July 2, 1940. G. H. HENNESSEY 2,206,478

GREENHOUSE VENTILATION SYSTEM

Original Filed Aug. 31, 1938 4 Sheets-Sheet 1

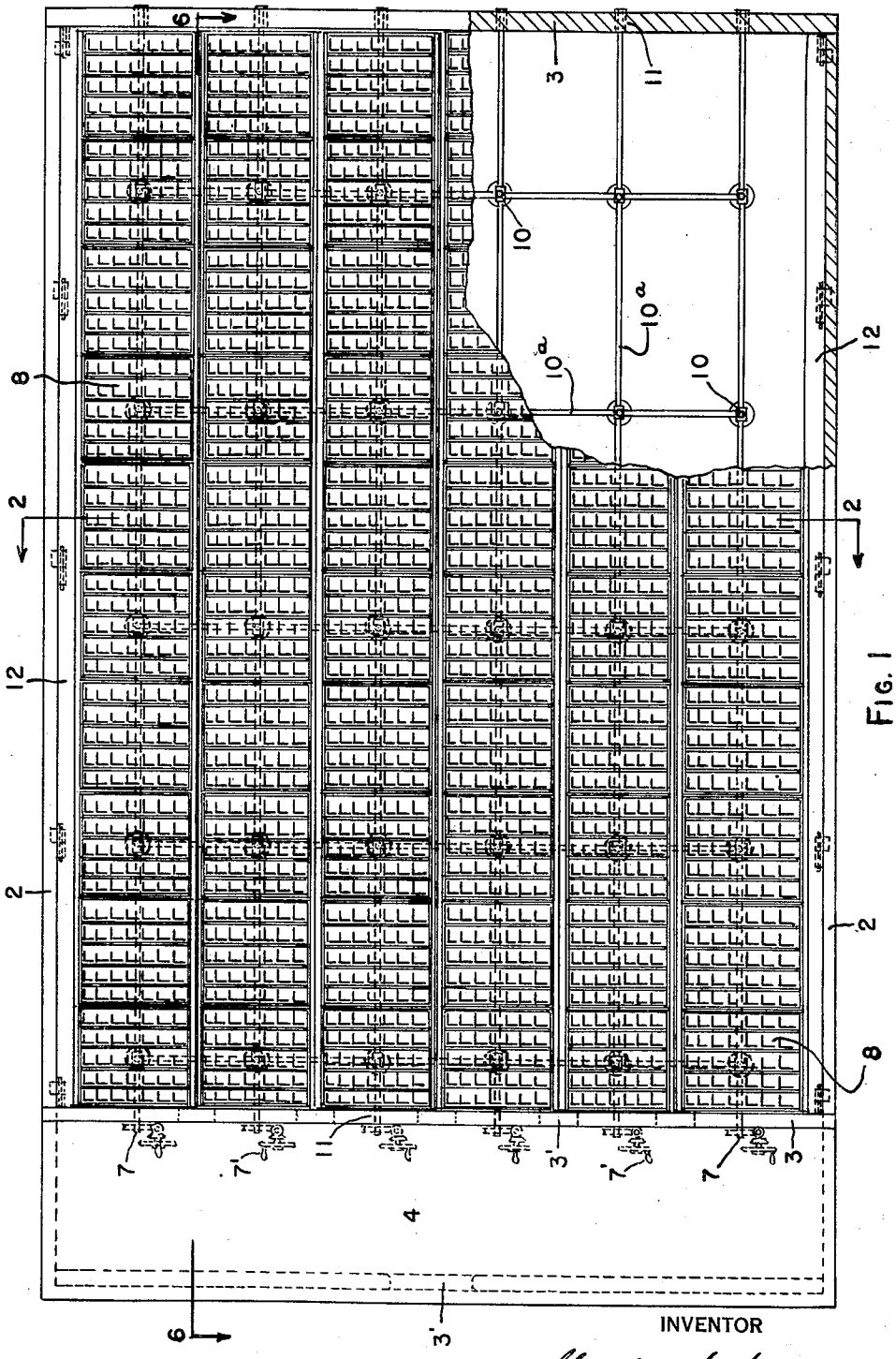


FIG. 1

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GREENHOUSE VENTILATION SYSTEM

