Aug. 28, 1962 J. E. REYNOLDS 3,051,185

ARCHED SHELTER STRUCTURE

Filed Sept. 10, 1959

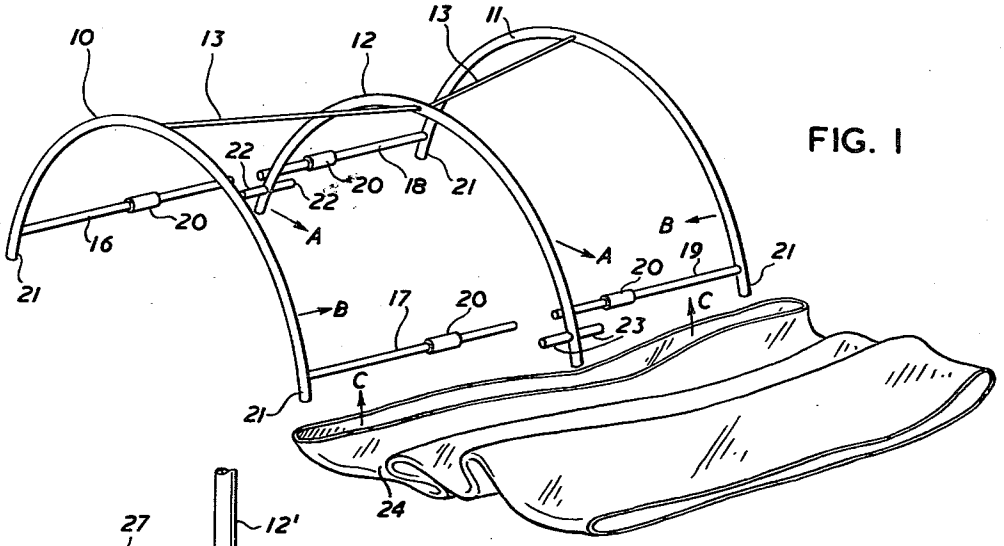


FIG. 1

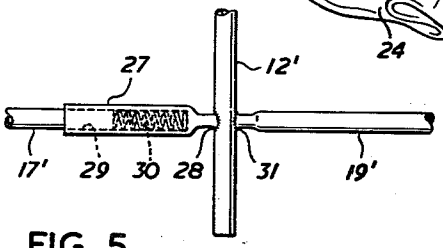


FIG. 5

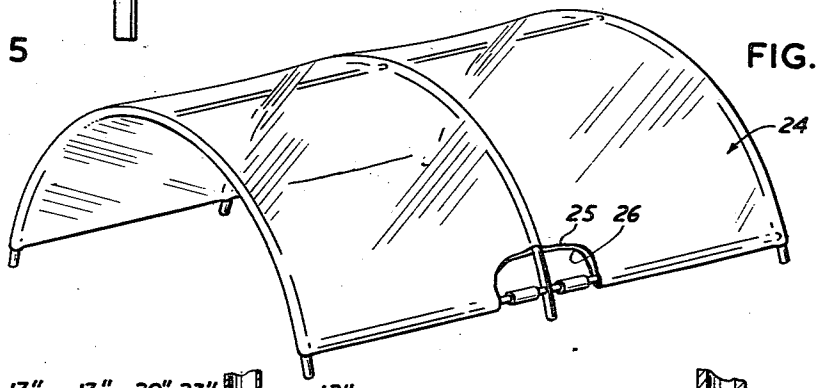


FIG. 2

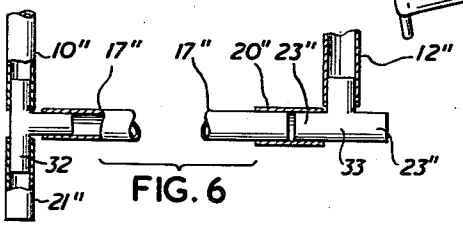


FIG. 6

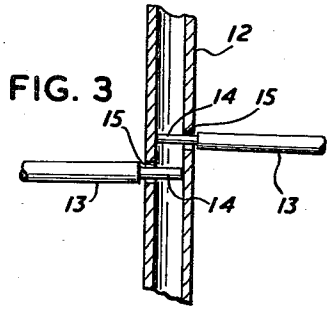


FIG. 3

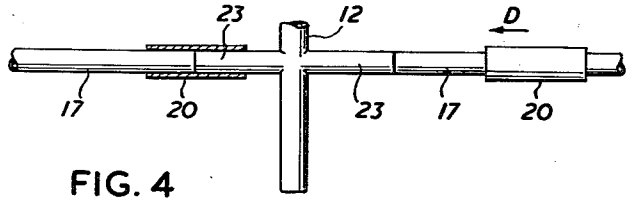


FIG. 4

INVENTOR
JOHN E. REYNOLDS

BY: Maybee & Legris
ATTORNEYS

United States Patent Office 3,051,185
Patented Aug. 28, 1962

3,051,185

ARCHED SHELTER STRUCTURE

John Edward Reynolds, Gosfield South, Ontario, Canada
(Box 34, Leamington, Ontario, Canada)

Filed Sept. 10, 1959, Ser. No. 839,183
4 Claims. (Cl. 135—3)

This invention relates to structures such as tents, awnings, cold frames and the like. The invention is particularly applicable to cold frames, i.e. frames used to protect plants growing in open fields.

The object of the invention is to provide an improved construction for protective structures suitable for use as cold frames, tents and the like.

Cold frames are provided to protect growing plants from inclement weather and normally have transparent or translucent coverings whereby sunlight may pass through the coverings to assist in the growth of the plants under the frames. However, it is also desirable that the covering of a cold frame have insulating properties and this is achieved in the present invention by having a double thickness covering in which the thicknesses of the covering are spaced apart to provide an intermediate insulating layer of air and the thicknesses of the covering are held in spaced apart relation by means of the supports of the frame. Although the invention is particularly applicable to cold frames, it may also be used to provide tents, huts and the like or, more generally speaking, any protective structure in the form of an arch or tunnel.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a general perspective view of a cold frame embodying the invention in a disassembled state,

FIGURE 2 is a perspective view of the cold frame of FIGURE 1 in an assembled state with part of the covering cut away to show how the parts are connected together,

