Nov. 21, 1950 S. EPSTEIN 2,531,035

TELEVISION ANTENNA

Filed Feb. 21, 1950

Fig. 1

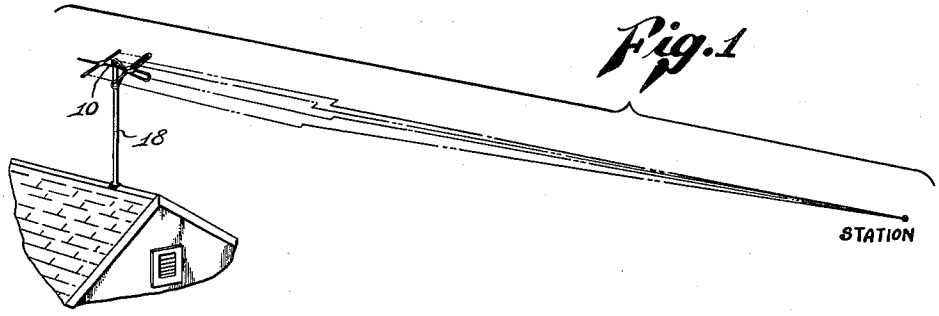


Fig. 2

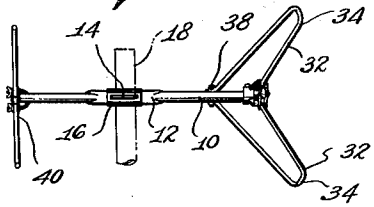


Fig. 3

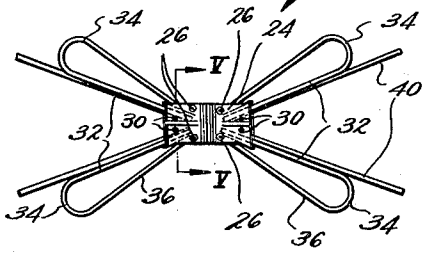


Fig. 4

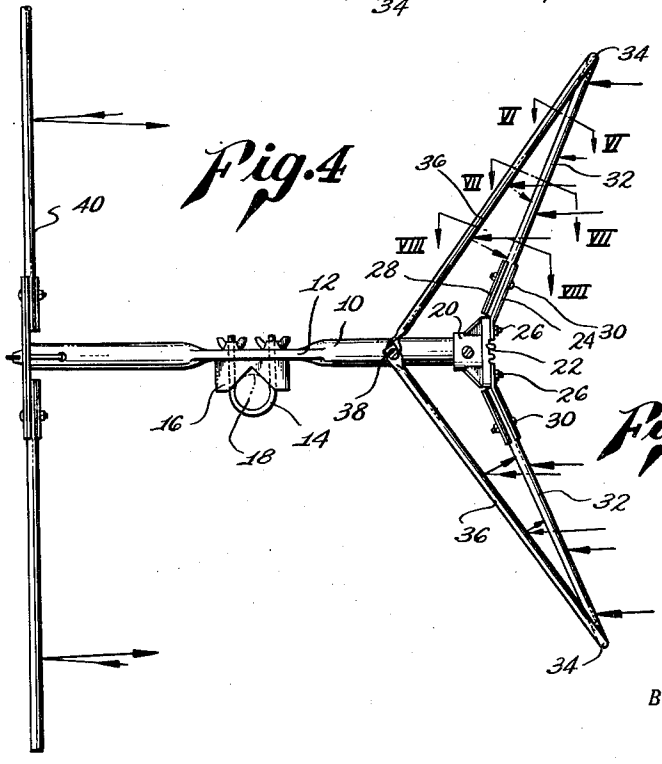


Fig. 5

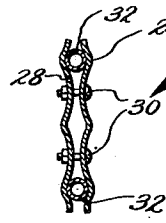


Fig. 6

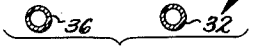


Fig. 7

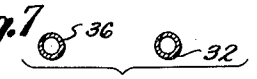


Fig. 8



INVENTOR.