Original Filed Aug. 31, 1938 4 Sheets-Sheet 2

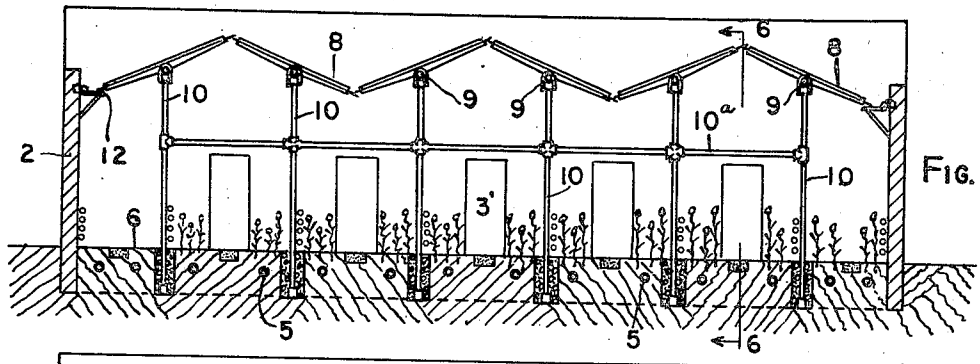


FIG. 2

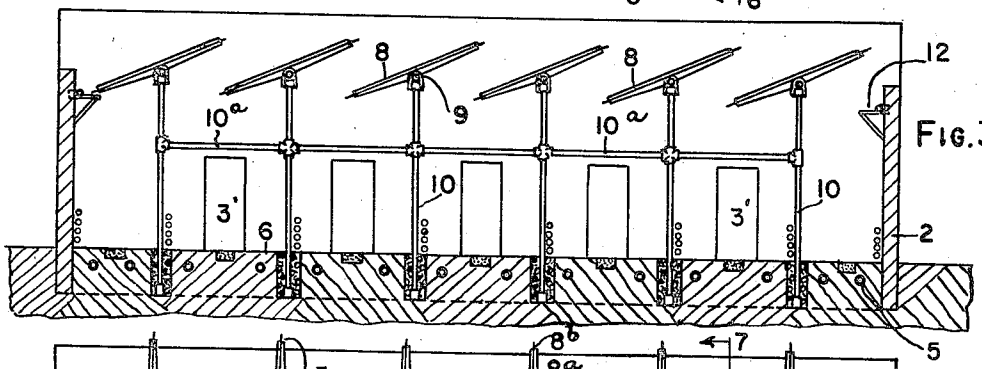


FIG. 3

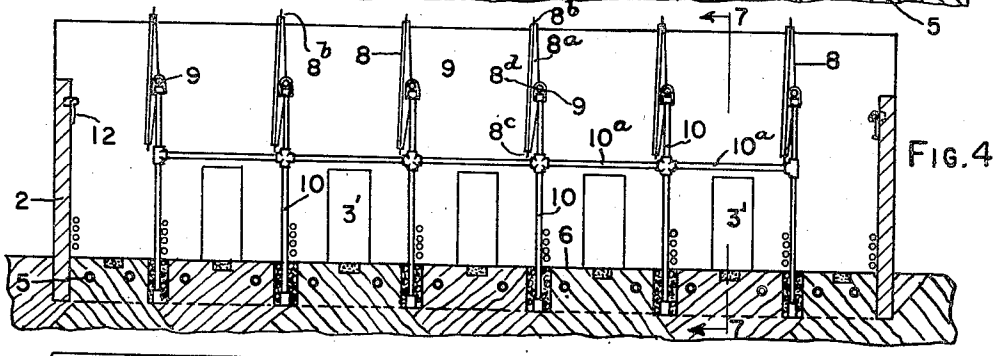


FIG. 4

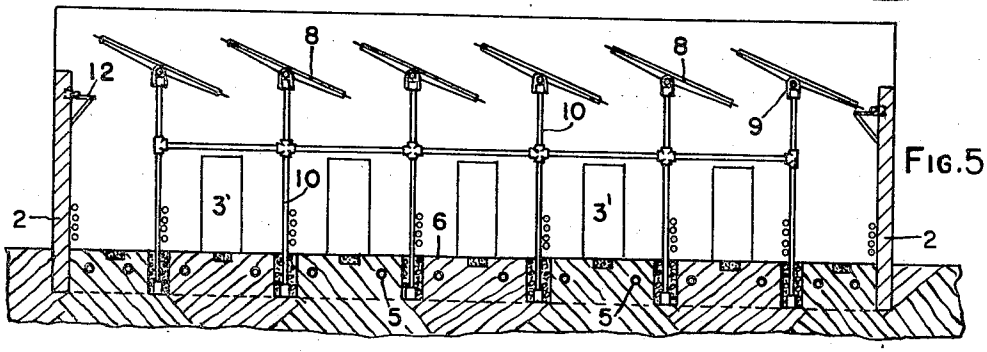


FIG. 5

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GREENHOUSE VENTILATION SYSTEM