FIGURE 3 is a section through the intermediate support of the frame of FIGURE 1 showing how some of the stretchers are mounted thereon,

FIGURE 4 is a detail, on a larger scale, showing how the intermediate support is connected to other stretchers of the framework,

FIGURE 5 is a detail of a modified construction, and

FIGURE 6 is a detail of a further modified construction.

Referring now to FIGURE 1, the cold frame comprises two arched end supports 10 and 11 and an intermediate support 12 interposed between the end supports. Each support is similar and is constructed of metal tubing bent to conform to an arc of a circle so that each support is rather less than a semi-circle and subtends less than 180° at the centre of the circle. First stretchers 13 extend between the end support 10 and the intermediate support 12 and between the end support 11 and the intermediate support 12.

The first stretchers 13 are mounted in the supports so that they may pivot relatively thereto. FIGURE 3 shows the arrangement of the ends of the first stretchers 13 at the intermediate support 12, each stretcher 13 has, at one end, a reduced extended portion 14 which passes through a hole 15 in the wall of the support 12. The length of each extended portion 14 is such that the free end of the portion abuts against the internal wall of the tube of which the support 12 is made while the reduced portion terminates exteriorly of the outer wall of the tube. The stretcher 13 can rock relatively to the support 12 and is pivotally mounted thereto since the hole 15 is of greater diameter than the portion 14. The stretchers on either side of the support 12 are offset as shown in FIGURE 3 so that they may both rock relative to the support 12

without interfering one with the other. The arrangement at the other ends of the stretchers 13 is similar, that is to say that each stretcher 13 has a reduced portion which is reecived in a hole in one of the tubular end supports 10 or 11 so that the stretchers 13 may rock relatively to the end supports and are pivotally mounted thereon.

