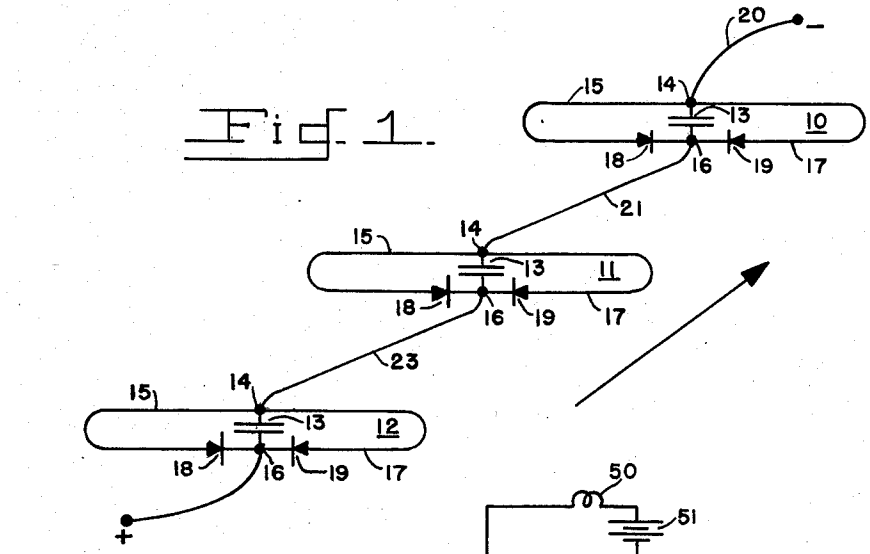
June 28, 1960 L. R. CRUMP 2,943,189

FOLDED DIPOLE HAVING A DIRECT CURRENT OUTPUT

Filed March 23, 1956

Fig. 1.



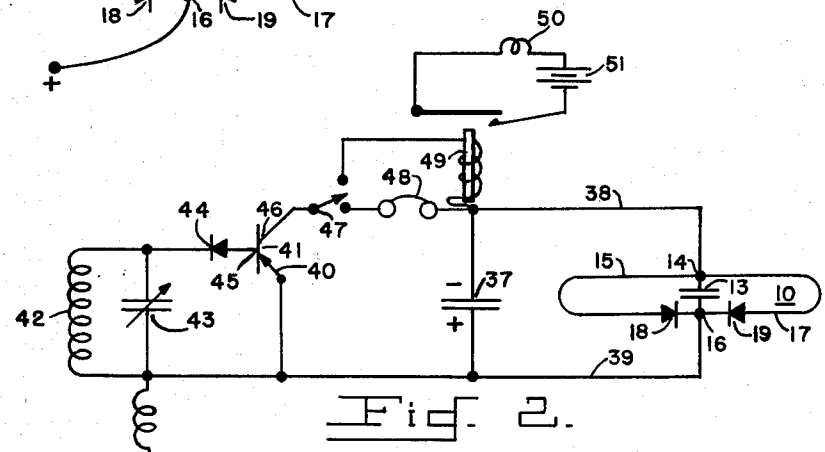


Fig. 2.

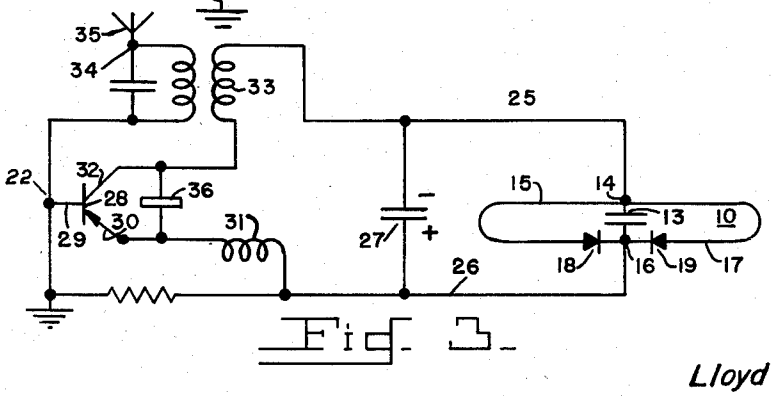


Fig. 3.

