J. F. M. FARQUHAR.

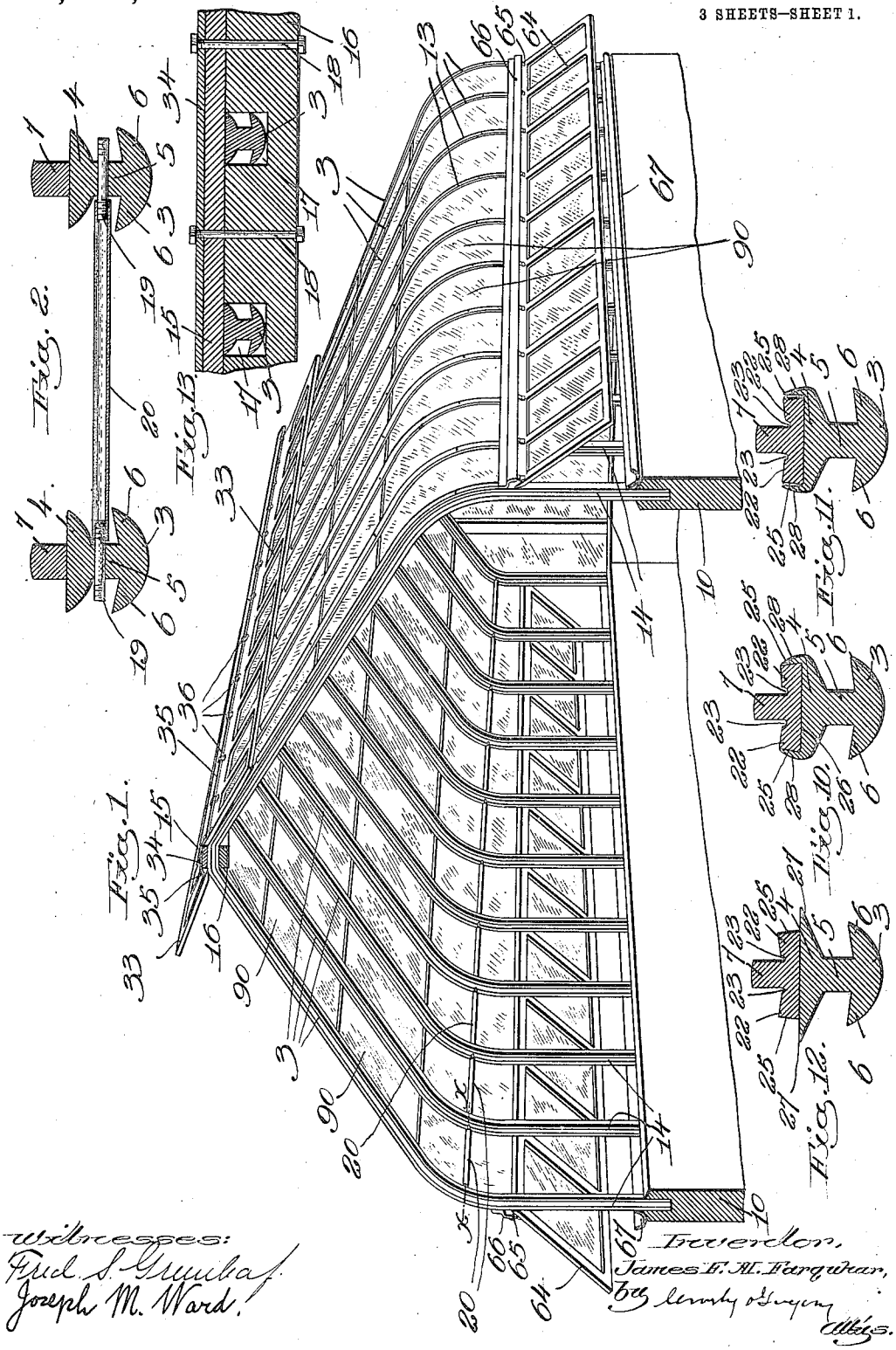
GREENHOUSE CONSTRUCTION.

APPLICATION FILED APR. 30, 1910.

1,070,434.

Patented Aug. 19, 1913.

3 SHEETS—SHEET 1.



Witnesses:
Fred. S. Gruenbaum
Joseph M. Ward.

Inventor,
James F. M. Farquhar,
by Lemby & Gwynn
Attys.

J. F. M. FARQUHAR.

GREENHOUSE CONSTRUCTION.

