April 5, 1966 G. L. RAYMOND 3,244,577

ARTIFICIAL CHRISTMAS TREE AND METHOD OF MAKING THE SAME

Filed April 26, 1962 3 Sheets-Sheet 1

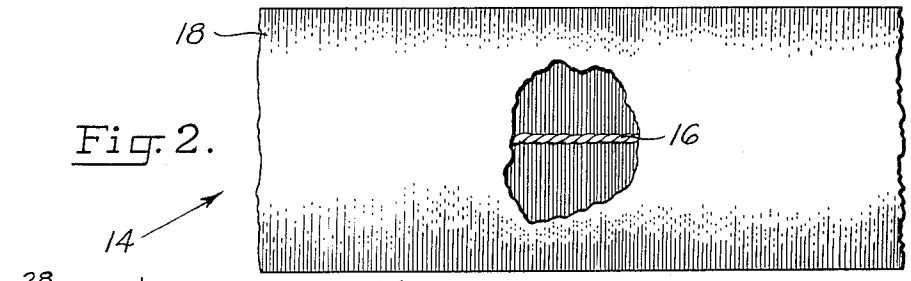


Fig. 2.

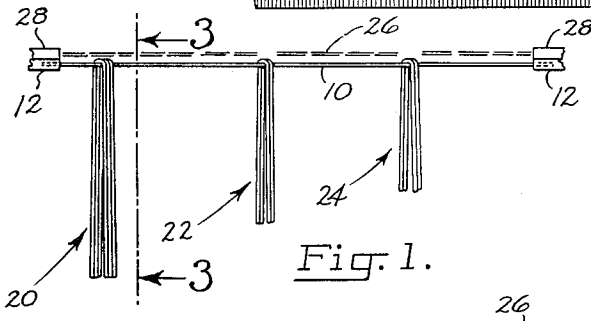


Fig. 1.

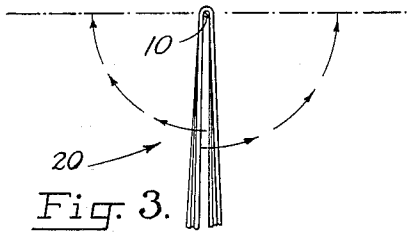


Fig. 3.

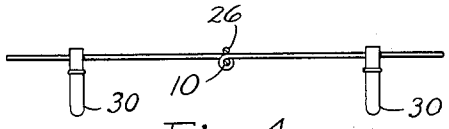


Fig. 4.

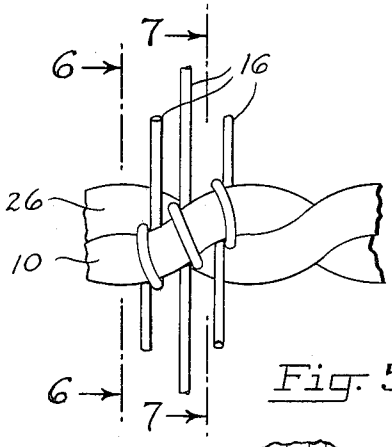


Fig. 5.

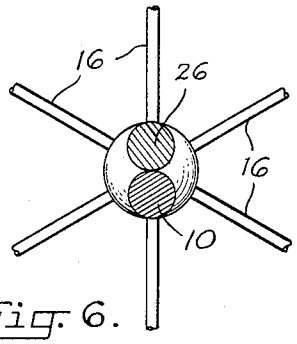


Fig. 6.

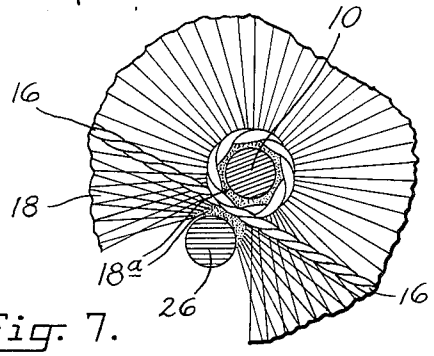


Fig. 7.