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FOLDED DIPOLE HAVING A DIRECT CURRENT OUTPUT

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6 Claims. (Cl. 250—17)

This invention relates to antennae for short waves. It relates in particular to an antenna which contains means whereby the output of the antenna is a direct current for operative connection to a control device or to a transistor oscillator to supply the direct current power to the oscillator so that it may radiate a signal when the antenna becomes excited by radio signals from a remote transmitter.

It is an object of this invention to provide an antenna in the form of a folded dipole and with the antenna having means therein whereby the output of the antenna is a direct current.

It is a further object of this invention to provide an antenna array of several folded dipoles, with each dipole having means therein whereby the output is direct current and with the outputs of the dipoles connected in series.

It is a further object of this invention to provide a folded dipole so constructed that the output of the dipole is direct current which may be carried over an output line without its being matched to the dipole.

It is a further object of this invention to provide an antenna in the form of a folded dipole and connected to a transistor oscillator to provide the continuous voltage necessary for the functioning of the oscillator, and with the oscillator being connected to a radiating circuit so that it will radiate a signal in response to excitation of the folded dipole by a remote transmitter.

Figure 1 is a diagrammatic showing of the folded dipole of this invention and of an antenna array of the dipoles of this invention.

Figure 2 is a wiring diagram of a folded dipole of this invention energizing a radio receiver or a relay.

Figure 3 is a wiring diagram of a folded dipole of this invention energizing a transistor radio oscillator.

In Figure 1 there is shown an antenna array of three folded dipoles which are arranged to extend in a horizontal line, and with the dipoles all tuned to the same frequency and of the same length. Since all of the dipoles are alike, it will be sufficient to describe one of them in detail. The first dipole **10** has its direct current output connected in series with the direct current output of the second dipole **11**, which is positioned at a distance from the first dipole equal to the length of the first dipole, and the output of the second dipole is connected in series with the output of the third dipole **12**, which is spaced from the second dipole by a distance which is half the length of the first dipole.

The output of the first two dipoles is more than twice that of the first dipole alone, and the output of the three dipoles is about seven times that of the first dipole alone.

The first dipole **10** has a filtering capacitor **13**, of around 1000 micromicrofarad capacity connecting the midpoint **14**, of one leg **15**, with the midpoint **16**, of the other leg **17**. On the other leg **17**, and immediately on either side of the capacitor connection there is inserted a first diode **18**, and a second diode **19**, with the diodes being connected in back-to-back relation. Type IN34

diodes are suitable, but other types may be used if they are comparable with the IN34.

A first output wire **20**, is connected to the midpoint **14**, and a second output wire **21**, is connected to the second midpoint **16**, and this first dipole may be connected by these two wires to a transsistor oscillator **22**, to radiate a signal when the dipole is excited by energy from a remote transmitter.

The output wire **21** of the first dipole is connected to the midpoint **14**, of the second dipole, and a wire **23**, connects the midpoint **16** of the second dipole to the midpoint **14**, of the third dipole, and a wire **24**, connected to the midpoint **16**, of the third dipole forms with wire **20** the output of the whole array.

When the dipoles are aligned in a parallel relation and along a horizontal line the direct power outputs multiply, that is, two dipoles give about four times the power of one dipole, and three dipoles give an output of about seven times that of one alone, the falling off being due in part to the increased resistance of the connections.

The dipole may be connected through a relay to close a battery circuit to flash a lamp when the dipole is energized, and the battery, of course, is not being used when the dipole is not excited.

In Figure 3 there is shown a folded dipole **10** connected by wires **25** and **26** to a capacitor **27**, which has a capacitance of around 5 microfarads. The capacitor is connected to an oscillator, indicated generally at **22**, and which comprises a transistor **28**, having its base terminal **29**, connected to the wire **26**, and having its emitter terminal **30**, connected also to the wire **26** through a radio-frequency choke **31**. The collector terminal **32**, of the transistor is connected through a tank circuit **33**, to the wire **25**, and the other element **34**, of the tank circuit is connected to an antenna **35**.