APPLICATION FILED APR. 30, 1910.

1,070,434.

Patented Aug. 19, 1913.

3 SHEETS—SHEET 2.

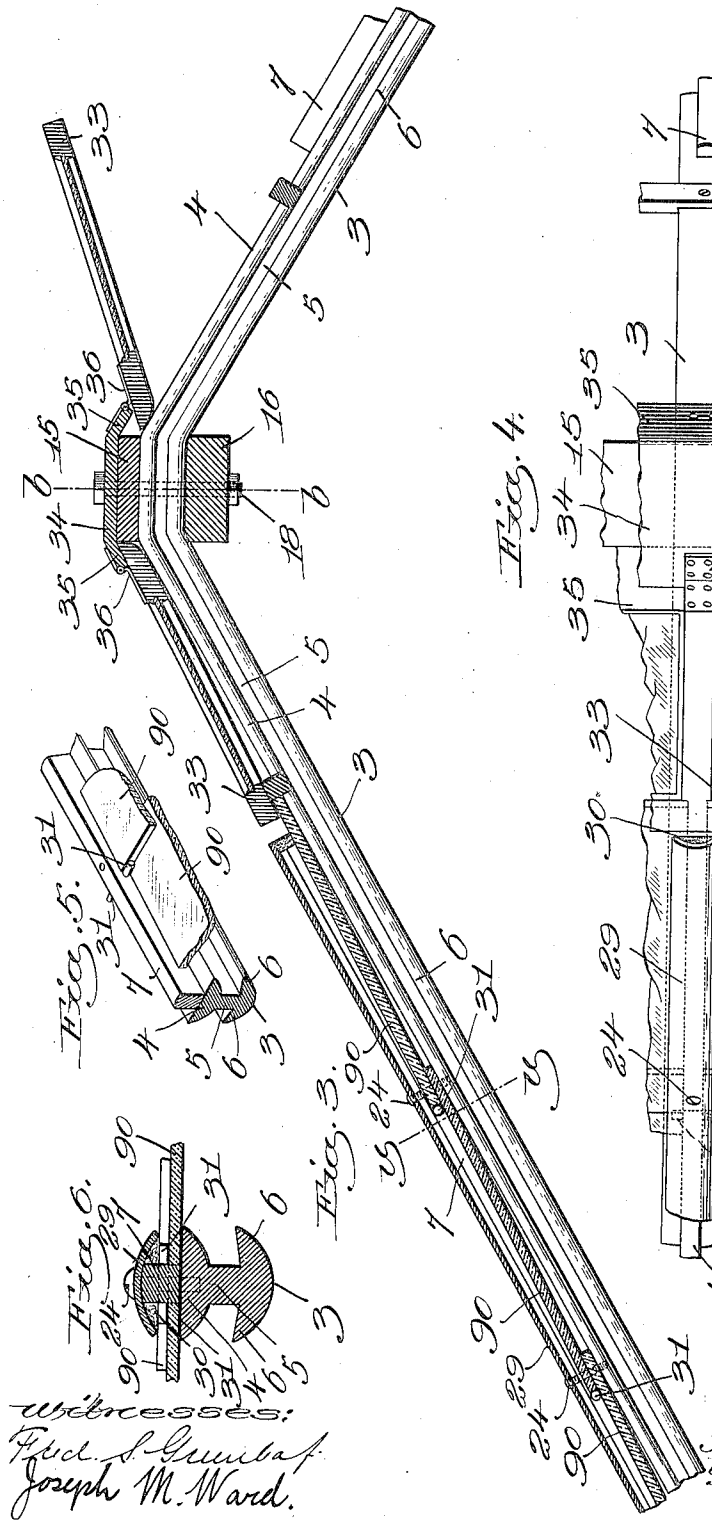


Fig. 4.

Fig. 5.

Fig. 6.

Witnesses:
Fred. L. Grumbach
Joseph M. Ward.

Inventor.
James F. M. Farquhar,
by Crosby & Gregory
Attys.

J. F. M. FARQUHAR.

GREENHOUSE CONSTRUCTION.

APPLICATION FILED APR. 30, 1910.

1,070,434.

Patented Aug. 19, 1913.