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April 5, 1966 G. L. RAYMOND 3,244,577

ARTIFICIAL CHRISTMAS TREE AND METHOD OF MAKING THE SAME

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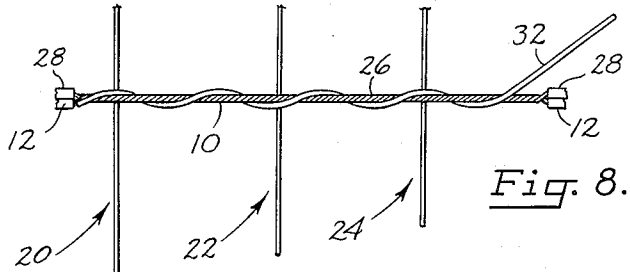


Fig. 8.

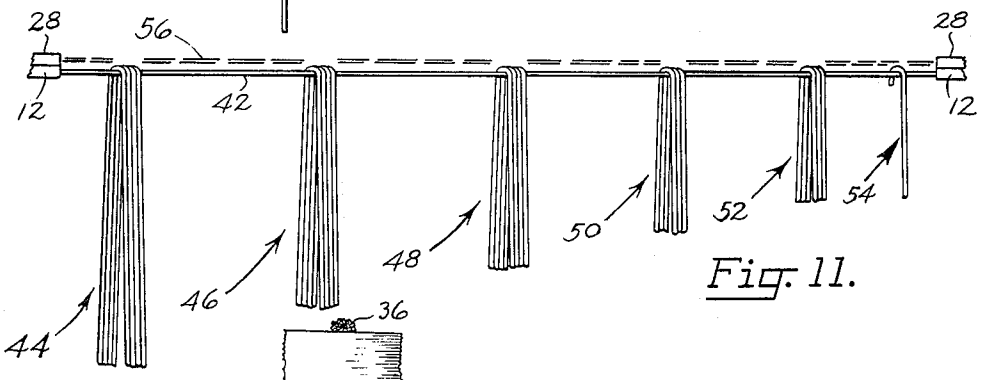


Fig. 11.

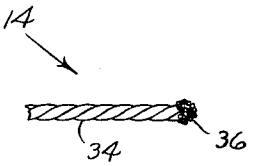


Fig. 9.

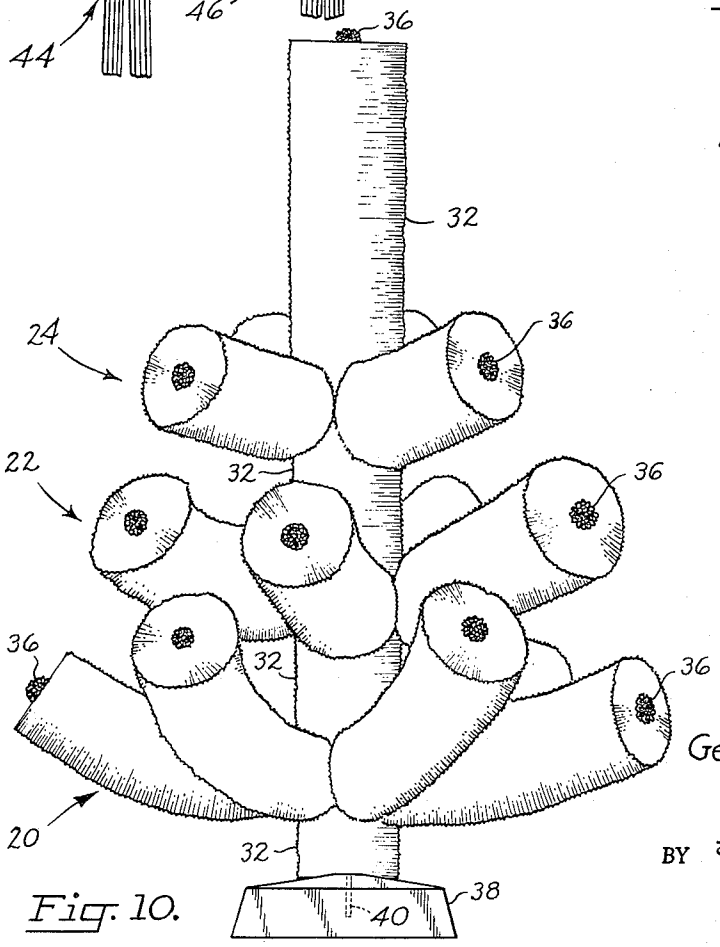


Fig. 10.

