No. 727,541. PATENTED MAY 5, 1903.

W. J. HAYES.

SHADE STRUCTURE.

APPLICATION FILED MAR. 14, 1903.

NO MODEL.

Fig. 1.

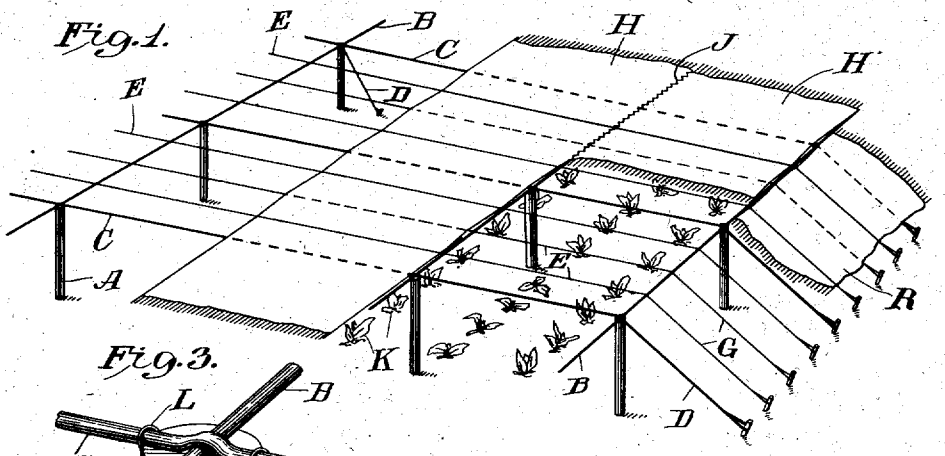


Fig. 3.

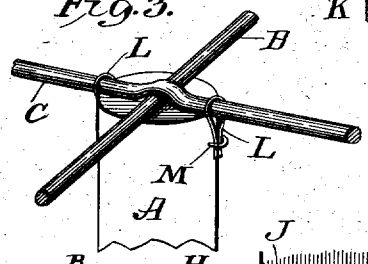
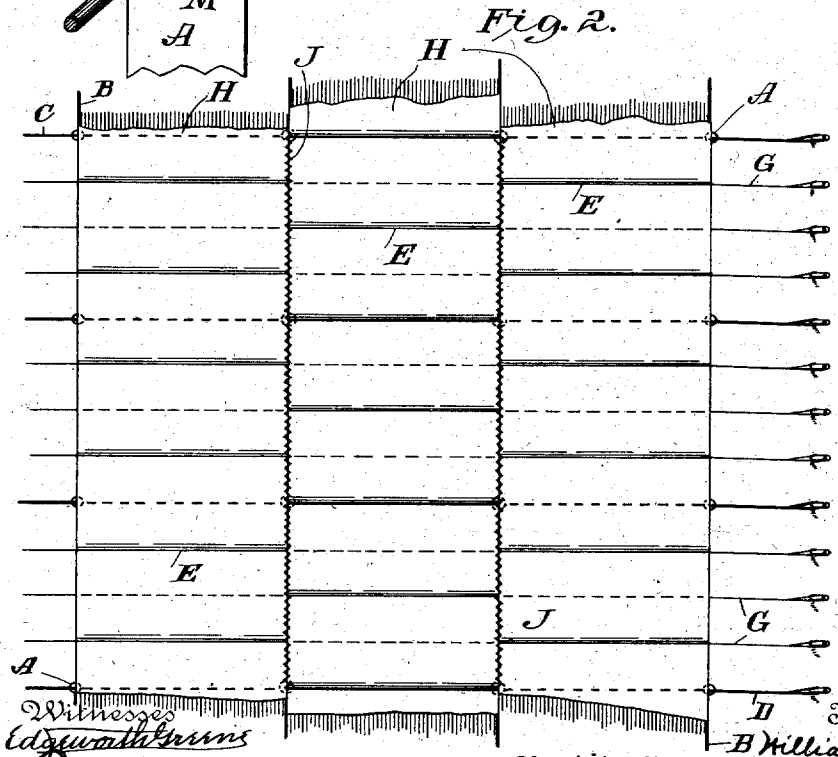


Fig. 2.



Witnesses
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No. 727,541. Patented May 5, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM J. HAYES, OF TARIFFVILLE, CONNECTICUT, ASSIGNOR TO INDIAN HEAD PLANTATIONS, INCORPORATED, OF EAST GRANBY, CONNECTICUT, A CORPORATION OF CONNECTICUT.

SHADE STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 727,541, dated May 5, 1903.

Application filed March 14, 1903. Serial No. 147,731. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. HAYES, a citizen of the United States, and a resident of Tariffville, township of Simsbury, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Shade Structures, of which the following is a specification.