3 SHEETS—SHEET 3.

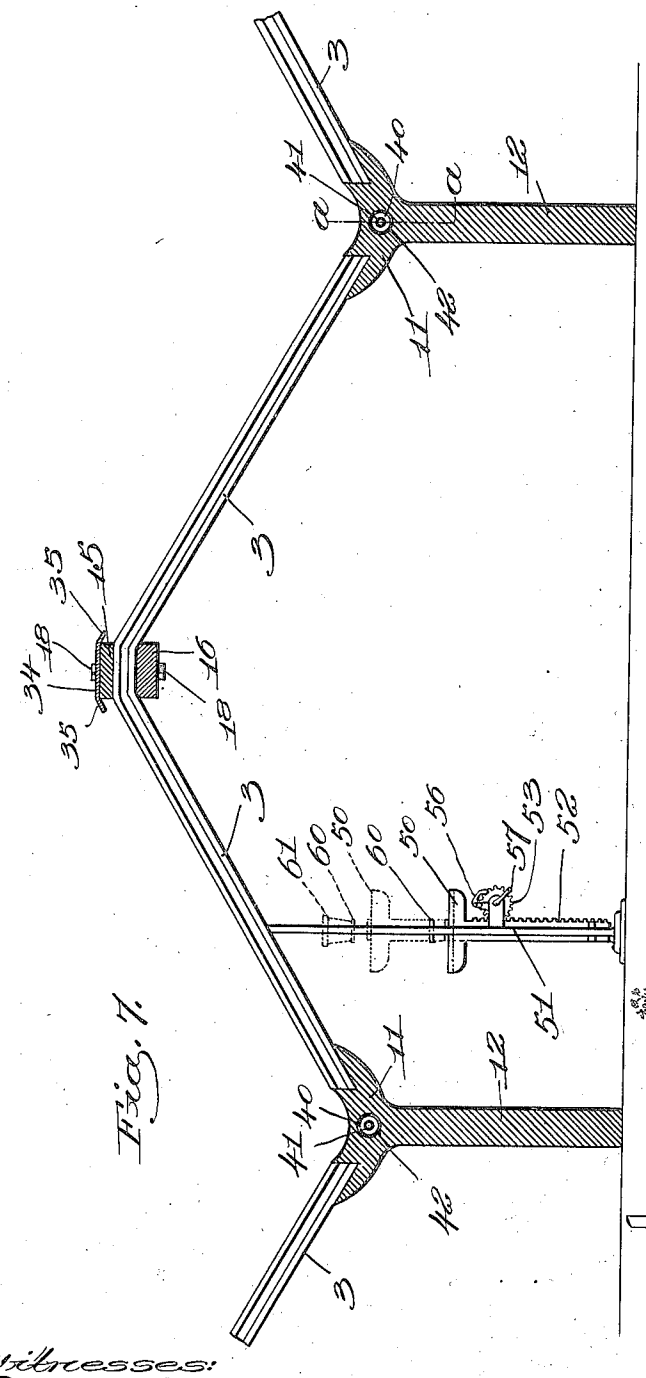


Fig. 7.

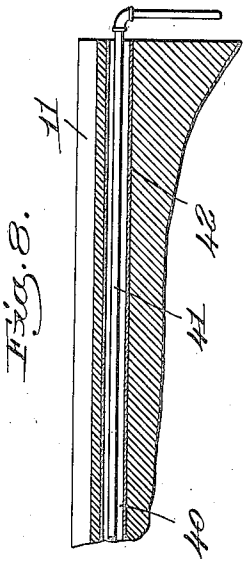


Fig. 8.

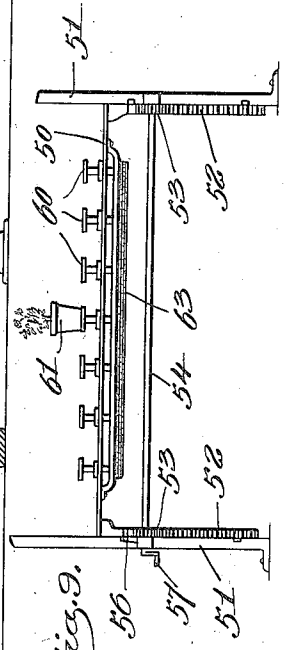


Fig. 9.

Witnesses:
Fred. J. Grumbach
Joseph M. Ward.

Inventor.
James F. M. Farquhar,
by Kenrick Gruning
Attys.

BEST AVAILABLE COPY

UNITED STATES PATENT OFFICE.

JAMES F. M. FARQUHAR, OF BOSTON, MASSACHUSETTS.

GREENHOUSE CONSTRUCTION.

1,070,434. Specification of Letters Patent. Patented Aug. 19, 1913.