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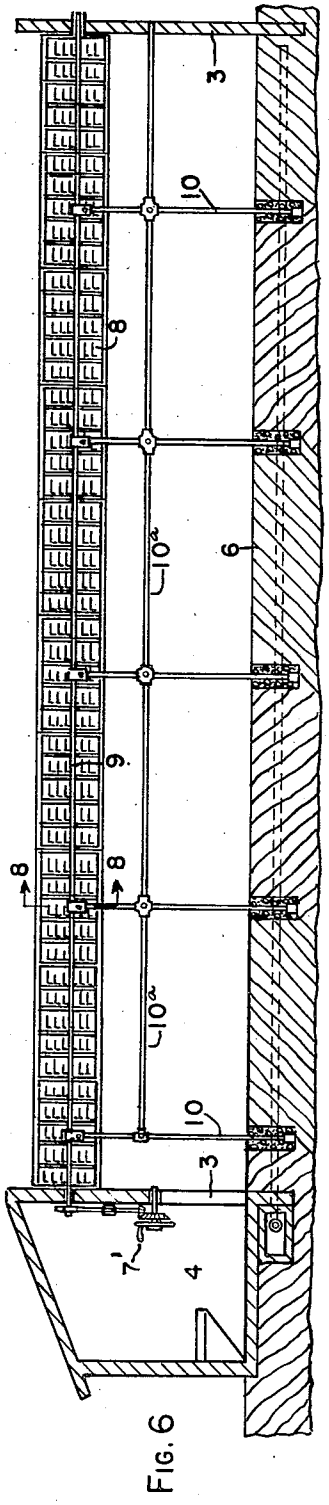