BY Sol Epstein

Wm. Edward Hann

Attorney

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TELEVISION ANTENNA

Sol Epstein, Los Angeles, Calif.

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6 Claims. (Cl. 250—33.51)

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This invention relates to a television antenna.

In certain areas within the normal range of television transmitters, there are physical or other conditions which result in ghosting. Many times it is due to the presence of physical objects which reflect the energy waves so that certain of the waves travel a longer path than the direction waves between the transmitter and the receiver. The delayed waves impose a delayed image on the picture tube of the receiver with the result that a multiple image or ghosting effect is produced.

Difficulties in reception are encountered in fringe areas which ordinarily are within a range of from 25 to 75 miles from the transmitter and some trouble is encountered in reception in an immediate area which covers a radius from 10 to 25 miles from the transmitter. These figures are not necessarily intended to be exact since the intermediate or fringe areas as well as the immediate reception area inside of the intermediate area can and do vary. At any rate, where reception difficulties are encountered due to ghosting or distance from the transmitter, some relief has been secured through the use of rather complicated and costly antenna arrays.

It is an object of the present invention to provide a television antenna which is relatively simple in construction, yet which will overcome many of the disadvantages encountered in ghosting and which will improve reception in both the low and high frequency bands in the intermediate and fringe areas of reception and particularly in the fringe area where reception difficulties are greater.

A more specific object of the invention is to provide a folded dipole antenna wherein the negative or grounded element thereof is spaced behind the positive element and wherein the spacing between the elements is different at different points to increase the frequency range of the antenna.

Another object is to provide a folded dipole wherein the negative element thereof is placed behind the positive element and wherein said negative element serves as a reflector to produce a gain in the strength of the signal received by the antenna and conducted to the transmission line.

A further object of the invention is to provide a folded dipole antenna in accordance with the above which can be effectively used with a parasitic reflector which will eliminate ghosting and reflect signal impulses to the negative and positive elements of the dipole, thereby producing a gain in received signal strength.

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The above and other objects and advantages of the invention will more fully appear in the following description made in connection with the accompanying drawing wherein:

Fig. 1 is a positive view of an improvement of the invention indicating its relationship to a transmitter;

Fig. 2 is a side elevation view of the antenna;

Fig. 3 is a front elevation view;

Fig. 4 is a plan view on an enlarged scale;

Fig. 5 is an enlarged section taken approximately on the line V—V of Fig. 3; and

Figs. 6, 7 and 8 are sections taken approximately on the lines VI—VI, VII—VII and VIII—VIII of Fig. 4.

In the drawing there is shown a horizontal mast arm 10 having a flattened central portion 12, with a U bolt 14 extending therethrough. A clamp 16 is slidably mounted on the U bolt to engage a vertical mast portion 18 which is adapted to be suitably mounted on a roof of a building or other supporting structure.

As viewed in Figs. 2 and 4, the right hand end of the structure is the end from which signals are received and of course is directed toward the transmitter. It is not necessary that there be an exact alignment of the longitudinal axis of the mast element 10 with the transmitter but this is a desirable position. Signals will be received from various angles but the reception efficiency is reduced as the angle becomes greater relative to the longitudinal axis of the antenna.

On the forward end of the mast element 10 is a sleeve 20 of a suitable insulated material, said sleeve having a flange 22 thereon. Secured to the flange 22 is a clamping plate 24 held by nutted bolts 26. A cooperate clamp element 28 is secured to the clamp 24 by means of nutted bolts 30. Secured between the clamp element 24 and 28 are the ends of positive dipole elements 32. The clamp units 24, 28 are disposed at an angle to the longitudinal axis of the mast element 10 as best shown in Fig. 4.

The dipole elements 32 are connected by curved portion 34 to negative dipole elements 36 which extend inwardly and rearwardly to be connected with the mast 10 by means of a bolt 38 which extends through the mast. It will be noted in Figs. 6, 7 and 8 that the distance between the positive and negative dipole elements 32 and 36 is varied.

