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METHOD AND APPARATUS FOR PRODUCING HOLLOW ANTENNAS

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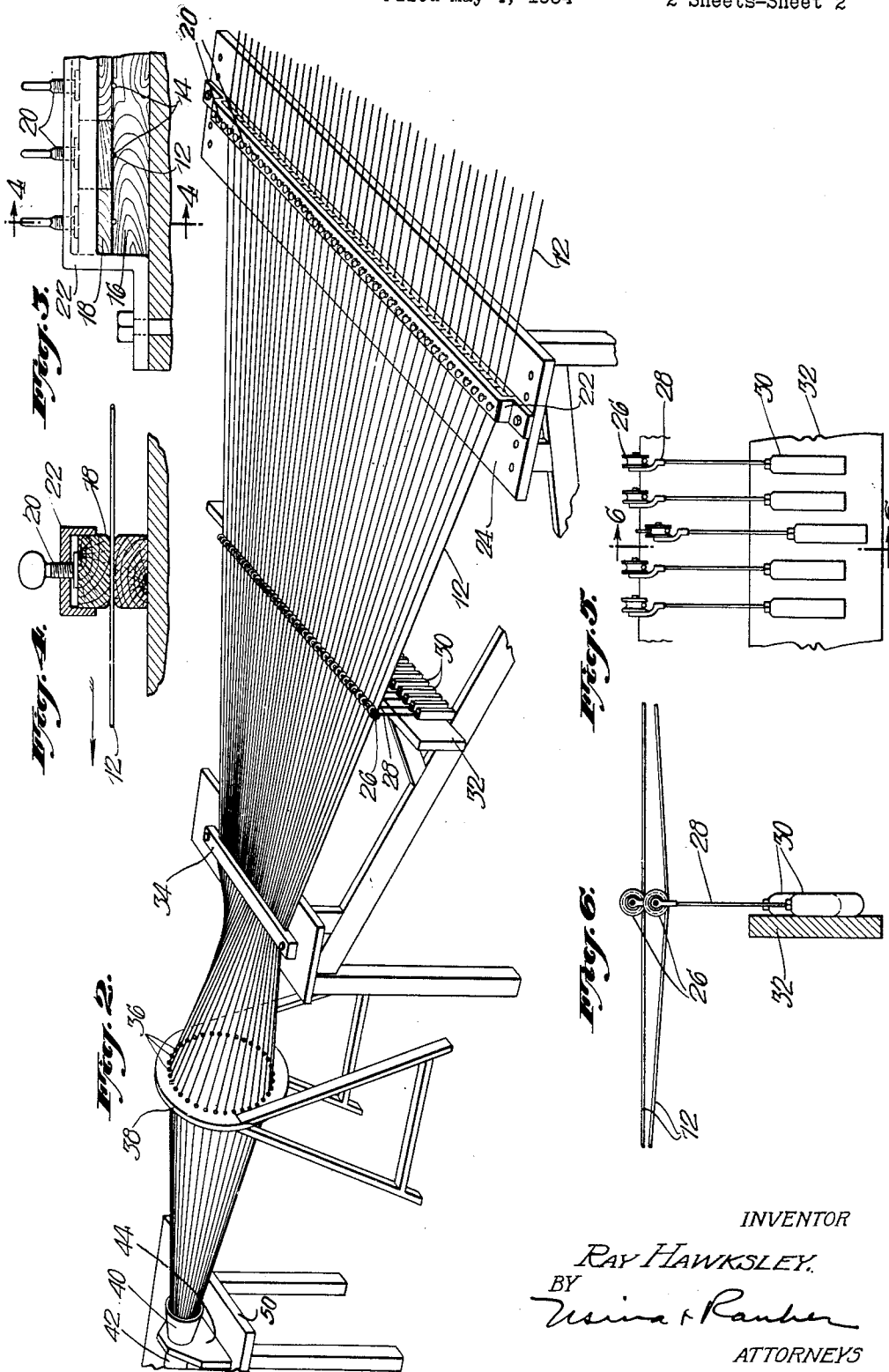
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METHOD AND APPARATUS FOR PRODUCING
HOLLOW ANTENNAS

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11 Claims. (Cl. 140—71)

This invention relates to improvements in methods and apparatus for the producing of hollow antennas. One characteristic feature of the invention relates to a method and means for maintaining a plurality of wires in circular juxtaposition and under substantially uniform tension. Another feature is the provision of means for clamping such tensioned wires between nested elements. A further feature contemplates improved means for supporting wires of great length from overhead and means for properly guiding such wires from a plurality of sources of supply and the provision of means whereby clamping elements can be supported in such manner as to be quickly and easily secured in assembled relationship with the multiplicity of wires of the hollow antenna. The above and other features of the invention will be fully apparent from the following detailed disclosure when read in connection with the accompanying drawings and will be defined with particularity in the appended claims.

