incoming air which passes downwardly in the space 39 as indicated by the arrows in Fig. 2 may enter the ends of all of the tubes 71 which provide the racks for the tobacco so that this preheated incoming air may circulate through the tobacco barn and promote movement of air in the presence of the tobacco being cured.

The invention includes means for supplying artificial heat to the interior of the barn and any suitable type of heating means may be employed in combination with the arrangement for preheating the incoming air. In the embodiment illustrated a row of burners 76 is arranged lengthwise along the south wall 12 as shown in Fig. 2. These burners may be of the open flame type and are preferably arranged in a recess 77 provided in the foundation wall 10. A pipe 78 is provided for supplying fuel to the rows of burners 76. It will be observed that a partition 79 forms a continuation of the panel 16 provides means for guiding the incoming air passing downwardly through the space 39 around the lower end of the partition 79 and upwardly along another panel section 81 so that the incoming air moves into the presence of the burners 76. A slot 70 is provided in the floor section 68 to permit heat from the burners 76 to move into the space 68. The preheated incoming air is intermingled with the heated air or the products of combustion provided by the heaters 76.

A similar row of heaters 83 are provided along the north wall 19 and these burners may be mounted in a recess 84 of the foundation wall 10. These burners 83 may be of the open flame type. A panel section 86 is provided along the north wall and may be flush therewith as shown in Figs. 1 and 2. An elongated slot 87 is provided along the lower end of the panel section 86 so that air may enter this slot to move in the direction of the arrow 88 shown in Fig. 2. A short panel section 89 is provided within this portion of the building to guide the air entering the slot 87 into the presence of the heaters 83 or into the presence of the products of combustion arising therefrom. A slot 85 is provided in the floor 67 over the burners 83. It will be noted that the space 68 provided between the main floor and the sub-floor 67 provides a conduit for guiding air or products of combustion from the south and north walls areas towards the center of the barn for rising through the slot 66. An important feature of the invention relates to the control of

the escape of air and the products of combustion from the interior of the building. It is desirable during the early curing phase to permit as much moisture as possible to escape from the tobacco and from the barn. It is also advantageous to restrict the escape of moisture from the presence of tobacco as the curing process progresses. The damper arrangement shown in Fig. 3 provides means for maintaining such conditions. The ventilating slot 52 is provided with a damper 91 which is mounted for turning movement about a horizontal pivot 92. The damper is biased towards a closed position by means of a spring 93. The spring 93 may be of a tension type and is preferably one which may be adjusted to control the force applied to the damper 91. The opposite end of the damper 91 is provided with means in the form of a hook 96 for suspending a predetermined weight or quantity of tobacco 94 thereon as illustrated in Fig. 3.

In carrying out a curing operation a quantity of green tobacco like that to be cured and having a high moisture content is suspended on the hook 96 and this tobacco is of sufficient weight to bias the damper 91 to an open position. As the curing process proceeds the green tobacco stored in the barn and supported on the rack tubes 71 will give off a relatively large amount of moisture in vapor form. The damper 91 is then open to permit the rapid escape of this moisture through the openings 61 and 62. Moisture will also be released from the tobacco 94 suspended on the hook 96 so that this fixed quantity of tobacco will become lighter in weight. Thus as the curing process advances and when it is desired to prevent the rapid escape of moisture from the barn during the later stages of the curing process, the spring 93 will progressively move the damper 91 towards a closed position and in proportion to the quantity of moisture that remains in the tobacco being treated within the barn.

In operation of the barn and when it is desired to cure a batch of tobacco one or more of the doors 20 forming the north wall 19 are removed and the hands or sticks of tobacco are suspended from the rack tubes 71. After the north wall has been closed and when a cluster of green tobacco has been suspended from the hook 96 the curing operation may be initiated. In the event that there is sufficient sunlight the curing operation may be started without the necessity of operating the burners 76 and 83. The air entering the roof structure through the scooping devices 41 and 44 will be preheated by radiant energy within the spaces 43 and 47. This air will pass downwardly in the space 39 and will be further heated by the radiant energy passing through the transparent panel 14 and stored by the surface 17. The morning sun will also preheat the air in the space 35 between the two panels of the east wall 28. In the afternoon the air in the space 30 between the two panels of the west wall 24 will be heated by radiant energy. This preheated air will then pass through the space 68 in the floor structure and escape through the slot 66 and move in the presence of the tobacco. During this stage of operation it may be undesirable to permit air to enter the slot 87 and a damper 98 may be closed to prevent air from entering the building through this slot along the north wall 19.

