July 1, 1969 R. G. LUNDERGAN 3,453,375

TERMINAL FOR ASSEMBLING ANTENNAS

Filed Nov. 22, 1966

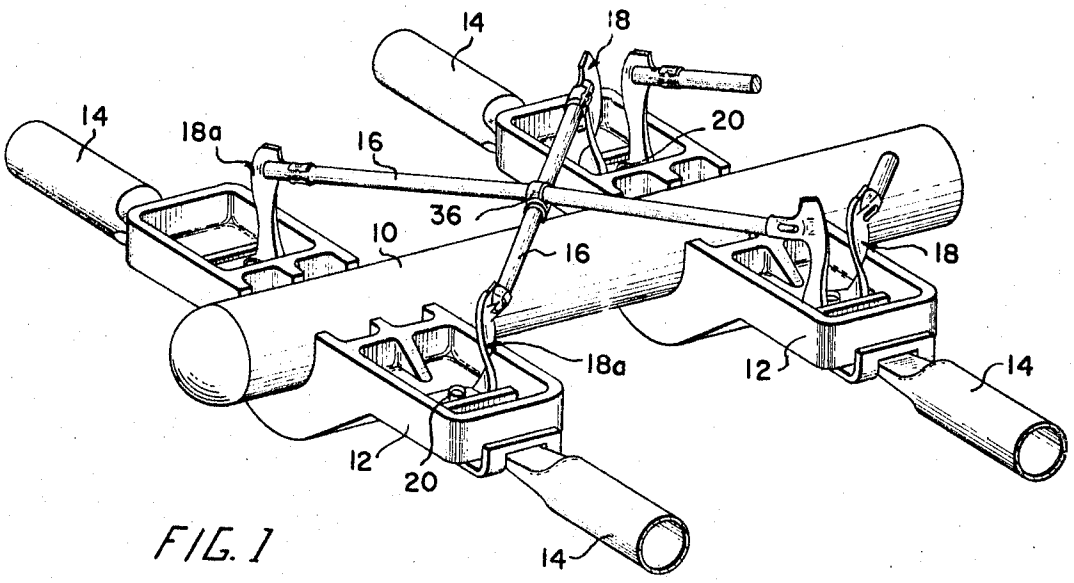


FIG. 1

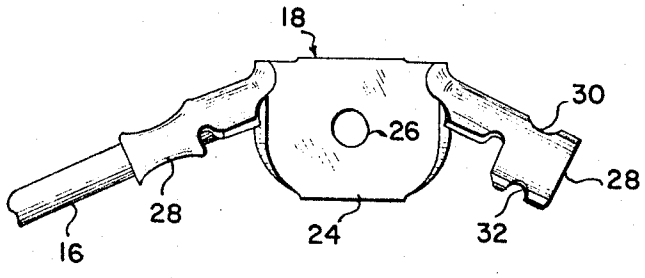


FIG. 2

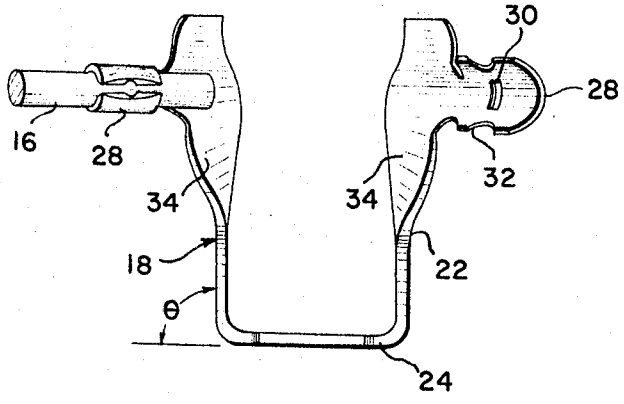


FIG. 3

United States Patent Office

3,453,375

Patented July 1, 1969

3,453,375

TERMINAL FOR ASSEMBLING ANTENNAS

Robert Graham Lundergan, Camp Hill, Pa., assignor to AMP Incorporated, Harrisburg, Pa.

Filed Nov. 22, 1966, Ser. No. 596,177
Int. Cl. H02g 15/08, 3/02; H01b 11/06
U.S. Cl. 174—72 6 Claims

ABSTRACT OF THE DISCLOSURE

A terminal for use in an antenna for radiating and receiving radio waves and comprising a base portion and a pair of longitudinally twisted sidewalls. The sidewalls are adjustable and have crimpable ferrule means extending therefrom. The ferrule means receive antenna rods ends and hold the rods in proper position on the antenna.

This invention relates to the art of antennas for radiating or receiving radio waves and more particularly to a new and novel terminal or connecting means for securing together the various lengths of rods which make up such antennas.

Signal radiating or receiving antennas frequently employ a large number of dipole elements spaced along the main carrier bar, the strength of the signal received or radiated being dependent in part upon the number and spacing between the various dipole elements. Conductive bars or rods extend between the elements for carrying the signals and for adding the signals received from each dipole. The manner in which the conductive rods are terminated is critical to the quality of signal received or transmitted due to the relationship which must be maintained between the length of the rods and the signal wave length.

An object of the present invention is to provide a signal radiating or receiving antenna having efficient means for terminating the various conductive rods.

Another object is to provide a terminal which is capable of limited adjustment to insure proper signal carrying characteristics in the antenna.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purpose of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings, in which like reference numerals refer to like parts:

FIGURE 1 is a perspective view of a portion of an antenna utilizing the terminal of the instant invention;

FIGURE 2 is a top plan view of the terminal shown in FIGURE 1; and

FIGURE 3 is a side elevational view of the terminal.