My invention relates to that class of structures employed as a protective and forcing agent in the art of shade-growing, and particularly in the cultivation of tobacco crops. In the construction of shade-tents posts are set in rows through the entire field, so as to form rectangles about a rod square, the posts extending for a height of about eight or nine feet from the ground. At this height from post to post a supporting-frame or latticework is built, and upon this in turn the shade fabric or tent-cloth is stretched. Heretofore the framework has been built largely of wood, the tops of the posts being connected by stringers of two-by-four-inch cross-section, the fabric being stretched upon these and tacked thereto along the lines of contact. The fabric is supplied in widths sufficient to extend from one stringer to the next. To support the fabric intermediate of the stringers, ropes or wires have been stretched beneath the fabric. In practice using this structure it has been found that the wind gets under the tent structure and causes "billows" or undulations of the stretched fabric, which billows may sometimes be seen to travel across the entire width of a field before disappearing at the edge of the tent. Owing to these billows and the consequent rising and falling of the fabric, an abrasion of the latter and sometimes a tear occurs along the lines of contact with the edges of the stringers. As the wind finds easier entrance at a tear, the billow action increases in violence, causing further rupture, and thus by one windstorm great damage may be done. In one instance I have known the wind-pressure to be exerted so powerfully as to draw the posts from the ground and wreck the entire structure. It becomes, therefore, of great importance to destroy or lessen the billow action. In some instances and to afford greater security between the cloth and the stringers laths have been placed over the cloth and nailed along the stringers. This construction is undesirable, as it has been found to retain moisture under the lath and to rot the cloth.

The object of my invention is to provide a shade construction which will overcome these disadvantages, permit of greater ease and rapidity of construction, and afford a more stable, storm-resisting, and enduring structure than those heretofore in use. I have obtained these desirable results by the adoption of a system of wire network as a supporting-frame, into which the fabric may be introduced or woven, as hereinafter explained.

In the drawings, Figure 1 represents an isometric perspective of a portion of a field with my tent structure in process of construction. Fig. 2 is a plan view of the structure, showing three widths of cloth differently woven. Fig. 3 is a detail.

Similar reference-letters indicate similar parts throughout the several views.

Across the field to be shaded at the usual intervals of a rod I place the posts A in the customary manner. Across their tops in the direction in which the lengths of cloth are to lie I stretch the heavy wires B, and in the transverse direction, also across the tops of the posts, I stretch the wires C, securing them to the posts in any suitable way, preferably by staples. At the edge of the field or wherever it is found necessary to relieve the strain I employ tension guy-wires D. In the drawings these are shown only as applied to the wires C; but it is to understood that I propose applying them as well to the ends of the wires B or at any other point intermediate the ends of the wires B and C.

Parallel with the wires C and spanning the space between adjacent wires B, I stretch lighter wires E, supplied at their ends or elsewhere, as may be desired, with the tension-guys G. Transverse to the wires C and E and parallel with the wires B, I stretch the fabric strips H, the strips being of such width as to extend from one wire B to the next. The selvage edges of each strip are to be attached, preferably by sewing, both to the wires B and to the selvage edges of the adja-

cent strips, making seams J. In passing the wires C and E, I propose that the fabric shall be interwoven with the same, passing under one wire and over the next, as clearly seen in Fig. 1. This is readily accomplished during the process of construction by passing the strip of fabric as the same is unrolled under one wire and over the next. I may pass adjacent strips of fabric over and under the same wires, as seen in Fig. 1, or I may alternate the arrangement, as seen in Fig. 2, where the middle strip of fabric passes under the wires C and E overlaid by the adjacent strips and over the wires C and E lying above the adjacent strips. I have shown the wires E arranged in sets of three; but it is to be understood that they may be employed in greater or less number, the requirement being simply that there shall be enough of them to permit of weaving the cloth therethrough.

As regards the arrangement of the wires E with respect to each other and to the wires B the following considerations must be kept in mind: The wires E lying beneath the cloth are to support it above the ground, resisting downward pressure, and the wires E lying above the cloth are to hold it down, resisting pressure from beneath. The performance of this latter function is aided in some situations by passing the upper wires E or those on top of the cloth beneath instead of above certain of the longitudinal wires B, while the lower wires E—namely, those below and supporting the cloth—still pass over the wires B and are supported thereby. Regarding the structure to be attained as in the nature of a diaphragm rather than a roof, it will be understood that if sufficient tension be applied to the cloth it will assume a substantially horizontal plane. When so located, the overlying and underlying wires will be found to be simultaneously in contact with the respective upper and lower surfaces of the cloth. In other words, considering the underlying wires C and E as occupying a plane substantially common to both below the fabric the wires E lying above the cloth are never wholly above the plane of the wires E or C lying below the cloth and in some instances may be partly below it—as, for instance, where the upper wires E pass under one or more of the lengthwise wires B. In both of these cases the wires overlying the fabric intersect the plane of the underlying wires, in the first case throughout their extent, the intersection amounting to coincidence, and in the second case intersecting only at the points where the overlying wires pass through the plane. It results in practice, since the cloth yields rather than the wires, that the cloth, passing through the wires, assumes a sort of zigzag form, passing up in a higher plane over a lower or underlying wire and down in a lower plane under an upper or overlying wire and uniting firmly, itself interwoven with the interwoven wires, to form a compact unitary diaphragm across the entire field, said diaphragm being supported at points only throughout its extent—namely, at the tops of the posts—and thus affording the least possible area for abrasion and cutting at sharp edges, while the interweaving offers great resistance to endwise movement of the cloth through the wires.

