

[72] Inventors **Donald L. Holzschuh
Richardson;
Betty M. Wicker, Richardson, Tex.**
[21] Appl. No. **773,826**
[22] Filed **Nov. 6, 1968**
[45] Patented **May 4, 1971**
[73] Assignee **Collins Radio Company
Dallas, Tex.**

[56] **References Cited**
UNITED STATES PATENTS
2,312,262 2/1943 Murdoch et al. 343/877
2,358,520 9/1944 Landon 343/821
3,400,402 9/1968 Gallagher et al. 343/723

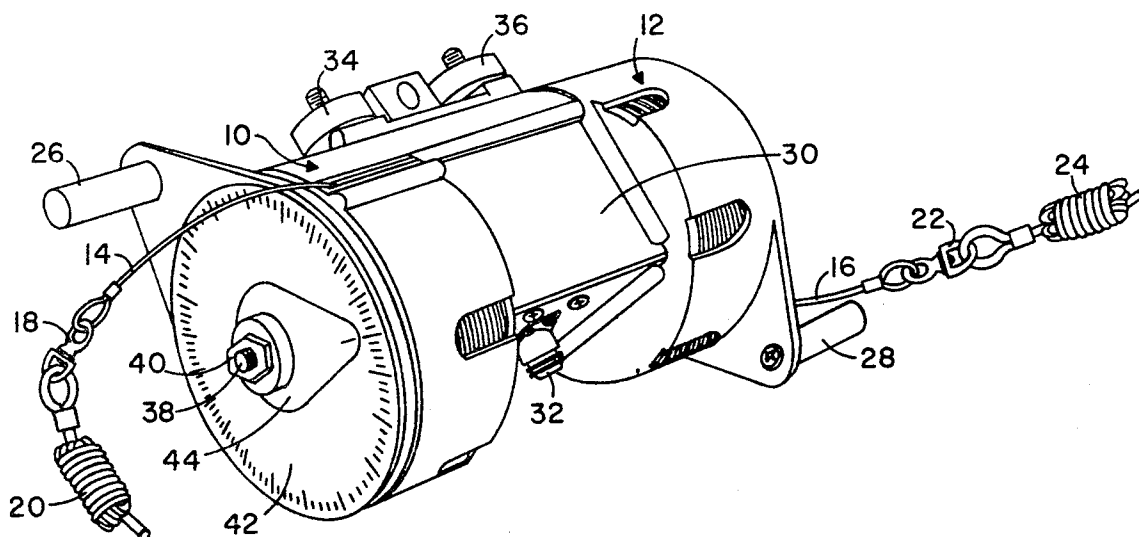
OTHER REFERENCES

TECHNICAL DATA REPORT on Model TD-1 Reel Antenna, Hy-Gain Antenna Products, Lincoln, Neb; obtained from IEEE Convention, March 25, 1963 343-877

Primary Examiner—Eli Lieberman
Assistant Examiner—Paul L. Gensler
Attorneys—Henry K. Woodward and Robert J. Crawford

[54] **PORTABLE REELABLE DIPOLE ANTENNA
HAVING FREQUENCY CALIBRATED DIAL
1 Claim, 7 Drawing Figs.**
[52] U.S. Cl. **343/821,**
33/139, 242/54, 343/823, 343/877
[51] Int. Cl. **H01q 9/16**
[50] Field of Search 343/720,
723, 820—823, 877; 242/54, 55, 55.42, 84.1, 84.1
(A), 84.21; 33/139, 140

ABSTRACT: An adjustable dipole antenna which is compact, portable and easily assembled in the field including reel means for accommodating two lengths of wire and calibrated dial means mechanically coupled to the reel means for indicating an operating frequency as the two lengths of wire are unreeled. Impedance matching means is provided to match the balanced antenna impedance to the unbalanced impedance of the input feedline.