An oscillating crystal **36** may be connected to the collector and emitter electrodes. The transistor oscillator is conventional, and the transistor shown is type PNP. Other types of transistors may be used when due attention is paid to the polarity of the terminals.

The capacitor **27** stores the energy from the dipole **10**, and stabilizes the feeding of energy to the oscillator.

It should now be clear that when the dipole **10** is energized from a remote radio transmitter, the oscillator **22** will respond with a signal of the desired frequency to indicate the presence of the object the dipole is attached to, if the oscillator and the dipole are on the same object. The dipole array, may, of course, be substituted for the single dipole shown for convenience in illustration. Since the output wires do not have to be matched to the dipole, for they carry only direct current, the dipole antenna **10** of Figure 2, can be conveniently attached to a device at some distance, away from the dipole or dipoles, so that an indication will be given by the device or load to indicate that the dipole, or dipoles, have been energized by radio energy from a remote transmitter.

In Figure 2, the folded dipole **10** of this invention is shown connected by wires **38** and **39** to a capacitor **37**, having a capacitance of the order of 5 microfarads. The wire **39**, is also connected to the emitter terminal **40**, of a transistor **41**, and through a tuned circuit comprising an inductance **42**, and a variable capacitor **43**, to the base **45** of the transistor in series with a diode **44**. The diode is a IN34, and the transistor is of the PNP type in the example shown. The collector terminal **46**, of the transistor is connected through a switch **47**, which may be thrown to connect a headset **48**, in the circuit, or be thrown to connect a relay **49**, in the circuit. The relay is adapted to close a circuit comprising a battery **51**, and a lamp **50**, or other device. The transistor circuit is energized entirely from the dipole **10**, of this invention,

and thus, when the dipole is energized by radio from a remote transmitter, the lamp will light in response to this energization of the dipole.

The distances between the dipoles may be changed slightly for best results when the proximity of objects has to be compensated for as is well understood in this art.

While in Figure 2 a transistor is shown as an amplifier so that a relatively rugged relay may be actuated, it will be obvious that a sensitive relay may be connected directly to the storage capacitor, and without using the transistor, for the output of the folded dipole is direct current.

I claim:

1. A folded dipole antenna comprising a first wire and a second wire in spaced parallel relation and connected at their ends and with said wires being located close to each other compared to the shortest wave length employed, one of said wires being interrupted at substantially its mid-point and having circuit means comprising a pair of diodes in back-to-back-relation, a capacitor connected to said one of said wires at a point between said pair of diodes and connected to an opposite point on the other of said wires, and a pair of wires to carry only direct current from said first and said second wires and connected to the terminals of said capacitor.

2. A folded dipole antenna array comprising three folded dipoles each identical to that claimed in claim 1, and each fix tuned in construction to the desired frequency with the diodes and capacitor connected, the second dipole being spaced from the first dipole a distance equal to the length of said first dipole, the third dipole being spaced from the second dipole a distance equal to half the length of the first dipole, said three dipoles having their direct current outputs connected in series circuit relation.

3. A folded dipole identical to that of claim 1, and having an external capacitor connected to said pair of wires in parallel therewith, and having a direct current load connected to said capacitor.

4. A folded dipole antenna array comprising three folded dipoles each identical to that claimed in claim 1, said dipoles being arranged in parallel to each other in a horizontal plane and having their direct current outputs connected in series.

5. A folded dipole antenna identical to that claimed in claim 1, and connected by said pair of wires to a transistor oscillator to energize said oscillator for the transmission of radio signals in response to the exciting of said folded dipole by radio energy.

6. A unitary folded dipole antenna assembly comprising a first wire and a second wire in spaced parallel relation to each other and connected together at their respective ends, and with said wires being located close to each other compared to the shortest wave length employed, one of said wires being interrupted at substantially the midpoint of its length and having circuit means comprising a pair of diodes in back-to-back-relation, a capacitor connected to said one of said wires at a point between said pair of diodes and connected to an opposite point on the other of said wires, and a pair of transmission wires connected to the terminals of said capacitor to carry direct current when said dipole is excited by radio energy without necessitating the transmission lines being matched to the dipole antenna.

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