The antenna usually has an impedance of 300 ohms to match the similar impedance of low receivers and the transmission line from the antenna to the receiver also has a matched 300 ohm impedance.

There is a capacitance set up between the positive and negative dipole element **32** and **36** which determines the frequency which it receives to best advantage. A conventional folded dipole has its positive and negative elements parallel and the spacing between them determines the frequency reception efficiency of the antenna. For low band frequency with ⅜ inch tubing in the dipole elements, a spacing of from 2 to 3 inches has been found to be effective. For high band frequency a spacing of from 1 to 2 inches has proven efficient.

It will be noted that I have varied the distance between the positive and negative dipole element **32** and **36** in order to produce an antenna which will give relatively high gain reception for frequencies for both the high and low bands. This is accomplished by locating the inner end of the negative dipole element **36** rearwardly from the inner end of the positive element **32**. This form of dipole has been found highly efficient in fringe areas, eliminating the need for complicated antenna arrays and in some cases providing reception where multiple stacked arrays have been ineffective.

On the left hand or rear end of the mast element **10** is a reflector unit **40**. This is a conventional type of reflector and in the relative lengths of the reflector arms and the dipole arms illustrated in the drawing, the reflector **40** would be located approximately ¼ wave from the positive dipole elements **32**.

The reflector **40** has a dual function. It reflects waves forwardly to the negative dipole elements **36** and from them to the positive elements **32**, thereby producing a gain in signal strength. The reflector **40** also cuts out signals approaching from the rear and thereby eliminates ghosting.

From experiments with the antenna it has been found that the negative dipole elements **36** also serve to reflect signals from the transmitter to the positive elements **32** to further increase the incoming signal strength. Furthermore, in areas where ghosting is pronounced, it has been found that location of the negative dipole **36** behind the positive elements **32** also serves to eliminate ghosting.

Reference is again made to the angulation of the folded dipole as brought out in Figs. 2 and 4 in conjunction with the variation in distance between the positive and negative dipole elements **32** and **36**. Straight dipoles have been made with their arms on a conic section but the efficiency gain of such antennas is not nearly so great as the cumulative gain provided by the V-shape or conic arrangement in conjunction with varied spacing between the elements **32** and **36**. This increase in efficiency is above the normal gain which could be expected from the use of a parasitic reflector such as the reflector **40**.

While I have given certain values, measurements and relative sizes herein it is to be understood that they can be varied within reasonable limits without departing from the spirit of the invention.

I claim as my invention:

1. A television antenna having a forward side to be directed toward a signal source and including a suport having an axis to be aligned generally with the direction of the signal source, and a folded dipole each arm of which includes a positive element extending outwardly and upwardly of said axis from its terminal end at said axis and being folded over inwardly and backwardly toward the axis to a point on said axis positioned behind said terminal end in an axial direction, said inwardly and backwardly folded portion forming a negative element of the dipole.

2. A television antenna comprising a plurality of folded dipoles each arm of which is constructed substantially as defined in claim 1, each of said dipoles being disposed symmetrically of each other around said axis.

3. The structure in claim 2 and the spacing between the positive and negative elements at certain points being within the optimum range for low frequency band reception, and the spacing at other points being within the optimum spacing range for high frequency band reception.

4. The structure in claim 3, and the spacing between the positive and negative elements at one point being at a median distance between the optimum spacing ranges for low and high frequency band reception.

5. A television antenna having a forward side to be directed toward a signal source and including a support having an axis to be aligned generally with the direction of the signal source, and a folded dipole each arm of which includes a positive element extending outwardly and forwardly of said axis and a negative element constituting the folded portion extending laterally behind the positive element, and wherein the spacing between the elements is different at different points, said elements being adapted to increase the frequency range of the antenna.

6. A television antenna comprising a plurality of looped dipoles each arm of which is constructed substantially as defined in claim 5, wherein the negative elements serve as reflectors and said dipoles diverge from each other symmetrically about said axis.

SOL EPSTEIN.

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