March 10, 1953 J. J. ROOT 2,631,236

TELEVISION ANTENNA SYSTEM

Filed Oct. 22, 1949

Fig. 1.

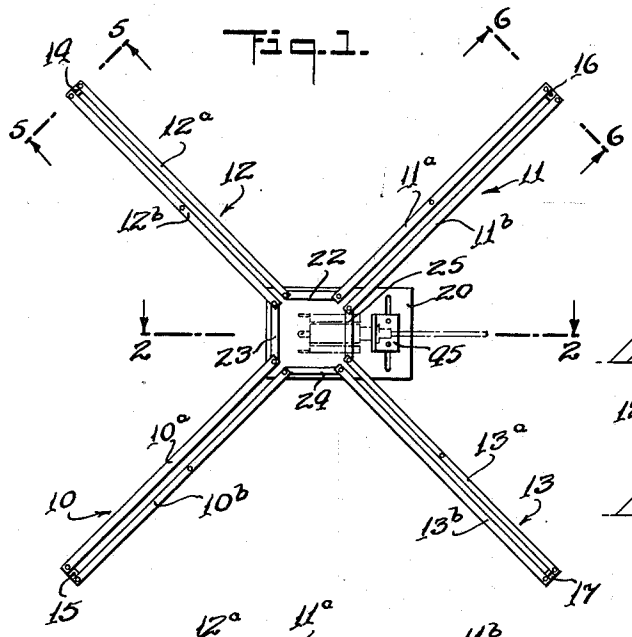


Fig. 4.

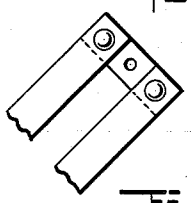


Fig. 5.

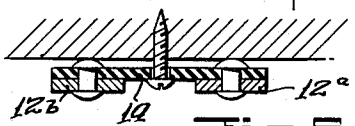


Fig. 6.

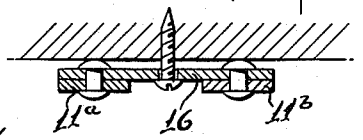
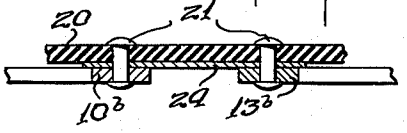


Fig. 7.



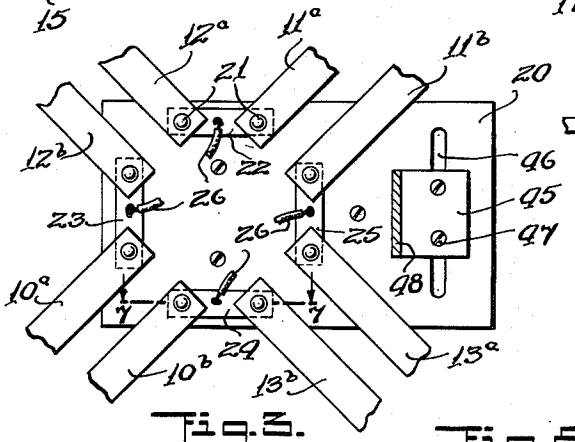
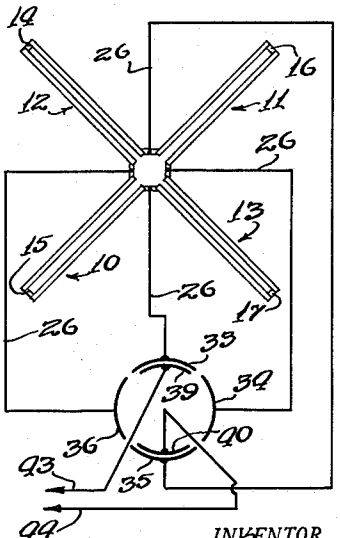


Fig. 3.

Fig. 8.



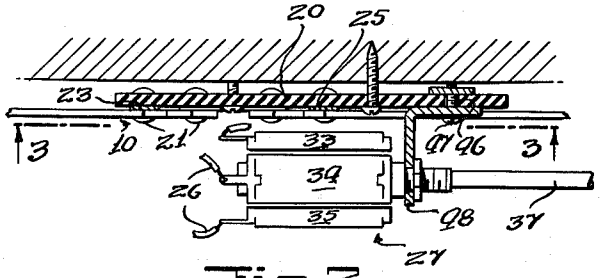


Fig. 2.