Application filed April 30, 1910. Serial No. 558,618.

To all whom it may concern:

Be it known that I, JAMES F. M. FARQUHAR, a citizen of the United States, residing at Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Greenhouse Construction, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to greenhouses and has for its objects to provide a novel construction in which the corresponding sash bars on opposite sides of the roof are integral with each other, thus making an extremely stiff and rigid structure; to provide a novel way of hanging ventilating sashes so as to obviate any danger of leaks around the sashes; and to otherwise improve the greenhouse construction, all as will be more fully hereinafter described and then pointed out in the appended claims.

Referring to the drawings wherein I have illustrated some embodiments of my invention, Figure 1 is a perspective view of a portion of a greenhouse made in accordance with my invention; Fig. 2 is an enlarged section on the line *x*—*x*, Fig. 1, showing one method of connecting the adjacent sash bars; Fig. 3 is an enlarged sectional view through the peak of the roof; Fig. 4 is a top plan view of Fig. 3; Fig. 5 is a detail perspective view showing the manner in which the glass is sustained in place on the sash bars; Fig. 6 is a cross section on the line *y*—*y*, Fig. 3; Fig. 7 is a sectional view of a valley roof showing one way of heating the gutters so as to prevent the accumulation of snow or ice therein, said view showing merely the sash bars and omitting the glass parting strip and ventilating sashes; Fig. 8 is an enlarged section on the line *a*—*a*, Fig. 7; Fig. 9 is a detail view of a novel plant stand adapted for keeping the plants near the glass of the greenhouse; Fig. 10 shows one form of sash bar construction which I find it convenient to use; Fig. 11 shows the way in which this sash bar may be made; Fig. 12 shows another way in which this sash bar may be made; Fig. 13 is a section on the line *b*—*b*, Fig. 3.

The sash bars or rafters 3 of my improved greenhouse will preferably be made principally of iron, and one feature of my invention relates to the manner in which they are made so that the opposed sash bars on opposite sides of the peak of the roof are formed from the same iron bar. The cross sectional shape of the sash bar may vary somewhat, but I prefer to make it of substantially the shape shown in Figs. 2, 5, 6 or 10. The body of the sash bar is made from a bar of iron rolled or otherwise formed to present the head 4, the web 5, and the laterally-extending wings 6 which form the drip gutter. A parting strip 7 of wood is supported on the head, and this may be arranged with flanges 22 so that the glass will rest on wood, as shown in Fig. 10, or it may be arranged so that it may be used without the flanges, in which case the glass would rest on the head 4.

In making the greenhouse in accordance with my invention, the iron bars are bent at a point constituting the peak of the roof so as to present the two sides having the correct slope for the roof, and the lower ends of these iron sash bars will be anchored or embedded in a cement foundation. Where the greenhouse is a single structure, as shown in Fig. 1, the lower ends of the sash bar may be embedded in a cement foundation wall 10, as clearly seen in the drawing. Where the roof is of the valley type, then the concrete foundation in which the lower ends of the sash bars are embedded would be in the form of a gutter 11, as shown in Fig. 7, which would be supported on suitable posts 12 that might either be of concrete or any other material. This gutter 11 can be readily made from concrete by usual forms of the proper shape, as will be understood by those skilled in the art. In the embodiment shown in Fig. 1, the two ends of each sash bar are each bent, as shown at 13, so that the lower ends 14 thereof will run vertically, but this is not essential to the invention. The various sash bars or rafters 3 are tied together at the peak or ridge pole of the roof, and if desired may be also tied together at the same point intermediate the ridge pole and the lower ends thereof. At the peak of the roof I place a ridge pole comprising two members 15 and 16 which are not only tied together but to which the sash bars or rafters are secured. The member 15 lies above the sash bars and the member 16 beneath them, and one of the members, preferably the member 16, will be provided with notches 17 through which the rafters or sash bars extend, said notches serving thus to rigidly space the sash bars and hold them

in position. The two members 15 and 16 are tied together at suitable intervals by bolts 18.

In the construction shown in Fig. 1 I have provided a purlin intermediate the upper and lower ends of the sash bars for tying them together. This is illustrated in detail in Fig. 2 wherein each sash bar has extending therethrough and laterally therefrom screw-threaded rods 19, the adjacent rods of which are connected by the tubular member 20. The rods 19 will be inserted into the sash bars before they are put into place, and as each sash bar is positioned, the connecting rod 20 may be put in place. This provides not only a suitable means for connecting the adjacent sash bars, but also a means by which the distance between the sash bars may be adjusted since the rods 19 are each provided with right and left hand screw threads. A greenhouse frame thus made with the sash bars continuous from one side of the roof to the other with the lower ends embedded in concrete foundation and connected at the peak, as shown, is extremely rigid and strong.