With reference to the drawings there is shown in FIGURE 1 a portion of an antenna comprising an elongated bar or shaft **10** having spaced therealong a plurality of supports **12**. The supports are in the form of a yoke and are plastic or other nonconductive material. The supports are fastened to the shaft **10** by suitable means so as to be fixed in position along the shaft. The spacing between the supports is critical and is determined as some fixed fraction of a wave length, the wave length being that of the signal to be received. A pair of dipoles **14** extend from each of the supports **12**, the dipoles serving to receive the transmitted signal.

A plurality of conductive rods **16** are positioned along the shaft **10** and are placed in a crossing relation whereby the conductive rods extend from a pole on one side of the shaft to the adjacent pole extending on the opposite side of the shaft. A terminal indicated generally at **18** is secured at each side of the support **12** and is in conductive engagement with the pole **14** extending from the support. The point of attachment between the terminal **18** and the pole **14** is indicated at **20**. The length of the conductive path between two adjacent points **20** is also critical and must be chosen as a fixed fraction of a wave length since the signals which are received by the antenna along the length of the shaft by the various dipoles will be added to increase the strength of the signal. If a proper phase relationship is not maintained, i.e. proper length of conductive path, the signals will not properly add in magnitude but will tend to be out of phase and thus there will result a distorted signal. The total strength of signal produced is of course dependent upon the amount of signal radiation or propagation between adjacent poles on the same side of the shaft **10** and on the amount of signal conduction between adjacent poles disposed on opposite sides of the shaft **10**.

The length of conductive path between two poles is equal to the length of the conductive rod **16** extending between the two points **20** plus the length of the terminal portion which extends between the point **20** and the point of attachment to the rod **16**. This length of terminal portion is equal to the length of the sidewalls **22** of the terminal.

In FIGURES 2 and 3 the terminal is shown in detail and comprises a base portion **24** which has an aperture **26** therein through which a rivet or other securing means fastens the terminal to the support **12** and makes conductive engagement with the pole **14** extending from the support. The sidewalls **22** of the terminal extend from the base portion **24** and carry at their outer ends a pair of crimping ferrules **28**. The ends of the conductive rods **16** are disposed within the ferrules **28** and the ferrules are crimped into tight engagement with the rod. In FIGURES 2 and 3 the lefthand ferrule is shown in its crimped condition around a rod **16** whereas the righthand ferrules are shown in their open position prior to crimping. The ferrules are provided with cutouts **30** and **32** whereby the material surrounding the cutouts will be caused, during the crimping operation, to bite into the conductive rods and thereby provide for firmer engagement between the terminal and the rod and also to prevent any tendency for the rods to rotate within the terminal ferrule.

The upper portion of the sidewalls **22** is longitudinally twisted as indicated at **34** whereby the ferrules are properly oriented to receive the conductive rods. The sidewalls are disposed at an angle θ relative to the base portion **24**, this angle being capable of variance to alter the the length of the conductive path extending between the points **20**. By increasing the angle θ the path length will be correspondingly increased due to the fact that the ferrule will engage closer to the end of the conductive rod **16**. If the angle θ is decreased the conductive path length will be correspondingly decreased since the ferrule will then grasp further from the end of the rod **16** and therefore the length of the rod between its terminated end portions will be decreased.

In order to isolate the conductive paths between crossing conductive rods **16** there is provided a spacer **36** of nonconductive material, the spacer also serving to isolate the conductive rods from the main shaft **10**.

It is to be understood that the terminals **18***a* which are located on the support positioned at the end of the shaft **10** are identical to the remaining terminals **18** with

the exception that only a single sidewall is present since there will be only a single rod extending to the terminal.

What is claimed is:

1. A terminal for use in an antenna for radiating and receiving radio waves, said terminal comprising base means for securing aid terminal to an antenna support, a pair of sidewalls extending from said base means, portions of said sidewalls being longitudinally twisted relative to said base means, and crimpable ferrule means extending from the twisted portion of said sidewalls for receiving the ends of antenna rods and for being secured thereto, said ferrule means being disposed at an acute angle relative to each other for holding said antenna rods in angular disposition.

2. A terminal as set forth in claim 1 further comprising cut-out means in said ferrule means for bittingly engaging said rod ends to prevent relative rotation between said rod ends and said terminal.

3. A connection comprising an antenna support, a pair of antenna rods each having an end adjacent said support, and a terminal secured to said support and connected to the ends of said antenna rods, said terminal having a base portion secured to said support and a pair of sidewalls extending from said base portion, said sidewalls each having a crimping ferrule extending therefrom, said ferrule receiving said rod ends and being crimped thereto.

4. A connection as set forth in claim 3 wherein said ferrules are provided with cut-out portions whereby the material surrounding said cut-out portions is caused to intimately engage said rod ends to prevent relative rotation therebetween.

5. A connection as set forth in claim 3 wherein said sidewalls are longitudinally twisted relative to said base portion to thereby align said ferrules with said rod ends.

6. An antenna for radiating or receiving radio waves comprising a main antenna shaft, a plurality of supports spaced along said shaft at regular intervals, rod means extending between said supports in crossing relation, and terminal means secured to said supports and connected to the ends of said rod means, each said terminal means comprising a base portion, means securing said base portion to said support, a pair of sidewalls extending from said base portion, and a crimping ferrule extending from each said sidewall, the ends of said rod means being located in said crimping ferrules and secured therein by deformation of said ferrules.

References Cited

UNITED STATES PATENTS

2,699,500	1/1955	Ercolino	343—812 X
3,086,206	4/1963	Greenberg	343—815

FOREIGN PATENTS

1,043,539	6/1953	France.
18,016	1905	Great Britain.

LARAMIE E. ASKIN, *Primary Examiner.*

U.S. Cl. X.R.

174—33, 88, 94; 343—812