In the drawings—

Fig. 1 is a view in side elevation illustrating the method of producing my improved antenna; Fig. 2 is a perspective detail on an enlarged scale of part of the apparatus shown in Fig. 1; Fig. 3 is a cross section on line 3—3 of Fig. 1; Fig. 4 is a section on line 4—4 of Fig. 3; Fig. 5 is an enlarged detail section on line 5—5 of Fig. 1; Fig. 6 is a section on line 6—6 of Fig. 5; Fig. 7 is an enlarged view of the central portion of the apparatus shown in Fig. 1; Fig. 8 is a side elevation of an antenna embodying my invention; Fig. 9 is a cross section thereof on line 9—9 of Fig. 8; Fig. 10 is a longitudinal section through the antenna taken, for example, on line 10—10 of Fig. 9; Fig. 11 is an enlarged detail through one end of a guide tube forming part of the apparatus used in the method of producing the antenna; Fig. 12 is a fragmentary section on line 12—12 of Fig. 11 chiefly illustrating a spacing member thereof.

Referring in detail to the drawings, 10 represents one of a plurality of supply reels from which the individual wires or strands 12 are fed. The multiplicity of strands 12 are guided by grooves 14, in a block 16 forming one element of a tension device. The other element of the tension device includes an individual block 18 for each wire 12. These blocks are pressed against the wire by means of individual thumb screws 20 threaded through the fixed cross member 22 carried by the plate 24 on a suitable standard.

Means are provided whereby the tension can be shown by indicators. These tension indicators comprise grooved sheaves 26, which ride freely on the individual wires 12, said sheaves having depending members 28 journaled thereon, which support weights 30. As the wires are fed forwardly or to the left of Figs. 1 and 2, the tension members are restrained from such forward movement by a cross bar 32 fixed to a standard. Variations in the tension of individual wires can be determined by observation, it being clear that when tension is below a predetermined point there will be a certain amount of slack in the wire, which will cause the weight to drop. The desired tension for the individual wire can be adjusted by manipulating the individual thumb screw 20 controlling that wire.

The multiplicity of wires 12 are converged toward and through a guide member 34 and are then fanned out and passed through equally spaced apertures 36 in the circular guide 38. From the guide 38, the multiplicity of wires are led to the flared end 40 of a guide tube 42 supported by members 44, 46 and 48 carried by table 50. The members 46 and 48 are hingedly supported on the table for a purpose hereinafter described. Secured to the interior and at the left end of the guide tube 42, there is a ring 52 having a plurality of equally spaced notches 54 formed therein serving to guide the multiplicity of wires 12 and to maintain them at the required spacing.

In forming the antenna, the wires are guided through the apparatus thus far described and the extreme left ends thereof are all secured to a member 56. Means are provided for applying a pull on this member 56, so as to put all of the wires under tension. The means illustrated is in the form of a tractor 58, which is adapted to move in the proper direction to exert a pull on the block and tackle 60, one end of which is coupled to the member 56. Instead of a tractor, an automobile truck or even a power driven winch could be used. Antennas are of great length and it is desirable to support them intermediate the ends. For this purpose, I provide an overhead messenger wire 62, on which rides a trolley wheel 64 from which is suspended a tackle 66, the lower block 68 of which engages a ring member 70 through which the cage-like antenna extends. The antennas of my invention may be of great length, often in excess of fifty feet and sometimes from one hundred to several hundred feet in length. It, therefore, is desirable to provide spacing means at regular intervals, so as to main-

tain the proper circular spacing of the individual wires 12. For this purpose, I provide a plurality of spacers, indicated generally at 12. Each spacer includes an inner ring 74 having a plurality of equally spaced notches 76 formed on the exterior thereof. The depth of these notches is substantially equal to the diameter of the individual wires or even a trifle less than the diameter of such wires. Nested over each member 74, there is an outer ring 78 which cooperates with the inner ring 74 to clamp the wires thereto. The exterior of the ring 74, in some cases, may be slightly tapered and the inner bar of the ring 78 also tapered to suit so that the parts can be assembled and held in relationship by a taper force fit.

In assembling the spacer members, the workman introduces one of the slotted ring-like members 74 into the space defined by the wires located at the left end of the guide tube 42. He then positions the multiplicity of wires in the notches of the ring 74. This operation is readily accomplished by reason of the fact that the notches 76 in the member 52 carried by the guide tube are spaced to correspond with the notches in the member 74. Then a ring 78 is slipped off of the end of the guide tube 42, a plurality of such rings 78 having been positioned on the guide tube prior to the threading of any wires thereto. The length of the guide tube is sufficient to permit the storage of a great number of rings thereon, this number being in excess of that required to complete one or more antennas. The hinged members 46 and 48 can be intermittently swung to proper position to permit the rings 78 to be slipped from the end of the tube. For example, when the supply of rings at the left of the member 46 has been exhausted by having been applied to the antenna, this member 46 may be swung down on its hinge to a substantially horizontal position, the tube 42 at such time being supported by the member 48, which for such operation will be swung to the vertical position, as indicated in dotted lines in Fig. 7.