Welded to the end support 10 are second and third stretchers 16 and 17 and welded to the end support 11 are second and third stretchers 18 and 19. The free end portions of the stretchers 16, 17, 18 and 19 extend towards the intermediate support 12. Each of the stretchers 16, 17, 18 and 19 is provided with a sleeve 20 which is slidable along the stretcher and is a sliding fit on the stretcher. The stretchers 16, 17, 18 and 19 are welded to the end supports 10 and 11 slightly above the lower free ends of the supports so that legs 21 are provided which may be pushed into the ground to secure the erected frame in position.

Welded to the intermediate support 12, near to the lower ends thereof, are abutments 22, 23 so positioned that, when the intermediate support 12 is in register with the end supports 10 and 11, the abutments 22 are in line with portions of the stretchers 16 and 18 and the abutments 23 are in register with portions of the stretchers 17 and 19. As will hereinafter be described, when the abutments 22, 23 are in register with their respective portions of the stretchers, the sleeves 20 may be slid over the abutments and said portions to hold the intermediate support in register with the end supports 10 and 11.

The covering of the framework is provided by a sleeve 24 of flexible material which may be slipped over the supports to form a double thickness covering of arched form as shown in FIGURE 2. The circumference of the tube is substantially equal to twice the length of the frame while the length of the tube is equal to the circumferential length of those portions of the supports 10, 11 and 12 which are to be covered. If the tube were a tight fit on the framework at all times it would be extremely difficult to slip the tube onto the framework. This is especially so with certain types of material such as polyethylene which is useful for a cold frame due to its translucent and flexible properties. For this reason, it is necessary to provide means operable to partially collapse the framework to allow the tube 24 to be slipped over the framework and, after the tube has been slipped into position, operable to extend the framework to tauten the tube. In the embodiment of the invention shown in FIGURES 1 to 4, this slackening and tautening of the tube 24 is achieved by moving the intermediate support 12 out of, and into, register with the end supports 10 and 11. When the intermediate support 12 is in register with the end supports 10 and 11 then the abutments 22, 23 are in register with the stretchers 16, 17, 18 and 19 and force the end supports 10, 11 away from one another thereby to tauten the tube.

In the position shown in FIGURE 1, the intermediate support 12 has been moved in the direction of the arrows A out of register with the end supports 10 and 11. As a result of this movement the first stretchers 13 have been moved out of parallelism so that they pivot relatively to the supports and become inclined to one another; the end frames 10 and 11 may then be moved towards one another in the directions of the arrows B. When the framework is in the position shown in FIGURE 1, the tube 24 may be moved upwardly in the direction of the arrows C to embrace the supports 10, 11 and 12. The tube is threaded onto the supports so that it extends along the circumferential length of the supports. Once the tube has been slipped onto the framework then the latter can be expanded to produce the finished frame shown in FIGURE 2.

The framework is expanded by moving the intermediate support **12** so that it is in registry with the end supports **10** and **11**. In this position, as mentioned above, the abutments **22** on the intermediate frame **12** register with portions of the stretchers **16** and **18** and the abutments **23** register up with portions of the stretchers **17** and **19**; the first stretchers **13** have also moved back into parallelism. The intermediate frame is manipulated manually through the tube **24** which is quite a simple operation. When the intermediate frame is in register with the end supports and the abutments are in register with the end portions of their respective stretchers, then the sleeves **20** are slid so that they embrace the abutments and the end portions of the stretchers on which they are mounted and hold the intermediate frame in register with the end frames. This is clearly shown in FIGURE 4 for the stretchers **17** and **19** and the abutments **23**. Thus to secure the intermediate support in its registered position the sleeve **20** to the right in FIGURE 4 is moved in the direction of the arrow D to embrace the registering ends of the abutment **23** and the stretcher **17**. The other sleeves similarly embrace the abutting ends of the abutment and the respective stretchers.