FIG. 6

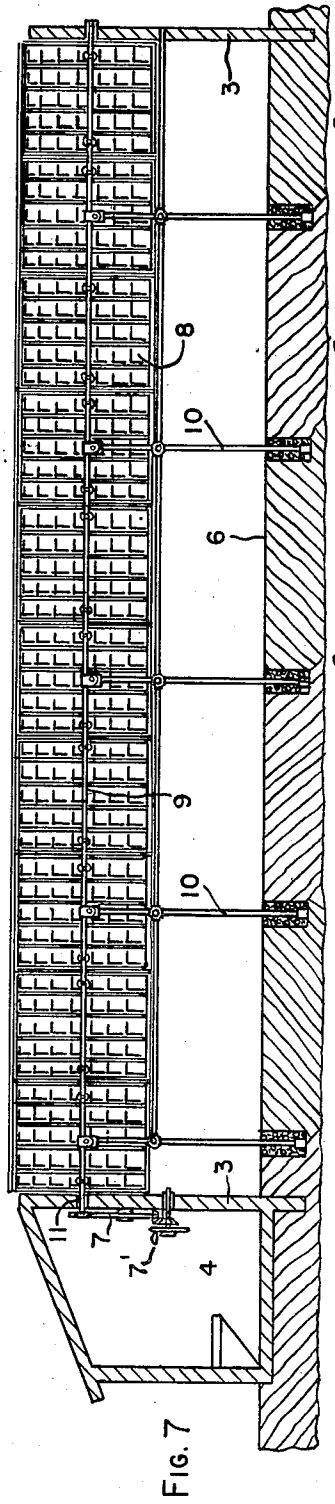


FIG. 7

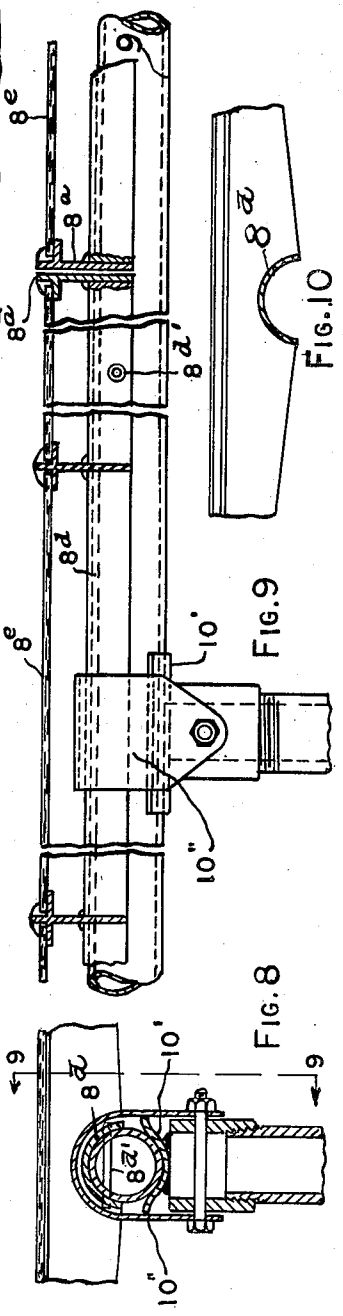


FIG. 9

FIG. 10

FIG. 8

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GREENHOUSE VENTILATION SYSTEM