In Figs. 5 and 6 I have shown the glass 90 as resting on the head 4 of the sash bars, it being understood, of course, that a layer of putty or other cushioning material will be interposed between the glass and the iron sash bar.

In Figs. 10 and 11 I have shown a different construction in which the parting strip 7 is formed with flanges on which the glass will rest so as to prevent it from contacting with the iron. These two flanges are shown at 22 and they may conveniently be provided with a groove 23 to form a putty-receiving pocket. In Fig. 6 the parting strip 7 is secured to the sash bar by means of screws 24, while in Fig. 10 I have shown the flanges of the parting strip as secured in a groove formed in the upper side of the metal sash bar. The sides 25 of the flanges are inclined and the groove 26 in which the sash bar is received is dove-tailed so that the parting strip will be firmly held in place without the use of screws. Figs. 11 and 12 show two ways in which the parting strip may be introduced into the groove. In Fig. 12 the iron sash bar is made with the flat head, as shown, and the parting strip is placed thereon and subsequently the edges 27 are folded over so as to constitute the sides of the grooves. In Fig. 11, the sash bar is made with a groove 26 having straight sides, as shown in full lines, and after the parting strip is inserted into the groove, the sides 28 thereof are forced together, as shown in dotted lines, so as to give the groove a dove-tailed shape and lock the parting strip therein.

In Figs. 3, 4 and 6 I have shown a cap 29 secured to and covering the parting strip and overlying the glass 90, and if desired the space beneath this cap may be packed with asbestos or any other suitable cushioning material, as shown at 30.

For holding the glass in position on the sash bars I employ projections extending laterally from the parting strip and adapted to engage the under edge of each pane of glass and to overlie the upper end of each pane of glass. These projections are shown at 31 and may be formed in any suitable way, as, for instance, by introducing pins into the parting strip at suitable intervals in such a way that the ends of the pins will project beyond the parting strip to form the stops or projections. These projections are located sufficiently above the glass-supporting flange to permit a pane of glass to be inserted under it, and they are so placed that they will engage the lower edge of each plane of glass. In laying the glass, the upper edge of the pane will be slipped in under the projections 31 until the lower edge of the glass will drop down above the next lower projection, and in this way the projections hold each pane of glass from slipping down, and also hold the upper edge of each pane of glass against the glass-supporting flange. The cap 29 engages the lower edges of the panes and thus prevents them from rising above the projections.

My improved greenhouse will be provided with the ventilating sashes 33 in usual manner which are pivoted at the top of the roof near the ridge pole. In my invention, however, these ventilating sashes are so pivoted that when they are closed there will be no danger of any leak occurring around them. As herein illustrated the ridge pole member 15 has thereon a sheet metal cap 34 which extends longitudinally thereof and which is wider than the ridge pole so as to present the overhanging sides or wings 35 that are preferably bent downwardly slightly. The ventilating sashes 33 are hinged to these wings 35 by suitable hinged members 36 that are secured to the sashes at a distance from the upper edge thereof. The construction is such that when the sashes are closed the upper edges engage and fit tightly against the under side of the overhanging wings 35 and thus a perfectly tight joint is formed at this point which will prevent any water from leaking into the greenhouse around the upper edges of the sashes 33.

In a greenhouse construction of the valley type, it frequently happens that the snow and ice will accumulate in the gutters to such an extent as to endanger the glass and to prevent this I have herein shown means for heating the gutters sufficiently to melt the snow and ice as it gathers therein. Where the gutters are made of

concrete, as herein illustrated, I propose to provide each of them with a longitudinally-extending chamber 40 through which a heating pipe 41 may pass so that steam or hot water or other heating medium may be circulated through the chamber 40. In this way it is possible to heat the gutter sufficiently to melt the snow and prevent it from accumulating therein. The chamber 40 can very easily be made in the concrete gutter at the time it is molded by placing in the mold a pipe 42, the interior of which will form the chamber 40.