The spacing members 72 are secured at desired intervals along the antenna and as the work proceeds the antenna is advanced lengthwise. The overhead messenger wire supports the dead weight and the pulling device 60 and the members 16, 18 and 20 all cooperate to maintain the several wires under substantially the same tension while the spacer members are applied. Thus in the completed antenna, the length of each wire between any two given spacers is equal, so that when the antenna is erected and tensioned between its supporting towers or masts, the component parts will all be under substantially identical tension.

The component members 74 and 78 of these members, in some cases, instead of being secured together by a force fit may be riveted, screwed, or otherwise secured.

The antenna per se disclosed herein is claimed in my copending application Serial No. 736,453, filed July 23, 1934.

While I have described quite precisely the antenna herein illustrated and certain steps in the method and a certain type of apparatus for its formation, it is to be understood that the drawings and description are to be interpreted in an illustrative rather than a limiting sense since various modifications may be made by those skilled in the art without departure from the invention as defined in the appended claims.

What I claim is:—

1. A method of forming antennas which comprises assembling a multiplicity of wires in circular juxtaposition, maintaining a tension thereon and clamping such wires between nested elements in substantially equi-distant circular spaced relationship while under such tension.

2. In the manufacture of antennas, the method which comprises maintaining a multiplicity of circularly arranged wires under substantially equal tension and forcibly clamping said wires between nested elements in circular relationship at spaced intervals lengthwise of the antenna while said wires are under such tension.

3. In the manufacture of antennas, the method which comprises applying a substantially uniform tension to a multiplicity of longitudinally extending wires while maintaining them in an equi-distant spaced relationship and applying separate clamps at greatly spaced intervals lengthwise of the antenna which grip the inner and outer surfaces of the wires so as to maintain the equi-distant relationship between them.

4. In the manufacture of antennas, the method which comprises feeding a multiplicity of longitudinally extending wires in cage-like formation through a multiplicity of spacer rings and separately and individually securing said spacer rings to the wires at widely spaced intervals.

5. In the manufacture of antennas, the method which comprises applying a substantially uniform tension to a multiplicity of longitudinally extending wires while maintaining them in cage-like spaced relationship, passing said wires through a plurality of rings, introducing spacer elements within the area defined by the inner surfaces of said wires and in nested relationship with said rings and clamping said wires between said elements and said rings so as to maintain the wires of the antenna in a predetermined relationship.

6. Antenna forming apparatus comprising means for guiding a multiplicity of spaced wires in a flat plane, means for individually varying the tension of said wires, means for converging the wires into circular relationship and common means for applying a pull to all the wires.

7. Antenna forming apparatus comprising means for guiding a plurality of wires, means for individually varying the tension of said wires, means for maintaining the wires in circular relationship, a single means for applying a tension to all the wires and an overhead traveling means for supporting the dead weight of said wires.

8. Antenna forming apparatus comprising guiding means for a multiplicity of wires, individual means for varying the tension of said wires, respective means supported by each wire indicating variations in the tension on said wires, a common means for applying a pull on all the wires and a guide for circularly positioning the wires and means through which the wires pass serving as a support for clamp rings adapted to encircle and be secured to said wires.

9. Antenna forming apparatus comprising guiding means for a multiplicity of wires, individual means for varying the tension of each wire, means indicating variations in the tension on said wires, a means common to all the wires for applying a tension thereto, a guide tube carrying means for circularly spacing the wires and serving as a support for clamp rings adapted to be assembled with the wires and a hinged support for said guide tube to facilitate the removal of the rings from the tube.

10. Antenna forming apparatus comprising guide means for positioning a multiplicity of wires in a common flat plane, individual means for varying the tension on each wire, means for guiding the wires from said guiding means into circular juxtaposition, a guide tube through which the wires pass and serving as a support for clamp rings adapted to be assembled with the wires.
- 5 11. Antenna forming apparatus comprising a series of individual tension devices located in a common plane for individually exerting tension on each of a multiplicity of wires, a member having a plurality of circularly spaced apertures for passage of said wires, means for converging the wires in a flat plane located intermediate said member and said tension device, a guide tube through which the wires are adapted to pass in circular juxtaposition and serving as a support for clamp rings adapted to be sequentially moved from said tube and assembled with the wires.
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