INVENTOR.
John J. Root
BY
S. Stephen Baker
ATTORNEY

Patented Mar. 10, 1953 2,631,236

UNITED STATES PATENT OFFICE

2,631,236

TELEVISION ANTENNA SYSTEM

John J. Root, New York, N. Y.

Application October 22, 1949, Serial No. 123,023

3 Claims. (Cl. 250—33.51)

1

This invention relates to high frequency antennas for use in television and frequency modulation receivers and is particularly directed to a crossed dipole type of antenna which requires no physical orientation. Effective orientation is, however, provided by means of a direction selecting condenser as described in my prior application, Serial No. 72,700, filed January 25, 1949, now abandoned.

In the art of television reception, as presently known, it is almost essential to employ a directive antenna which is further of a size to resonate approximately within the frequency range of reception. When the television receiver is in a so-called "fringe area," a term referring to areas at a substantial distance from the television transmitter, it is generally necessary to employ a, more or less, elaborate antenna having elements of adequate size to resonate at the desired frequencies. When the receiver is closer to the television station, the antenna may be correspondingly simplified although it is rare in actual practice that one may be dispensed with entirely.

The need for a simple, small antenna for television receivers located in large cities has been very great. A major reason is that the population of such large cities often inhabit apartment houses where the use of a great number of individual, elaborate antennas is inconvenient, if not impossible. Furthermore, the provision of a smaller, simplified antenna obviously offers considerable manufacturing and installation economies. As a result of the above need, there have been developed antennas which are disposed within the television receiver cabinet but, as far as I am aware, such antennas have been extremely inefficient. In addition, it was often necessary to orient the antenna in order to improve reception, and the physical orienting of the cabinets was then necessary. It will be evident that this may be very impractical since the cabinet may be required to be so turned that the viewing tube is directed away from the spectators.

With the above in mind, I have devised an antenna to be incorporated in or near a television cabinet which is of pronounced efficiency and provides a usable signal within reasonable distances from the television transmitter. The instant antenna employs crossed dipoles, as will hereinafter appear, each dipole being formed of two parallel lengths of metal.

Orientation of the antenna is electrically provided. In other words, no physical rotation is

2

necessary but a rotary condenser having elements connected to and corresponding to the dipoles serves to electrically rotate the antenna so that the cabinet itself need not be moved at all. Orientation of the antenna is then accomplished by means of a knob which may be disposed on the cabinet and which rotates the condenser rotor and effectively orients the antenna.

The invention will be further understood from the following description and drawings in which:

Fig. 1 is a top plan view of an antenna constructed according to the instant invention and affixed to a support.

Fig. 2 is a view taken substantially along the lines 2—2 of Fig. 1.

Fig. 3 is a plan view of the dipole terminal ends as taken substantially along the lines 3—3 of Fig. 2.

Fig. 4 is a fragmentary view of the outer ends of a dipole.

Fig. 5 is a cross-sectional view taken along the lines 5—5 of Fig. 1

Fig. 6 is a cross-sectional view taken along the lines 6—6 of Fig. 1.

Fig. 7 is a cross-sectional view taken along the lines 7—7 of Fig. 3.

Fig. 8 is a schematic view illustrating the electrical operation of the instant antenna.

The antenna comprises a pair of crossed dipoles; one dipole consists of section 10 and section 11 and the other dipole consists of section 12 and section 13. In the form shown, each dipole section is formed of two elongated parallel bars such as 11*a* and 11*b*. Bars 10*a* and 10*b* form dipole section 10. Bars 12*a* and 12*b* form dipole section 12 while bars 13*a* and 13*b* form dipole section 13. The bars are metallic throughout as will be understood.

The two outer or free ends of the dipole sections are interconnected. Two pairs of the dipole ends are thus connected electrically while two pairs are connected mechanically or physically for stability purposes. Thus a bridging element 14 of insulating material connects the free outer ends of the dipole bars of dipole section 12. Bridging element 14 is of insulating material so as to serve purely as a mechanical or physical connector. Bridging element 15 is also of insulating material. However, bridging elements 16 and 17 are of metallic material so as to electrically short-circuit the free outer ends of the dipole sections 11 and 13 respectively.