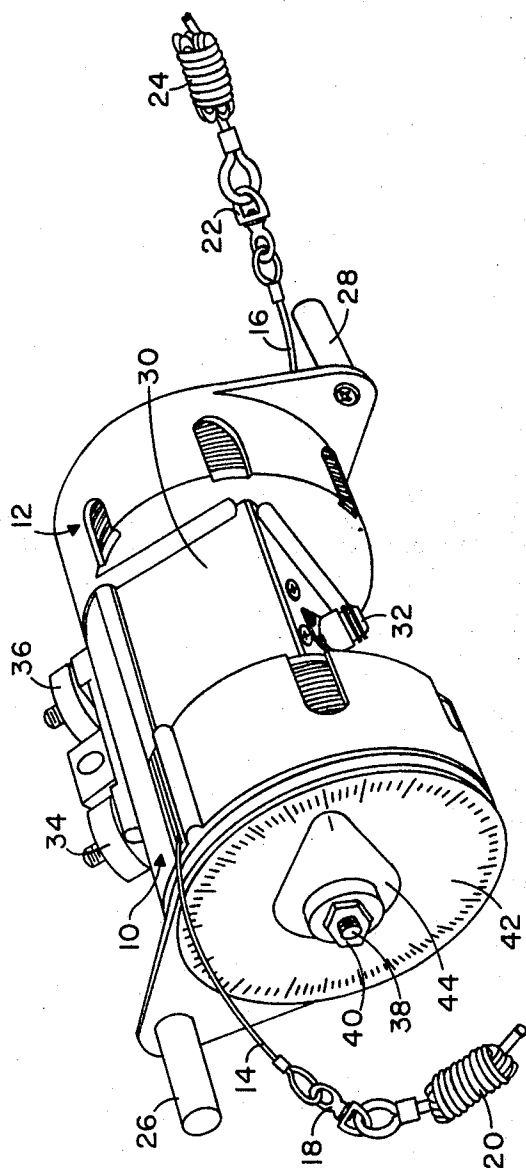


FIG. 1

INVENTORS.
DONALD L. HOLZSCHUH
BETTY M. WICKER
BY *Henry K. Woodward*
ATTORNEY

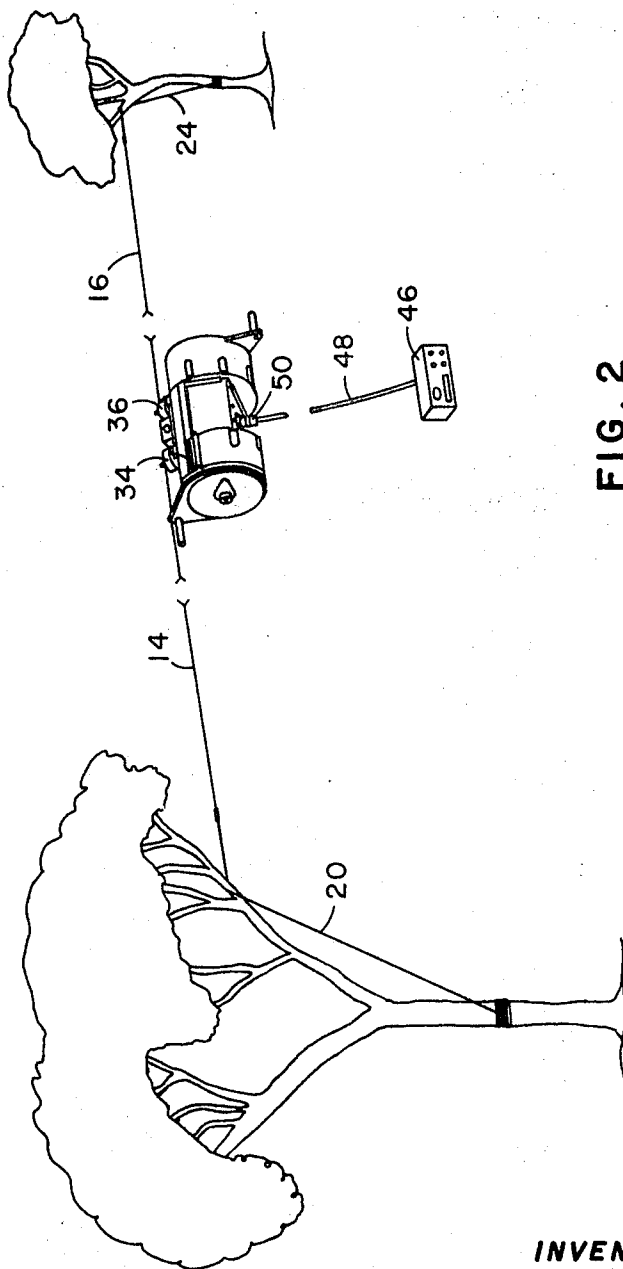


FIG. 2

INVENTORS.
DONALD L. HOLZSCHUH
BETTY M. WICKER

BY *Henry H. Woodward*
ATTORNEY

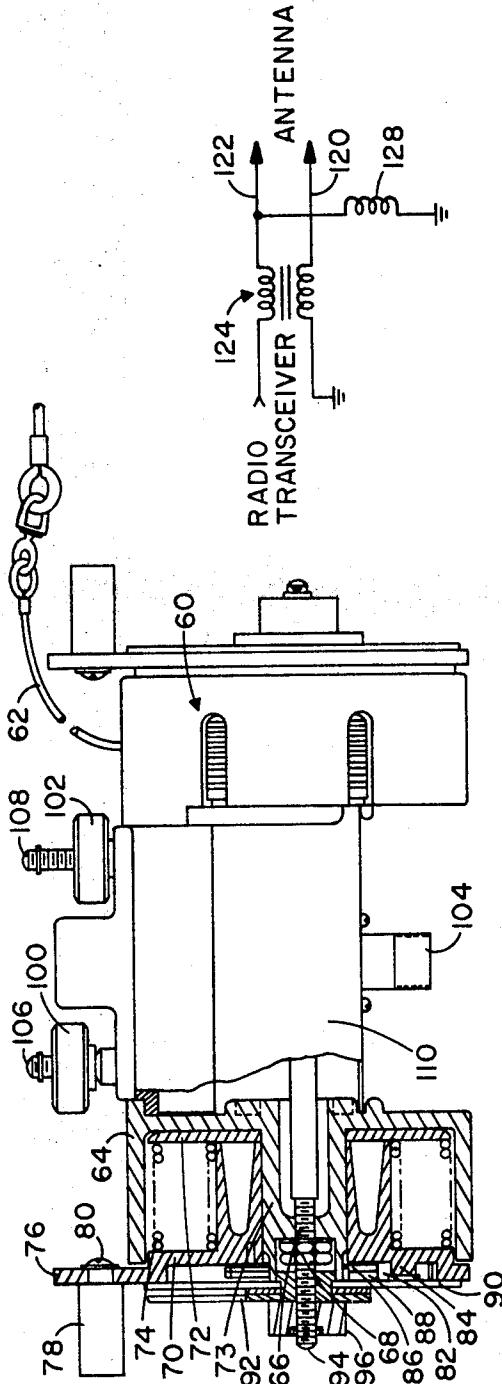


FIG. 6

FIG. 3

INVENTORS.
DONALD L. HOLZSCHUH
BETTY M. WICKER

BY *Henry F. Woodward*
ATTORNEY

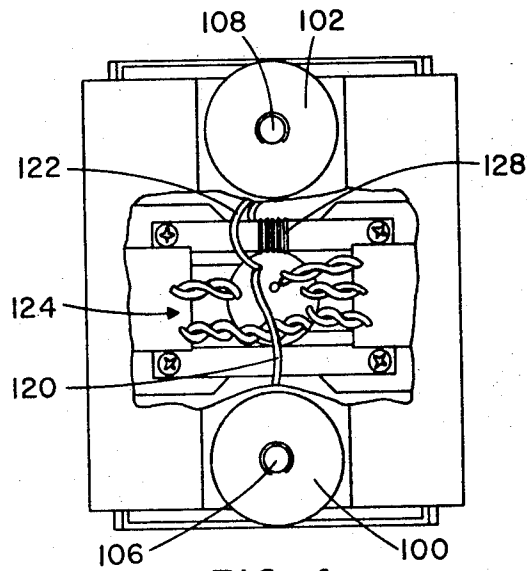


FIG. 4

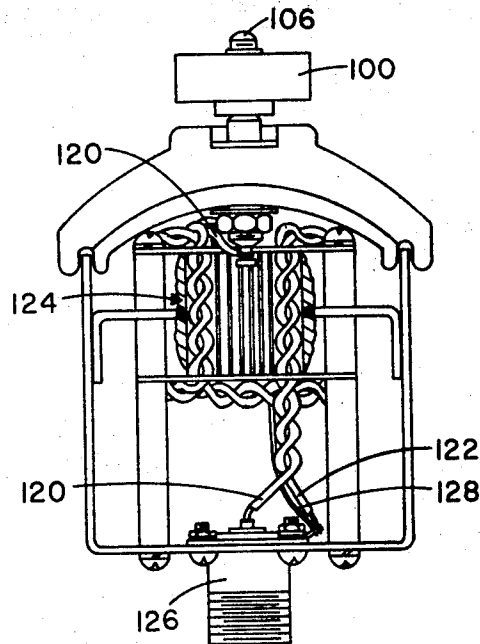


FIG. 5

INVENTORS.
DONALD L. HOLZSCHUH
BETTY M. WICKER

BY *Henry K. Woodward*
ATTORNEY

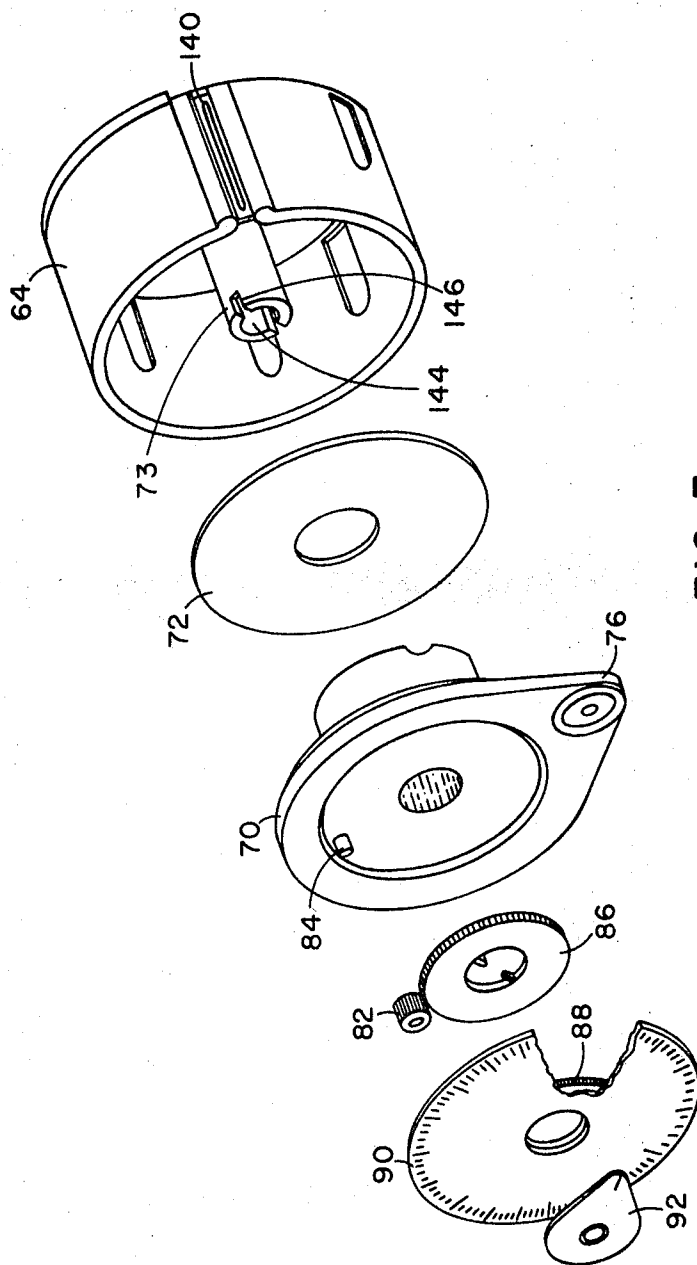


FIG. 7

INVENTORS.
DONALD L. HOLZSCHUH
BETTY M. WICKER

BY *Henry K. Woodward*
ATTORNEY

PORTABLE REELABLE DIPOLE ANTENNA HAVING FREQUENCY CALIBRATED DIAL

This invention relates to radio antennas, and more particularly to adjustable antennas which are especially suited for field use.

Portable and adjustable dipole antennas for field applications are presently available. One such antenna, described in U.S. Pat. No. 3,400,402, comprises a pair of radiating tape or wire elements which are coiled within a housing in a fashion similar to the familiar tape measure. When erecting the antenna, the two tapes or wires are reeled from the housing and extended between support means such as a tree or the like. The length of the tape is indicated on the tape and by means of a frequency—tape length conversion chart, the desired length of tape for a particular operating frequency is determined.

Such an adjustable dipole antenna has certain limiting features. The antenna tape elements are susceptible to breakage when subjected to moderately strong wind. Further, conversion of tape length to operating frequency by means of a conversion chart is rather cumbersome.

An object of the present invention is an improved adjustable dipole antenna.

Another object of the invention is an adjustable dipole antenna which is durable, compact, portable and easily erected and disassembled.