Original Filed Aug. 31, 1938 4 Sheets-Sheet 4

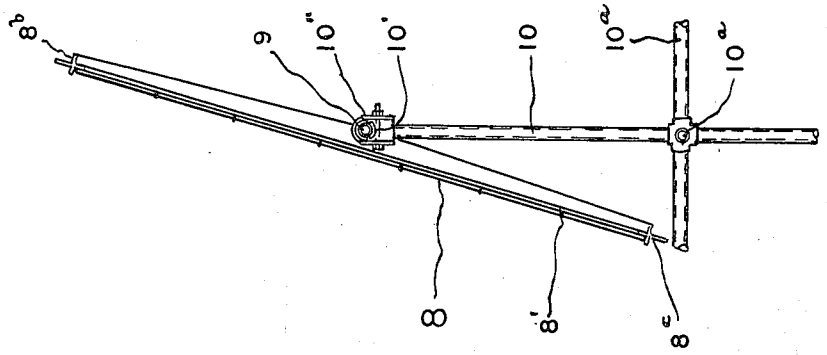


FIG. 12

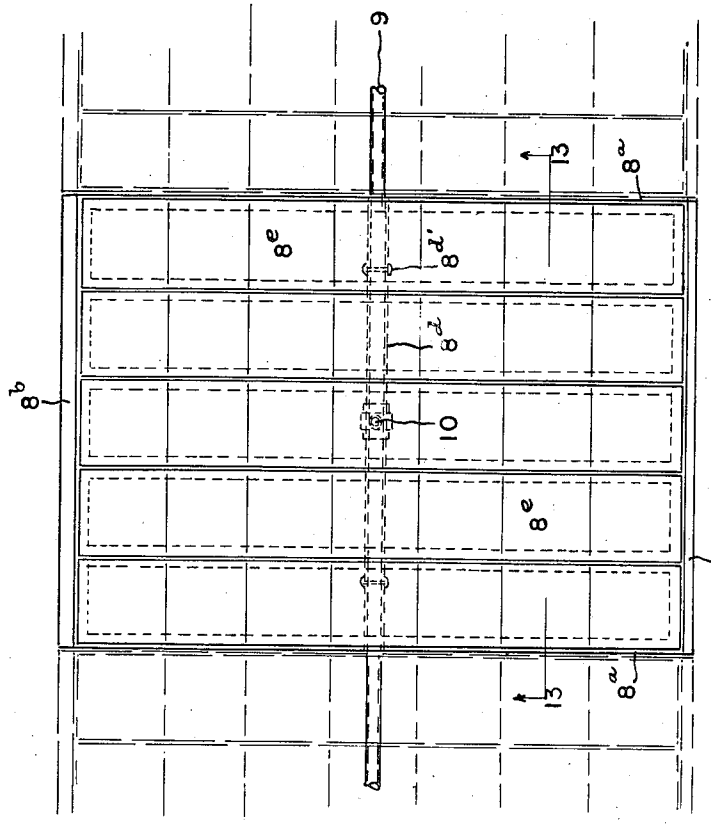


FIG. 11

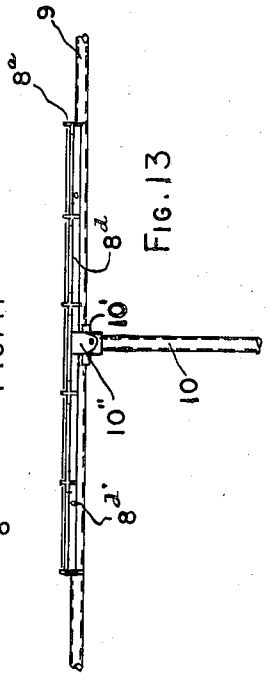


FIG. 13

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Patented July 2, 1940

2,206,478

UNITED STATES PATENT OFFICE

2,206,478

GREENHOUSE VENTILATION SYSTEM

Gilbert H. Hennessey, Springfield, Ill.

Substituted for abandoned application Serial No. 227,662, August 31, 1938. This application September 19, 1939, Serial No. 295,693

7 Claims. (Cl. 108—2)

This application is a substitute for my abandoned application Serial No. 227,662, filed Aug. 31, 1938.

My invention relates to greenhouse roofs and means for supporting the same, and more particularly to roofs employing shutters which are swingable to admit ventilation or sunshine directly or from different angles to the interior of the greenhouse, and my main object is to provide a shutter system which has the normal form of a series of gables, yet is capable of being manipulated to swing the shutters to all angles to obtain partial, directional or direct ventilation for the greenhouse.

A further object of the invention is to include a simple and efficient supporting structure for the roof.

Another object of the invention is to provide supplemental units for the gabled roof structure, for the extension thereof to the side walls of the greenhouse.

With the above objects in view and with any others which may suggest themselves from the description to follow, a better understanding of the invention may be had by reference to the accompanying drawings, in which—

Fig. 1 is a top plan view of the improved greenhouse with the roof broken away to disclose the supporting structure;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1 and showing the roof completely closed;

Figs. 3 to 5 are views similar to Fig. 2 and showing the roof sections in different positions of ventilation;

Fig. 6 is a section on the line 6—6 of Fig. 1;

Fig. 7 is a section on the line 7—7 of Fig. 4;

Fig. 8 is a section on the line 8—8 of Fig. 6;

Fig. 9 is a section on the line 9—9 of Fig. 8;

Fig. 10 is a separate view of a unit in the upper portion of Fig. 8;

Fig. 11 is an enlarged plan view of one of the sash units from which the roof sections are composed;

Fig. 12 is an enlargement of one of the roof sections substantially in the form seen in Fig. 4; and

Fig. 13 is a section on the line 13—13 of Fig. 11.

Referring specifically to the drawings, it is noted that the side walls of the building, usually glazed, are marked 2. The end walls 3, usually higher, contain door openings 3'. A work room 4 is usually built against one of the end walls and may contain heating apparatus and the necessary internal heat controls.

Both drain and tempering ducts 5 often underlie the working area 6. The work room 4 may also contain the roof swinging or tilting mechanisms 7, which I employ to operate the individual roof sections 8, here shown.

By preference and for ease of operation, the roof sections 8 are made to extend from end to end of the building and each roof section comprises a plurality of galvanized rectangular metal sashes or frames 8', joined end to end and rigidly attached to a rock shaft 9. The roof sections are independently operable, each shaft 9 being coupled to an individual operating mechanism 7. The latter are simple reduction gears operated by hand cranks 7', as shown. Obviously, all sections or alternate sections could be joined for simultaneous movement if desired.

Each sash or frame comprises two end rails 8a, 8a, a top rail 8b, a bottom rail 8c, and a mid rail 8d. A rigid frame is thus provided. These frames, divided into panels of convenient width, receive the roof sheeting 8e, the latter usually comprising rectangular panes of glass.

Obviously, a number of roof sections 8 are required to cover a working area of any considerable width, and normally they occupy the alternate slanting positions depicted in Fig. 2, in which positions they provide a complete roof for the working area.

In most cases it is unnecessary that the several sections 8 be tightly joined and the glass panels need not be puttied, because roof leakage is not important or objectionable. However, the movable roof sections are formed with the outward flanges 8c in order to overlap when closed, as indicated in Fig. 2, so that the sections are in closed relation with each other. Depending rain-collecting troughs may be provided at the ends of the roof valleys as well as a convenient cistern. And to the same end, fixed troughs may be installed upon the roof supporting frame work. It has not been deemed necessary to illustrate the troughs or gutters thus incorporated with the tilting roof sections or with the fixed frame work.