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ARTIFICIAL CHRISTMAS TREE AND METHOD OF MAKING THE SAME

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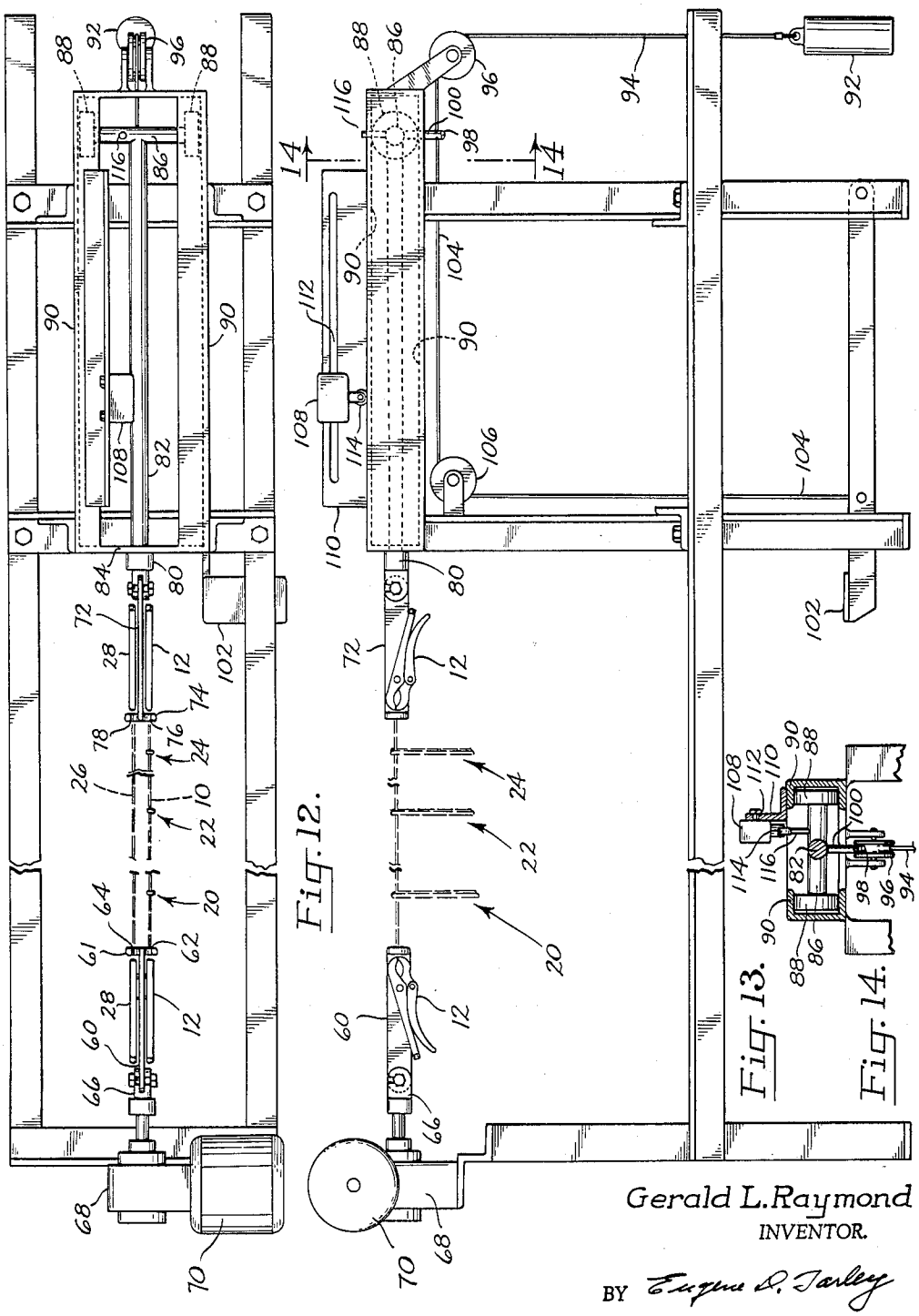


Fig. 12.

Fig. 13.

Fig. 14.

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United States Patent Office

3,244,577
Patented Apr. 5, 1966

3,244,577

ARTIFICIAL CHRISTMAS TREE AND METHOD OF MAKING THE SAME

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Filed Apr. 26, 1962, Ser. No. 190,405
7 Claims. (Cl. 161—22)

This invention relates to decorative articles such as artificial Christmas trees, wreaths, garlanding, and the like, as well as to method and apparatus for their production.