The completed cold frame is shown in FIGURE 2 from which it will be seen that the tube **24** provides a double thickness covering for the framework, the thicknesses being indicated at **25** and **26** in FIGURE 2. The tube **24** embraces the supports so that the supports lie between the thicknesses **25** and **26** which are spaced apart by the supports. The diameter of the tube is chosen so that, when the framework is expanded by bringing the intermediate support **12** into register with the end supports **10** and **11**, the tube will be tautened so that the walls thereof lie spaced from one another as shown in FIGURE 2. For relatively thin supports of the type shown in the drawing, the total length of the cold frame will be very nearly equal to half the circumference of the tube. It will be appreciated, however, that if the supports were thicker than those shown, then the length of the frame might differ substantially from half of the circumference of the tube.

Referring now to FIGURE 5, this shows details of an alternative construction. Instead of having the first stretchers **13** and the second and third stretchers **16**, **17**, **18** and **19** arranged as shown in FIGURES 1 to 4, each stretcher, or some of the stretchers, may incorporate spring means which forces the end supports away from one another to tauten the tube as is done in the embodiments of FIGURES 1–4 by bringing the intermediate support into registry with the abutments. In this modified construction, each stretcher may be of similar construction such as that shown in FIGURE 5 for stretchers designated as **19'** and **17'** attached to an intermediate support **12'**. The stretcher **17'** includes a tubular portion **27** which is welded at **28** to an intermediate support **12'**. The stretcher **17'** also includes a spigot portion **29** which is received within the tubular portion **27** and the end of the spigot portion **29** is in engagement with a compression spring **30**. The stretcher **19'** is welded to the intermediate support at **31**; the stretchers **17'** and **19'** are welded at their remote ends to end supports similar to those shown at **10** and **11** in FIGURE 1.

If the construction shown in FIGURE 5 is substituted for the co-operating abutments **22**, **23** and stretchers **16**, **17**, **18**, **19** shown in FIGURE 1 then the end supports **10** and **11** may be moved towards one another to reduce the length of the framework by applying pressure to the end supports to compress the spring **30** and, while the end supports are so held, the tube **24** may be slipped onto the framework. When the pressure holding the end supports **10** and **11** together is released the supports will move away from one another under the influence of the springs **30** and will tauten the tube to produce a construction similar to that shown in FIGURE 2.

Referring now to FIGURE 6, instead of the stretchers

16, **17**, **18** and **19** being welded to the end supports **10** and **11** as in FIGURES 1 to 4, the stretchers may be detachably secured to the supports by T-members. Thus an end support **10''** may have a T-member **32** driven into the end thereof. A separate leg **21''** is also driven onto the T-member **32**. The third arm of the T-member is received in the stretcher **17''**. In a similar manner the abutments **22** or **23** of the intermediate support **12** of FIGURE 1 may be provided by opposed arms of a T-member **33** as shown in FIGURE 6. The T-member is shown driven into the end of an intermediate support **12''** to provide abutment **23''**. A sleeve **20''** cooperates with the stretcher **17''** and the abutment **23''** in a manner similar to that for the sleeve **20** in FIGURE 1. In this arrangement no legs are provided for the intermediate support **12''**. The use of T-members as described facilitates shipping of the structure since it may be broken down into parts which may be readily packed flat.

The invention has been described with reference to a cold frame in which the legs **21** will be inserted into the ground and the frames will be arranged in a row, the ends of the row being closed in a conventional manner. However, the invention may also be applied to a tent which would be made somewhat larger than the embodiment shown in the drawings and it is obvious that the arched supports need not be circular.

It will be seen that the invention provides a structure of simple construction which has the advantages that a double thickness insulating covering is provided and that the covering is attached to the framework over relatively long attachment areas, i.e. the circumferential lengths of the supports, so that any stress developed in the covering due to wind loads and the like is evenly distributed and is not concentrated in small areas liable to tearing.