The tiltable sections 8 may be supported by cross beams or trusses but for ease of operation, cheapness and general convenience I mount the rock shafts 9 belonging thereto upon the tops of spaced stanchions 10. The latter rise from the working area, 6, and are of uniform height. Bearings 11 provided in the end walls 3 supplement shaft bearings or sockets 10', which are fixed on respective stanchion tops. A retaining strap 10'' provided for each bearing 10' serves to hold the rock shaft safely therein. The de-

tails here described are best shown in Figs. 8, 9 and 10.

It will be noted that the mid rails 8*d*, which are integral parts of respective frames, are concave in shape and rest upon the top of the rock shaft 9. They are welded thereon or are fixed by spaced bolts or rivets 8*d'*, so that when the shaft 9 is rocked in either direction the many frames necessarily move with it. In this connection it is to be noted that the sections are so nearly balanced upon respective rock shafts that it is not difficult to rock or tilt the whole structure. It is therefore easy to operate the roof sections even against a high wind pressure.

By preference, the several stanchions 10 are joined by rigid braces 10*a*. The braces afford head room and are found convenient as holders for shade cloths, not shown, but often required for the darkening of the working area.

The parts marked 12 are hinged boards or strips provided on the side walls 2, for use in most easily completing a substantially tight roof closure, as well shown in Figs. 1 to 5. These are normally braced in raised positions but may be dropped down, as shown in Fig. 4, when necessary to permit the tilting of the outer roof sections. Very little practice is needed to enable an operator to make the quick changes sometimes required to take advantage of or guard against natural weather conditions.

It will be evident from the above description that I have provided a ventilating system which is both extremely versatile in its phases of adjustment, as well as efficiently constructed as a roof or overhead closure. When in the closed position, as per Fig. 2, the series of roof sections form a multiple-gable type of roof which is continuous and provides a full closure between the side walls 2. This type of structure is universally desirable for the purpose of drainage for rain or melting snow, whereby to keep the roof clear. At the same time, the roof sections are individually movable to the several positions shown in the subsequent figures, whereby to control the amount and direction of ventilation and sunshine entering the enclosure. The supporting structure formed by the stanchions 10 and their spacers 10*a* is both compact and directed to support each of the roof sections along a medial zone, balancing the roof sections and occupying a minimum amount of room. In view of these considerations, the present ventilating system is an efficient advancement from the viewpoints of structure and utility.

While I have described the invention along specific lines, various minor changes and refinements may be made without departing from its principle, and I desire to consider all such changes and refinements as coming within the scope and spirit of the appended claims.

I claim:

1. A greenhouse roof structure comprising a series of separate and laterally-arranged roof sections, these being oppositely inclined in alternation to form a series of gables and overlapping in succession to constitute a continuous closure.

2. The structure of claim 1, longitudinal bearings midway between the sides of the sections to rotatably dispose the sections, and stanchions depending from the bearings at intervals for supporting the same.

3. The structure of claim 1, longitudinal bearings midway between the sides of the sections to rotatably dispose the sections, stanchions depending from the bearings at intervals for supporting the same, and spacing bars connecting the stanchions in longitudinal and transverse directions.

4. The structure of claim 1, the sides of the section series being spaced from the adjoining greenhouse walls, and closures to supplement the section series between the sides thereof and the related walls.

5. The structure of claim 1, the sides of the section series being spaced from the adjoining greenhouse walls, and closures to supplement the section series between the sides thereof and the related walls, said closures being shelves overlappd by the outer edges of said sides and extending to the respective walls.

6. The structure of claim 1, the sides of the section series being spaced from the adjoining greenhouse walls, and closures to supplement the section series between the sides thereof and the related walls, said closures being shelves overlapped by the outer edges of said sides and extending to the respective walls, and means to fold said shelves and afford clearance to the outer roof sections for rotation.

7. The structure of claim 1, the sides of the section series being spaced from the adjoining greenhouse walls, and closures to supplement the section series between the sides thereof and the related walls, said closures being shelves overlappd by the outer edges of said sides and extending to the respective walls, the shelves being hinged to the walls, and collapsible braces beneath the shelves to permit the folding of the same.

GILBERT H. HENNESSEY.