During the early curing stage the vent slot 52 will remain open as previously described to permit the rapid escape of moisture from tobacco in the building. In the event that additional heat is required for any stage of the curing operation the burners 76 and 83 may be set in operation. The incoming preheated air passing downwardly through the space 39 will then move in the presence of the heaters 76 and if they are of the open flame type the heated air will mingle with the products of combustion and rise through the tobacco barn. The damper 98 may be opened so that the air entering the slot 87 will also pass into the presence of the heaters 83 and if they are of the open flame type mingle with the products of combustion and rise into the curing chamber through the slot 66. The incoming preheated air will also enter the tubes 71 and escape through the apertures 72 to further promote circulation through the barn. As the curing operation proceeds the vent slot 52 will be progressively closed in accordance with the dehydration of the tobacco in the barn and in response to the decreased weight of the cluster of tobacco plants carried by the hook 96.

A modified damper control is shown in Fig. 7. In this embodiment two damper blades 101 and 102 are mounted for swinging movement about the axis of a horizontal pivot 103. A temperature responsive device in the form of a bellows 104 is provided connecting the adjacent ends of the damper blades 101 and 102. As the temperature within the building increases the bellows 104 expands and thereby moves the dampers toward positions closing the venting slot 52. As the temperature falls within the building the bellows 104 contracts and moves the dampers towards the open position. A tension spring 106 may be provided for supplementing the action of the bellows 104 in returning the damper blades to the open positions.

While the invention has been described with reference to specific structural features and with regard to a building structure to a particular type it will be understood that changes may be made in the details as well as the general organization. Such modifications and others may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a building structure for curing tobacco, an upper metal roof section, a lower roof section spaced from the upper roof section, means for collecting and guiding outside air into the space between the roof sections, side walls, two spaced panels forming the south side wall with the space therebetween in communication with the space between the roof sections, a floor and a sub-floor spaced below the floor to provide a space between, means guiding air from the space between the panels to the space between the floor and sub-floor, said floor having an elongated aperture therein through which the air may rise into the interior of the building, a north wall having a slot therethrough along a lower portion in open communication with the space between the floor and sub-floor, and a row of burners along the north wall supplying heat to the air entering through said slot.

2. In a building structure for curing tobacco, an upper metal roof section, a lower roof section spaced from the upper roof section, means for collecting and guiding outside air into the space between the roof sections, side walls, two spaced panels forming the south side wall with the space therebetween in communication with the space between the roof sections, a floor and a sub-floor spaced below the floor to provide a space

between, means guiding air from the space between the panels to the space between the floor and sub-floor, said floor having an elongated aperture therein through which the air may rise into the interior of the building, a north wall having a slot therethrough along a lower portion in open communication with the space between the floor and sub-floor, a row of burners along the north wall supplying heat to the air entering through said slot, and means for adjusting the effective area of said slot.

3. In a building structure for curing tobacco, an upper roof section, a lower roof section spaced from the upper roof section, a double cone structure for collecting outside air including means for guiding said air into the space between the roof sections, side walls, two spaced panels forming one of said side walls with the space therebetween in open communication with the space between the roof sections, a floor, a sub-floor positioned below said floor to provide a space therebetween in open communication with the space between said panels so that air may move

into the space between the floor and the sub-floor, said floor having an elongated aperture therein extending from one side wall to an opposite side wall with its longitudinal axis disposed parallel to said panels, the side wall opposite said panels having a slot therein for admitting air to the space between the floor and sub-floor for escape through said elongated aperture, means for supplying heat to the air as it enters through said slot, and means for supplying heat to the air entering the space between the floor and sub-floor as it leaves the space between said panels.

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