I have also shown a plant stand adapted to support plants so that they can always be placed at a certain distance from the glass regardless of the size of the plant. There are some special plants that can only be successfully grown at a certain distance from the glass, and as the plants grow upwardly, this distance can be preserved only by gradually lowering the pot or ground in which the plant is growing. In my present invention I provide a platform 50 which is capable of vertical movement so that it may be placed at any desired distance from the glass. As herein shown, this platform is received between two vertical guides 51 and is provided with two or more depending rack bars 52 that mesh with pinions 53 on a shaft 54 that is journaled in the standards 51 so that by turning the shaft the plants can be placed at any desired elevation. The rack bar may be locked in its desired position by a locking pawl 56 adapted to engage one of the pinions 53, and the shaft may be turned in any suitable way, as by means of a crank handle 57. I have herein shown the table 50 as provided with a plurality of rotatable plant supports 60, each one of which is adapted to contain a flower pot 61, as shown. These rotatable plant supports 60 are each preferably provided with a sprocket wheel and the sprocket wheels mesh with a sprocket chain 63 so that by moving the chain the plant supports will be turned slightly. In this way it is possible to turn the plants around as necessary in order to present all sides of the plant to the sun. This plant stand forms no part of my present invention.

In the embodiment shown in Fig. 1, the greenhouse is provided with additional ventilating sashes 64 which are hinged to the sides of the roof near the lower ends thereof. The manner of hinging these ventilating sashes is somewhat similar to the manner in which the ventilating sashes 33 are hinged, that is the sashes have connected thereto hinged members 65 situated at a distance from the upper edge of the sashes and pivotally connected to a strip or support 66 which overhangs the upper edge of the sashes and is spaced somewhat from the sash bars, said strip being rigidly secured to the sash bars as will be evident.

67 are drip gutters to take the drip from the inside of the ventilating sashes.

While I have illustrated some embodiments of my invention, I do not wish to be limited to the construction shown.

I find that a concrete made with oil cinders and sand forms an efficient concrete for use in greenhouse construction, although any other suitable concrete mixture might be employed.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In greenhouse construction, the combination with continuous sash bars extending from the lower edge of one side of the roof to the peak and down to the lower edge of the other side of the roof and provided with glass-receiving flanges, glass sustained by said sash bars, and a two-part ridge pole at the peak of the roof between the two parts of which the sash bars are received.

2. In greenhouse construction, the combination with a plurality of sash bars each bent centrally to form two portions at an angle to each other and situated with the bent part at the apex of the roof and the two portions constituting the rafters for the sides of the roof, of glass sustained by the sash bars, and a two-part ridge pole, one part having notches in which the sash bars are received.

3. In greenhouse construction, the combination with sash bars extending continuously from the lower edge of one side of the roof to the peak of the roof and thence to the lower edge of the other side of the roof, of a cement foundation in which the lower ends of the sash bars are embedded, a notched ridge pole member at the peak of the roof in the notches of which the sash bars are received and a second ridge pole member secured to the first and overlying the notches therein.

4. In greenhouse construction, the combination with sash bars extending continuously from the lower edge of one side of the roof to the peak of the roof and thence to the lower edge of the other side of the roof, of a cement foundation in which the lower ends of the sash bars are embedded and a two-part ridge pole at the peak of the roof between the two parts of which the sash bars are received.

5. In greenhouse construction, the combination with integral continuous sash bars extending from the lower edge of one side of the roof to the peak of the roof and thence to the lower edge of the other side of the roof, of two ridge pole members at the peak of the roof between which the sash bars are received.

6. In greenhouse construction, the combination with integral continuous sash bars extending from the lower edge of one side of the roof to the peak of the roof and thence to the lower edge of the other side of the roof, of two ridge pole members at the peak of the roof between which the sash bars are received, one of said members being notched to receive the sash bars.

7. In greenhouse construction, the combination with continuous sash bars or rafters extending from one side to the other of the roof, of a ridge pole having openings through which the sash bars extend, a sheet metal cap plate covering the ridge pole and projecting beyond the same on each side thereof, and ventilating sashes hinged to the overhanging edges of the cap plate.

8. In greenhouse construction, the combination with continuous sash bars or rafters extending from one side of the roof to the other, of a ridge pole having openings through which the sash bars extend, a sheet metal cap plate covering the ridge pole and projecting beyond the same on each side thereof, and ventilating sashes hinged to the overhanging edges of the cap plate, the upper edges of the sashes contacting with the under side of the projecting portion of the cap plate when the sashes are closed.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JAMES F. M. FARQUHAR.

Witnesses:
BERTHA F. HEUSER,
FREDERICK S. GREENLEAF.