Although artificial Christmas trees, wreaths and garlanding of diverse types heretofore have been made using various methods and apparatus, most, if not all of such products have been characterized by one or more disadvantageous features including unattractive appearance, lack of durability and stability, difficulty or impossibility of cleaning, inflammability, excessive bulk for transportation and storage, and high cost of manufacture.

In addition, some of them have been made of aluminum or other metals and hence have possessed such a high degree of electrical conductivity that ornamental electric lights cannot be used upon them without the danger of electric shock.

Accordingly it is the general object of the present invention to provide artificial Christmas trees, wreaths and other decorative articles having a high degree of beauty; which are stable, durable and fireproof; which can be cleaned easily and efficiently; which can be folded readily into small compass for transportation and storage; and which are relatively inexpensive to manufacture.

It is another important object of this invention to provide artificial Christmas trees, wreaths and the like which may be decorated safely with electric lights, without hazard of shock.

The manner in which the foregoing and other objects of the present invention are accomplished will be apparent from the accompanying specification and claims considered together with the drawings, wherein:

FIG. 1 is a schematic view in side elevation illustrating the first stage of manufacture of the herein described articles, by one method;

FIG. 2 is a perspective view of one of the branch members illustrated schematically in FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is a schematic sectional view similar to FIG. 3 but illustrating a second stage in the manufacture of the herein described articles;

FIGS. 5 and 6 are schematic views in plan and transverse section, respectively, of a third stage of the herein described method, FIG. 6 being taken along line 6—6 of FIG. 5.

FIG. 7 is a transverse sectional view taken along line 7—7 of FIG. 5 and illustrating in greater detail the effects occurring during the stage of manufacture illustrated in FIGS. 5 and 6.

FIGS. 8 and 9 are schematic plan views illustrating additional steps in the method of manufacture of the herein described articles, FIG. 8 illustrating a method for covering the exposed trunk and stems of an artificial Christmas tree and forming the tip thereof, and FIG. 9 illustrating a manner of concealing and decorating the ends of the branches of the tree;

FIG. 10 is a view in elevation of an artificial Christmas tree made by the sequence of steps illustrated in the preceding figures;

FIG. 11 is a view in side elevation, similar to FIG. 1 but illustrating a lay-up for an artificial Christmas tree of greater height;

FIGS. 12 and 13 are views in plan and side elevation, respectively, of apparatus which may be employed in manufacturing the decorative articles of the present invention, by the method illustrated in the preceding figures; and

FIG. 14 is a transverse sectional view taken along line 14—14 of FIG. 13.

The construction and character of the artificial Christmas trees and other decorative articles which are the subject of my invention may best be understood with reference to the method steps employed in their manufacture, as illustrated in FIGS. 1–10 inclusive of the drawings.

Basically the articles of the invention are formed from but four classes of structural elements, i.e. two or more wires or other stiffly flexible stem members, a plurality of branch members, an elongated member of branch material adapted to be wound spirally about the stem members to conceal the same, and, if an artificial Christmas tree is contemplated, a base to support it.

In the first step of the fabricating procedure, one of the stem members or wires **10** is tensioned between a pair of releasable grips **12**.

Next, a plurality of branch members comprising stiffly flexible units covered with decorative material are reversely bent, hairpin fashion. Although various types of branch members may be employed, the use of those illustrated in FIG. 2 is contemplated particularly. As will be seen from this figure, each member **14** comprises two wires or other stiff, elongated units **16** twisted together and securing between them a multiplicity of filaments **18** radiating outwardly in all directions.

Although various filamentous materials such as cloth thread, metal thread, plastic thread, and the like may be used, it is preferred to use fiberglass filaments because of their beauty, the effectiveness with which they may be dyed different colors, their durability, and the ease with which they may be cleaned. Also, they are noninflammable and nonconductors of electricity.

The reversely bent branch members are placed in clusters spaced apart along the length of stem member **10** as indicated in FIG. 1. Thus, three long branch-forming members are placed near one end of the stem in a cluster **20**, a pair of slightly shorter branch-forming members are placed at an intermediate position in a cluster **22**, and two branch-forming members which are still shorter are placed adjacent the other end of the stem member in a cluster **24**. In the final article, these clusters will form whorls of 6, 4 and 4 branches, respectively, in the tapered arrangement which is characteristic of a coniferous tree.