The inner or terminal ends of each dipole bar are mounted on an insulating block or panel 20

as by rivets 21. A bar of each dipole section is electrically connected to a bar of an adjacent or angularly succeeding dipole section so as to form a continuous circuit of the dipole bars. Thus, a metal strip 22 is connected between dipole bars 11*a* and 12*a*. Strip 23 is connected between bars 12*b* and 10*a*. Strip 24 is connected between bars 10*b* and 13*b* while strip 25 is connected between bars 13*a* and 11*b*. Strips 22—25 are each provided with an electrical conductor 26 to which connections may be made, as will be hereinafter made clear.

Effective orientation of the crossed dipole antenna is accomplished by means of a rotary, substantially tubular condenser 27 having four outer arcuate stator plates which are insulated from each other. The form of the condenser may follow that described in my prior application, Serial No. 72,700, filed January 25, 1949, but it may further take the improved form illustrated herein and which is the subject of a new application filed substantially herewith.

Wires or conductors 26 are connected to the lugs 29 of the condenser stator plates 33, 34, 35 and 36. Condenser 27 may be mounted within the receiver cabinet in any conventional manner, the condenser shaft 37 extending therethrough so that it may be employed to operate the condenser as will be hereinafter described.

To the shaft 37 are connected two rotor plates 39 and 40 having capacitative action with the stator plates. It will be recognized that rotation of the plates 39 and 40 will serve to select input voltages from any particular diametrical position of the stator plates. In this way, rotation of the rotor plates acts as quadrant selection in respect to the dipoles to which the stator plates are connected.

Wires 43 and 44 are respectively connected to the rotor plates 39 and 40 so that such wires represent the output of the antenna and are correspondingly connected to the input of the television receiver. The condenser 27 may be mounted on the insulating support 20 as by an L-shaped member 45 which is connected to the slot 46 by bolts 47. The upright portion 48 has an opening through which the condenser shaft extends as illustrated in Fig. 1.

The operation of the antenna system described will be apparent from the above explanation. Briefly, the directional dipoles accommodate signals received from any direction. The parallel, side-by-side bar formation of the dipoles broadens the tuning range and permits the circuit connections described. The received signals are then selected through rotation of the variable condenser so as to effectively orient the antenna in space, although it is physically motionless. Actually, it has been found that the condenser 27 exercises both a tuning and phasing effect. Although signals having various phases may be received at the antenna, the condenser appears to be effective in absorbing a considerable portion of said signals and rephasing them so that they are suitable for feeding the receiver input.

What is claimed is:

1. A high frequency antenna comprising a pair of dipoles crossed perpendicularly at their centers, each of said dipoles being formed of two parallel members disposed side by side, each of said parallel members comprising two centrally separated conductors of substantially equal length and disposed substantially in the same straight line, the parallel members of each dipole being short-circuited at one end thereof and being insulated from each other at the other end thereof.

2. A high frequency antenna comprising a pair of dipoles crossed perpendicularly at their centers, each of said dipoles being formed of two parallel members disposed side by side, each of said parallel members comprising two centrally separated conductors of substantially equal length and disposed substantially in the same straight line, the parallel members of each dipole being short-circuited at one end thereof and being insulated from each other at the other end thereof, an insulating support, the inner or terminal ends of said dipoles at the central separation thereof being secured to said insulating support, and a parallel member of each dipole being electrically connected to an adjacent parallel member of an angularly succeeding dipole.

3. A high frequency antenna comprising a pair of dipole crossed perpendicularly at their centers, each of said dipoles being formed of two parallel members disposed side by side, each of said parallel members comprising two centrally separated conductors of substantially equal length and disposed substantially in the same straight line, an insulating support, the inner or terminal ends of said dipoles at the central separation thereof being secured to said insulating support so that eight such terminal ends are secured to said insulating support, each of the terminal ends of one dipole being electrically connected to an adjacent terminal end of an angularly succeeding dipole, the parallel members of each dipole being electrically connected together at an outer end thereof, and being insulated from each other at an opposite end thereof.

JOHN J. ROOT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,188,649	Carter	Jan. 30, 1940
2,254,697	Godet	Sept. 2, 1941
2,258,406	Carter	Oct. 7, 1941
2,338,564	Aram	Jan. 4, 1944

OTHER REFERENCES

CQ, June 1947, p. 49.

RCA Review, June 1947, p. 293.