Still another object of the invention is an adjustable dipole antenna with means for indicating operating frequency as the radiating elements are unreeled.

Yet another object of the invention is an adjustable dipole antenna including impedance matching means.

A feature of the invention is dial means calibrated in operating frequency and which indicates operating frequency as the radiating elements are unwound.

These and other objects and features of the invention will be apparent from the following description and appended claims.

Briefly, the present adjustable dipole antenna includes first and second reel means for accommodating two lengths of wire. The two reels are mounted on a common shaft with crank means provided for driving said first and second reel means. Calibrated dial means is mechanically coupled to said first and second reel means for indicating an operating frequency as said two lengths of wire are unreeled. Locking means is provided for securing the wire at the desired length. Conductor means, preferably including impedance matching means, is provided to transmit energy between the radiating means and radio transceiver means.

The invention will be more fully understood from the following detailed description and appended claims when taken with the drawings, in which:

FIG. 1 is a perspective view of an adjustable dipole antenna in accordance with the invention;

FIG. 2 is a perspective view illustrating the adjustable dipole antenna of FIG. 1 erected for field operation;

FIG. 3 is a plan view partially in section of the adjustable dipole antenna of FIG. 1;

FIGS. 4 and 5 are section views of electrical connector means including impedance matching means which is advantageously utilized in the adjustable dipole antenna in accordance with the present invention;

FIG. 6 is an electrical schematic of the conductor means and impedance matching means of FIGS. 4 and 5; and

FIG. 7 is an exploded view of a reel assembly and calibrated dial means of the adjustable dipole antenna of FIG. 1.

Referring now to the drawings, and in particular to FIG. 1, an adjustable dipole antenna in accordance with the invention is shown in perspective. The antenna assembly includes two reel portions shown generally at 10 and 12 which accommodate dipole wires 14 and 16, respectively. The end of wire 14 is attached through a swivel 18 to a length of nylon rope 20, similarly wire 16 is attached through swivel 22 to nylon rope 24. Ropes 20 and 24 facilitate erection of the antenna in the field. Handles 26 and 28 are fastened to protruding ears of the reel assemblies 10 and 12, respectively, for manually operating either reel assembly.

Housing 30 accommodates a ferrite balun which provides impedance matching between the balanced impedance of the dipole-radiating elements and the unbalanced impedance of the coaxial connector 32 which connects a radio transceiver to the antenna. Lock knobs 34 and 36 are provided on housing 30 and function to secure wires 14 and 16, when unreeled to a desired length, and also function to electrically connect the ferrite balun within housing 30 to the wires 14 and 16.

Shaft 38 extends through the antenna assembly and nuts 40 on either end of the shaft retain the antenna assembly compactly on the support shaft. Each reel assembly includes a calibrated dial 42 which cooperatively functions with a pointer 44 affixed to shaft 38 to indicate the effective operating frequency for wires 14 and 16 as said wires are unreeled.

Being sturdy, compact and lightweight (e.g. an HF antenna in accordance with the invention, having a size of 4-inch diameter and 9-inch length and weight of only 5 pounds, has been constructed), the antenna may be easily manually transported and assembled in the field. In field installation, the dipole-radiating wires 14 and 16 are unreeled until the desired operating frequency is indicated on dial 42. Either wire is then looped under lock knobs 34 and 36 which secure the desired length of wire to the antenna housing. Nylon ropes 20 and 24 which are attached to the ends of wires 14 and 16, respectively, are then utilized to support the antenna between convenient supports such as trees as illustrated in FIG. 2. Before securing the antenna between the trees, the radio transceiver 46 will be connected by coaxial feedline 48 to the antenna connector 50. One man can deploy the antenna in a matter of only a few minutes.

FIG. 3 is a side view of the adjustable dipole antenna of FIG. 1 shown partially in section to further illustrate the reel assembly. Reel assembly 60 is shown intact with wire 62 wound thereon. Referring to the other reel assembly, shown in section, housing 64 is positioned on shaft 66 and is held thereon by lock nuts 68. The wire spool includes a main body 70 and disc-shaped end plate 72 which are rotatably supported on cylindrical-bearing portion 73 of housing 64 and accommodates wire 74, shown in cross section. Protruding ear 76 of spool portion 70 extends outside of housing 64 and accommodates handle 78 which is fastened thereto by means of screw 80.