As viewed in end elevation, the clusters have the appearance indicated in FIG. 3. The next step is to engage them with the stem member in such a manner that in the final article they will be locked together and remain stiffly erect in any desired position.

This is accomplished by bending the two segments of each reversely bent branch member toward and past each other so that a loop is formed completely wrapped around, or encircling, the stem member. This effect is shown in FIG. 4.

The next step in the procedure is to place a second wire or other stiffly flexible stem member **26** between releasa-

ble grips **28** so that it lies adjacent and substantially parallel to its companion stem member **10** on the side opposite the loops of the encircling branch members (FIG. 4). This is important if maximum interlocking of the branches and stem is to be achieved.

If desired, spring clamp members **30** may be affixed at this stage to each cluster, near the ends, to insure that the component branches will remain close together in their proper relationship to each other and to the branches of the adjacent clusters.

In the next stage of the sequence, the two stem members **10, 26** are intertwisted, as by rotating in unison one pair of grips **12, 28** without rotating the companion pair. Three important results ensue.

First, the branch members are locked securely between the intertwisted spirals of the stem members. As seen in FIG. 5, they become spaced very slightly from each other and are so interlocked that they can not move in any direction, either longitudinally or laterally.

Second, the branch members are rotated relative to each other to conform to the contour of the stem spirals so that they radiate out from the stem in all directions, as do the branches of a tree. This effect is shown particularly in FIG. 6.

The third effect is to wedge and compress some of the fiberglass or other filaments **18** so that they form compacted, electrically insulating mats **18***a* between the stem wires, and between the stem wires and branch wires. This effect is illustrated in FIG. 7. In this way each of the branch wires is insulated so effectively from the rest of the article that ornamental electric lights, for example Christmas tree lights, may be mounted on the article without danger of electrical shock.

In the next step of the procedure, a length of material **32** may be wound spirally about the assembly in the manner illustrated in FIG. 2 before releasing grips **12, 28**. The material used for this purpose may, if desired, comprise a long piece of the same material as is used to make branches **14**. When applied spirally, it covers up the exposed sections of the stem, i.e. of the tree trunk in case an artificial Christmas tree is being made.

Also, a portion of the covering material **32** may be left extending beyond one end of the twisted assembly. This extension then may be bent outwardly substantially parallel with the stem to form the tip of the tree.

To conceal and decorate the ends of the branches, they are bent reversely or as shown in FIG. 9, dipped in an adhesive **34**. The adhesive-dipped ends then are dipped into a glittering, flaky material **36** of selected color, to form brightly spangled tips.

If it is desired to make a wreath, an assembly with branches of suitable length may be removed from the grips, arranged in a circle with the ends overlapped, and the ends fastened together by means of looped tie wires or otherwise.

On the other hand, if it is desired to make a Christmas tree, an assembly containing branches, graduated in length and arranged in a typical, tapered tree-like arrangement may be provided. The bottom end of this assembly may be dipped in adhesive and inserted in a suitable base **38**.

The resulting product then has the appearance illustrated in FIG. 10. It consists of a rigid stem **40** formed by intertwisting stem members **10, 26**; a plurality of whorls of branches **20, 22, 24** developed by twisting the clusters of branch members **20, 22, 24** of FIG. 1; a stem covering **32** wrapped around the stem to conceal it; and an upwardly extending projection of the covering forming the tip of the tree.

If it is desired to make a larger tree, the length of the stem wires may be increased, as may the number of clusters of branch members. A typical assembly for making such a tree is illustrated in FIG. 11.

It comprises a first stem member **42** tensioned between grips **12** and supporting at spaced intervals a plurality of clusters of branch members **44, 46, 48, 50, 52** containing

4, 4, 4, 3 and 3 reversely-bent, branch-forming members, respectively. Since in making a tree of this size the stem wires necessarily must be quite heavy and stiff, it it preferred to form the tip of the tree by including in the assembly a single, crook-shaped tip member **54** which may be of the same gauge and construction as the branch members.