It will be understood that the forms of the invention herewith shown and described are preferred examples and that various modifications may be carried out without departing from the spirit of the invention or the scope of the appended claims.

What I claim as my invention is:

1. A structure comprising two arched end supports, an arched intermediate support interposed between the end supports, first stretchers extending between the end supports and the intermediate support and mounted on the supports to pivot relatively thereto whereby the intermediate support can move into and out of register with the end supports, second and third stretches secured to the end supports and extending towards the intermediate support, the supports and the stretchers together forming an arched framework, a flattened tube of flexible material extending between the end supports to form a double thickness covering for the framework, the tube embracing each support so that the support lies between the thicknesses of the covering to space them apart, abutment means associated with the intermediate support whereby, when the intermediate support is in register with the end supports, said abutments register with portions of the second and third stretchers and force the end supports apart to tauten the tube whereas, when the intermediate support is out of register with the end supports, the abutments are out of register with said portions thereby permitting movement of the end supports towards one another to allow the tube to be slipped over the framework, and sleeves to embrace said abutments and said registering portions of the second and third stretchers, said sleeves being slidable along said stretchers and abutments to releasably retain the intermediate support in register with the end supports.

2. An arched supporting structure, comprising: a spaced pair of arched supporting members each including a pair of generally upright base portions converging upwardly and inwardly into a centrally disposed upper portion; longitudinal frame members removably mounted between said arched supporting members to assist in

maintaining the same in spaced parallel relation, said frame members extending between opposed points on said supporting members in the central portions and in the base portions thereof; resilient means incorporated in at least one of said longitudinal frame members to yieldably urge said supporting members apart; and a flattened sleeve of flexible material extending around the opposed supporting members for substantially the full length thereof, said sleeve forming a double-walled arched covering and serving to limit outward movement of said support members under the influence of said resilient means.

3. An arched supporting structure, comprising: a spaced pair of arched supporting members each including a pair of generally upright base portions converging upwardly and inwardly into a centrally disposed upper portion; longitudinal frame members removably mounted between said arched supporting members to assist in maintaining the same in spaced parallel relation, said frame members extending between opposed points on said supporting members in the central portions and in the base portions thereof; means associated with at least one of said longitudinal frame members and operable to urge said supporting members apart; and a flattened sleeve of flexible material extending around the opposed supporting members for substantially the full length thereof, said sleeve forming a double-walled, arched covering and serving to limit outward movement of said support members under the influence of said last mentioned means.

4. An arched supporting structure, comprising: a spaced pair of arched supporting members each including a pair of generally upright base portions converging upwardly and inwardly into a centrally disposed upper portion; a third arched supporting member corresponding in size and configuration to said pair of arched supporting members and disposed intermediate said pair of arched supporting members; longitudinal frame members removably mounted between said pair of arched supporting members respectively and said third arched supporting member to assist in maintaining all of said arched supporting members in spaced parallel relation, said frame members extending between opposed points on said supporting members in the central portions thereof and in the base portions thereof, the longitudinal frame members associated with said central portions being substantially aligned and being pivotally connected to said third arched supporting member whereby said third supporting member can be moved between an offset position and an aligned position with respect to said spaced pair of supporting members with said last mentionad longitudinal frame members urging said pair of supporting members apart in the central portion thereof as said third supporting member approaches said aligned position; a flattened sleeve of flexible material extending around said pair of supporting members for substantially the full length thereof, said sleeve forming a double-walled, arched covering and serving to limit outward movement of said pair of support members by manipulation of said third separate member.

References Cited in the file of this patent

UNITED STATES PATENTS

413,730	Palmer	Oct. 29, 1889
2,084,524	Eide	June 22, 1937
2,193,469	Ashton	Mar. 12, 1940
2,810,430	Jacob	Oct. 22, 1957
2,817,399	Donaldson et al.	Dec. 24, 1957
2,823,683	Smith et al.	Feb. 18, 1958
2,827,138	Roy	Mar. 18, 1958