Planetary gear 82 is rotatably mounted on protruding rod 84 which is an integral part of spool portion 70. As wire is pulled from the reel, planetary gear 82 travels about gear 86 which is stationarily mounted on the end of cylindrical bearing portion 73 of housing 64. As planetary gear 82 travels around gear 86, planetary gear 82 drives gear 88 which is mounted on the backside of dial 90. Dial 90 and pointer 92 are mounted on the end of shaft 94, which runs the entire length of the adjustable dipole antenna assembly, by means of nut 96. Pointer 92 remains static, but dial 90 is free to rotate on the shaft. As wire 74 is pulled from reel assembly, the gear train comprising gears 82, 86 and 88 move dial 90 with respect to pointer 92 so that the operating frequency for the length of wire pulled from the reel assembly is indicated by the pointer on dial 90. The reel assembly is further illustrated in FIG. 7.

As described above, lock knobs 100 and 102 are provided for locking the desired length of wire and also for providing electrical contact of the wire to coaxial input 104 through conductors 106 and 108, respectively. Electrical connector means 110 including impedance matching means is mounted between the two reel assemblies and held in supported relationship therewith by means of shaft 94.

FIGS. 4 and 5 are section views of the electrical connector means 110 of FIG. 3, and FIG. 6 is an electrical schematic of the electrical conductor means. Referring to FIG. 4 electrical conductors 106 and 108 and lock knobs 100 and 102 are shown in end view. Electrical leads 120 and 122 electrically connect conductors 106 and 108 through transformer means shown generally at 124 to the coaxial input 126, shown in FIG. 5. Balance winding 128 is also provided on transformer 124 and connects post 108 to ground, as illustrated in the electrical schematic of FIG. 6. Transformer 124 and balance winding

128 function as a balun in impedance matching the unbalanced transmission line which connects the radio to the coaxial input and the balanced antenna load. As seen in FIG. 5, the windings of transformer 124 include six turns of a twisted wire pair, and the balance winding 128 also has six turns.

FIG. 7 is an exploded view of the reel assembly shown in cross section in FIG. 3. Like elements have the same reference numerals. Reel housing 64 is provided with a slot 140 through which the wire is reeled and unreeled. Bushing portion 73 of the housing 64 is provided with an interior bearing surface 144 which accommodates the shaft (not shown) and with slots 146 which accommodate gear 86. The spool assembly comprises end disc portion 72 and wire support portion 70 which includes protruding handle support ear 76. Planetary gear 82 is rotatably mounted on protruding rod 84 of the wire support portion 70, and movement of the spool assembly drives gear 82 about stationary gear 86. Gear 82, in turn, drives gear 88 which is mounted on the back of dial 90. Dial 90 is shown partially in section so that gear 88 may be seen. By proper adjustment of the gear ratio of the gear train, dial 90 will move with respect to stationary pointer 92 to indicate operating frequency as the radiating dipole wire is unreeled from the reel assembly. For example, if gear 86 has 100 teeth and gear 88 has 99 teeth, gear 88 and dial 90 will move one complete revolution with respect to pointer 92 for every 100 revolutions of the reel assembly. Dial 90 is calibrated to reflect operating frequency for any length of wire which is unreeled.

While the invention has been described with reference to a specific embodiment, the description is illustrative and is not to be construed as limiting the scope of the invention. Various modifications and changes may occur to those skilled in the

art without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. An adjustable dipole antenna comprising at least two lengths of electrically conducting wire; reel means including two reels each accommodating a separate length of wire, each reel including a spool portion for receiving the wire and having a projecting ear for accommodating a handle, and an outer housing portion including a cylindrical bearing for rotatably receiving said spool portion; crank means including handles for driving said reel means; dial means including two dials each mechanically coupled to a reel for indicating operating frequency as wire is unreeled therefrom; each dial including a stationary pointer, a movable frequency calibrated dial plate, and planetary gear means for driving each of said dial plates as each of said spool portions of said reel means is rotated; a shaft which is common to and supports said two reels, said shaft extending through said cylindrical bearings of said outer housing portions; and connector means for electrically connecting each separate length of wire to radio transceiver means and providing impedance matching between said antenna and said transceiver means including two threaded conductors, knob means threadably engaging said two threaded conductors, an input connector having two terminals, transformer means connecting said two threaded conductors to said input connector, said transformer means having a first winding electrically connecting one of said conductors to a first of said two terminals, a second winding connecting the other of said conductors to the second of said two terminals, and a third winding connecting said other conductor to said first of said two terminals.

35

40

45

50

55

60

65

70

75