A second stem wire **56** then is tensioned between grips **28**. Clamps, not illustrated but similar to clamps **30** of FIG. 4, are applied to each cluster to restrain it, and one set of the grips rotated to intertwist the assembly in the manner described above. The same sequence then may be followed for completing the tree, with the exception that the spiralled stem covering need not extend upwardly to form the tip, since member **54** may be bent upwardly to serve that function.

In a similar manner, other assemblies may be put together to create trees, wreaths and garlanding of desired size and appearance.

APPARATUS

Apparatus suitable for use in the manufacture of the articles described above, rapidly on a large commercial scale, is illustrated in FIGS. 12–14.

As previously described, grips **12, 12** and **28, 28** are provided for releasably holding stem wires **10, 26** respectively. In FIG. 12, however, the grips are illustrated rotated 90° from their positions of FIGS. 1 and 10, FIG. 12 being in plan.

Although various types of grips may be employed, it is preferred to use adjustable, plier-like grips, the construction of which is evident particularly in FIG. 14. These enable rapid clamping and release of the wires, as well as precise adjustment to wires of varying gauge.

Grips **12, 28** on the rotating side of the assembly, i.e. on the left as seen in FIGS. 12 and 13, are fixed to a flat bar **60** to the outer end of which is welded a transverse plate **61**. In the upper surface of the bar there are a pair of spaced guideways **62, 64**.

Guideway **62** is aligned with the jaws of grip member **12**, and guideway **64** with the jaws of grip **28**. Each is dimensioned to receive a segment of one of stem members **10, 26**, respectively, and serves the function of preventing it from twisting out the grips during the twisting operation. This is of particular importance when stem wires of heavy gauge are used.

The outer end of mounting bar **60** is bolted to a clevis **66**, the base of which is fixed to the shaft of a gear reducer **68**. The latter in turn is driven by a variable speed electric motor **70** and accordingly rotates the left hand grip assembly slowly at a controlled and uniform rate.

Grips **12, 28** on the other side of the apparatus, i.e. on the right side as viewed in FIGS. 12 and 13, do not rotate but are mounted for longitudinal movement as required to accommodate shortening of the stem members during the twisting operation.

Accordingly, they are fixed rigidly to a mounting bar **72** to the inner end of which is welded a plate **74**, provided with guideways **76, 78**. These are aligned with grips **12, 28** respectively and also with guideways **62, 64** in the left-hand grip assembly. As in the case of the latter guideways, their function is to prevent the stiff stem members from being wrenched out of the grips as they are twisted together. The outer end of bar **72** is bolted to a clevis **80** which, in turn, is fastened to the end of a tongue **82**.

Tongue **82** works in a guidway in plate **84**. Its outer end is fastened to an axle **86** which mounts rotatably a pair of wheels **88**. These run on tracks **90**, forming a carriage which prevents the rotation of the grip members to which it is attached, while still permitting their longitudinal movement.

Tensioning means are provided for tensioning stem members **10, 26** so they are loaded and twisted together.

This prevents them from double winding, i.e. overlapping each other as they are wound. It insures also that they will intertwist equally without one of the wires remaining straight and the other wrapping around it.

In the illustrated form of the invention the tensioning means comprises a freely hanging weight **92** attached to one end of a cable or other flexible member **94**. The cable passes over a pulley **96** and is fastened by means of set screw **98** to a perforated post **100** depending from axle **86**.

Means also are provided for releasing the tension applied by weight **92** when it is desired to engage or release the stem members from the grips. Hence there is provided a foot operated lever **102**, one end of which is pivoted to the frame of the apparatus. One end of a cable or other flexible link **104** is fastened adjacent the other end of the foot lever and passes about a pulley **106**. The other end of the cable is fastened to the carriage, preferably by being formed as an extension of cable **94**, passing completely through the perforation in post **100**.

Limit means also are provided for limiting the degree of intertwisting of the stem wires to the predetermined value. This value is critical since the wires must be twisted together tightly enough to integrate the assembly and securely interlock the branch members and stem. On the other hand, overtwisting obviously will weaken the structure.

The extent of forward travel of the carriage assembly including tongue **82** and axle **86**, caused by shortening of the stem wires as they are twisted together, gives a measure of the degree of twisting. Accordingly, there is provided a limit switch **108**, adjustably mounted lengthwise of the unit by being bolted to a bracket **110** containing a longitudinal slot **112** through which the bolts extend.