At the sides of the structure the fabric is to be stretched to the ground, so as to make a complete inclosure, and I find it convenient to do this by interweaving the fabric with the tension-guys, so as to form an oblique wall R. Apertures may be left from time to time to afford entrance for men and teams to the interior of the tent. The effect of this construction is to form a continuous diaphragm-like shade structure overlying the plants K and protecting them from wind, rain, frost, hail, and insects and considerably augmenting the average temperature existing above them. The absence of contact with the edges of wood stringers does away with the tendency to abrasion, and the avoidance of laths or battens as retaining means removes the moisture-collecting agencies and with them the tendencies toward rot. The arrangement of wires partly above and partly below the cloth affords a light but firm and stable structure and is cheaper and easier to put up than the frameworks of wood. It serves also as a means of absorbing and in some instances of preventing the objectionable billow action, heretofore referred to, as experienced with former constructions. With an experimental tent of this wire construction I have seen a billow disappear entirely before traveling more than a few sections.

At points where the tent crosses a depression in the ground, such as a swale, I have found it advisable to secure the wires to the posts by some means more reliable than staples, as the latter, from the continuous upward strain, sometimes pull out. For this purpose I employ the lock arrangement shown in Fig. 3. Around the upper wire of the two wires B C, crossing the post at right angles and on one or both sides of the post, I pass the length of wire L to form a loop or lock, bringing its ends together below against the side of the post and securing them with a staple M. This lock may be applied at every post throughout the extent of the swale or every other post or even less frequently, as found sufficient.

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

1. In a shade structure, the combination of posts, wires stretched from post to post, so as to form sets of wires transverse to each other, other wires arranged intermediate of and parallel to the wires of one of the said sets and supported by the wires of the other set, and fabric supported by and interwoven with the wires, substantially as described.

2. In a shade structure, the combination of

posts, heavy wires stretched from post to post across the tops thereof so as to form sets of wires transverse to each other, lighter wires arranged intermediate of and parallel to the wires of one of the sets and supported by the wires of the other set, and fabric supported by and interwoven with the wires, substantially as described.

3. In a shade structure, the combination of posts, wires stretched from post to post, fabric interwoven with said wires, guy-wires extending from the ends of said wires to the ground, and fabric interwoven with said guy-wires, substantially as described.

4. In a shade structure, the combination of posts, heavy wires stretched from post to post so as to form sets of wires transverse to each other, guy-wires extending from the ends of said wires to the ground, other wires arranged intermediate of and parallel to the wires of one of the said sets, guy-wires extending from the ends of the intermediate wires to the ground, and fabric interwoven with the heavy and intermediate wires, and with the guy-wires thereof, substantially as described.

5. In a shade structure, the combination of posts, wires stretched from post to post, so as to form sets of wires transverse to each other, other wires arranged intermediate of and parallel to the wires of one of the said sets, and interwoven with and supported by the wires of the other set, and fabric interwoven with the intermediate wires and with the set of wires parallel thereto, and supported by all the wires, to form a unitary diaphragm, substantially as described.

6. In a shade structure, the combination of posts, wires stretched from post to post, so as to form sets of wires transverse to each other, other wires arranged intermediate of and parallel to the wires of one of the said sets, and supported by the wires of the other set, fabric interwoven with the intermediate wires and with the set of wires parallel thereto, and supported by all the wires, the wires overlying the fabric intersecting the plane of the underlying wires, and resisting upward and downward pressures as a unitary diaphragm, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of March, 1903.

WILLIAM J. HAYES.

Witnesses:
ARTHUR B. JENKINS,
ERMA P. COFFRIN.

Correction in Letters Patent No. 727,541.

It is hereby certified that in Letters Patent No. 727,541, granted May 5, 1903, upon the application of William J. Hayes, of Tariffville, Connecticut, for an improvement in "Shade Structures," an error appears in the printed specification requiring correction, as follows: In line 86, page 1, before the word "understood," the word *be* should be inserted; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of August, A. D., 1903.

[SEAL.]

E. B. MOORE,
Acting Commissioner of Patents.

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