A scale of limit switch positions, not illustrated, is provided on the face of bracket **110**, each position being determined by trial and error as being an appropriate limit of travel of the carriage assembly when making a tree or other article of given length.

Limit switch **108** is in an electric circuit with motor **70**, and its contact member **114** is positioned for engagement with a post **116** extending upwardly from axle **86**. Hence when contact is made, switch **108** shuts off motor **70** and the twisting together of the wires is terminated.

The operation of the apparatus of FIGS. 12–14 is as follows:

First, stem member **10** is tensioned between grips **12**. This is accomplished by depressing lever **102**, advancing the carriage, inserting the left hand end of the wire in left hand grip **12**, running it through guides **62** and **76**, gripping the right hand end of the wire in right hand grip **12**, and then releasing lever **102**.

Clusters of branch members **20**, **22**, **24** are placed over the stem wire in locations determined by a scale or jig as shown in FIG. 1.

The branch wires are bent toward and opposite each other in the direction indicated by the arrows in FIG. 3 until they completely encircle the stem wire as seen in FIG. 4. Their ends then are clamped together by means of clamps **30** to prevent them from wandering longitudinally of the wire.

The ends of the other stem wire **26** next are run through guides **64**, **78** and clamped between grips **28**.

Motor **70** then is started and the left hand grip assembly rotated through gear box **68** at the predetermined rotational speed.

As the stem wires are twisted together, they interlock the branch wires in the manner shown in FIG. 5. At the same time, as the branch wires conform to the contour of the spiral stem wires, they are shifted so that they radiate outwardly in all directions as shown in FIG. 6.

The twisting continues until contact post **116** on the carriage hits contact element **114** of limit switch **108**. This stops motor **70** at the precise point at which the optimum degree of intertwisting of the stem wires has been achieved as required securely to interlock the branch wires without weakening the stem wires unduly.

The fabricated assembly then is removed from the grips and processed as described above to complete the tree or other decorative article.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A decorative Christmas tree having a stem having a pair of tightly intertwisted stiff stem wires and, at spaced intervals along the stem, a plurality of clusters of branches, each cluster comprising a plurality of branches arranged in pairs, each pair comprising a length of tightly intertwisted stiffly bendable branch wires and a multiplicity of decorative radially extending filaments gripped between the branch wires, the length of each branch wire being wrapped intermediate its ends around one of the stem wires, the plurality of branches of each cluster being locked in place adjacent each other by the intertwisted spirals of the stem and with the two segments of each branch radiating outwardly from the stem in directions different from the other branches of the cluster.

2. The decorative article of claim **1** wherein the decorative radially extending filaments on the branch wires are fiberglass filaments and wherein some of said fiberglass filaments are squeezed between the stem wires and branch wires, serving thereby as electrical insulation material.

3. The decorative article of claim **1** and including a base, one end of the stem being fastened to the base and including a length of filament-covered branch wire wound spirally about the stem to conceal the same.

4. The method of making decorative articles which comprises supporting horizontally by its ends a first stiffly flexible stem member, reversely bending a plurality of stiffly flexible branch members, placing the reversely-bent, stiffly flexible branch members in clusters at spaced intervals along the length of the first stem member, each cluster comprising a plurality of the branch members disposed adjacent each other bending the two lengths of each of the reversely bent branch members toward and past each other, thereby wrapping the branch members about the first stem member intermediate their ends, arranging a second stiffly flexible stem member adjacent the first stem member, and intertwisting the two stem members for locking the branch members between the resulting twisted spirals in radially extending relation thereto with each branch pair of a cluster extending radially in directions different from the other branch pair of said cluster.

5. The method of claim **4** including the step of clamping together the members of each cluster of branch members during the intertwisting step, thereby preventing them from wandering and retaining them in the desired spaced relation to each other.

6. The method of claim **4** including the step of spiralling a length of branch member material about the intertwisted stem members to conceal them.

7. The method of claim **4** wherein the stem members comprise stiffly flexible wires and the branch members comprise intertwisted stiffly flexible wires having a multiplicity of fiberglass filaments secured between them, and including the step of dipping the ends of the branch wires in adhesive and thereafter in decorative flake material to conceal said ends.

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ALEXANDER WYMAN, *Examiner.*