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ANTENNA FOR SIGNAL RECEIVERS

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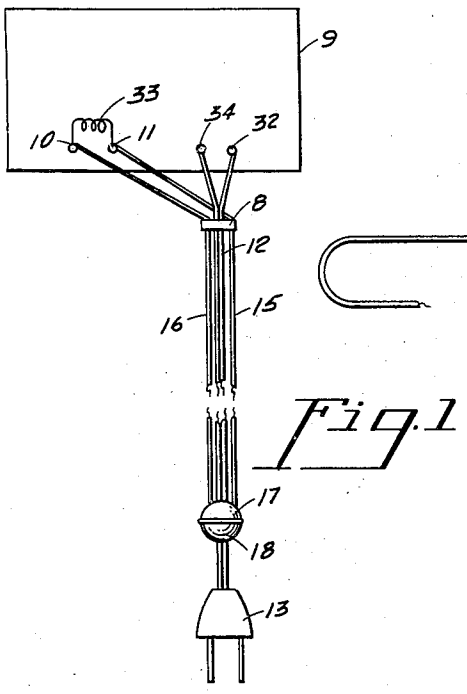


Fig. 1

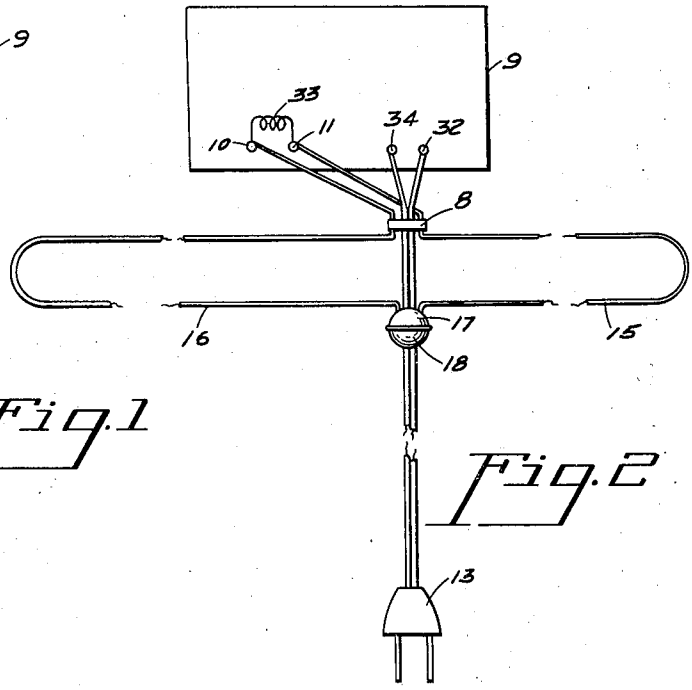


Fig. 2

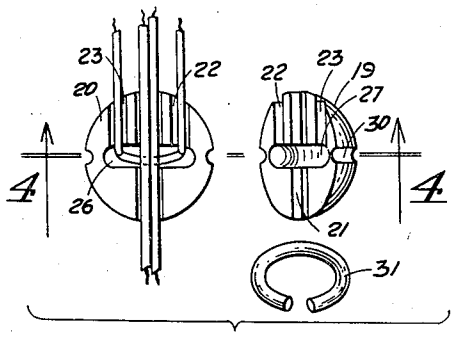


Fig. 3

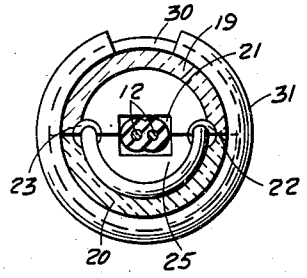


Fig. 4

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ANTENNA FOR SIGNAL RECEIVERS

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5 Claims. (Cl. 250—33)

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The present invention relates to antennas and particularly to a novel and very convenient type of antenna for use with very-high-frequency (VHF) radio receivers such as frequency-modulation (FM) broadcast receivers. The prior art embraces a number of antennas for this type of receiver, such as the simple dipole, the folded dipole and similar types, generally made up of tubular conductors and either requiring careful outside installation and adjustment or occupying a large part of the receiver cabinet. Short sections of wire have also been employed without satisfactory results. The attainment of satisfactory performance characteristics has heretofore required careful and expensive outdoor installations or bulky space-consuming dipoles in the interior of the receiver. In an endeavor to obtain a satisfactory antenna which does not consume excessive space there has been developed what is known as a "power line antenna," but the pickup characteristics of that type have not been found entirely satisfactory.

It is accordingly a basic object of the invention to provide a UFH antenna which does not place excessive bulk within a receiver interior, which has the space-saving advantages of the power line antenna, and which at the same time gives satisfactory pickup and impedance match performance characteristics.

In accordance with the invention and for the attainment of this basic object, there is provided in a FM radio receiver of the type including an antenna input circuit and a power cord having an external length approximately equal to one-half of the signal wave length at the center of the FM band, an antenna comprising a physically folded flexible full wave conductor adapted to be coupled to said input circuit, and a slider mounted on said cord and secured to the folded end of said conductor, said slider being so adjustable that the conductor may be spread into two half-wave portions comprising a folded dipole or restrained into parallelism with said cord.

For a better understanding of the present invention, together with other and further objects, capabilities, and advantages thereof, reference is made to the following description of the illustrative preferred embodiment of the invention shown in the accompanying drawings, in which:

Fig. 1 is a perspective view showing a preferred form of antenna in accordance with my invention, the slider being so adjusted in proximity to the power plug that the antenna conductor portions are restrained in parallelism with the power cord;

Fig. 2 is a perspective view of my antenna when the conductor portions are so spread and the slider so adjusted in proximity to the receiver that the antenna functions electrically as a folded dipole;

Fig. 3 is a perspective view showing the slider

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elements and the folded end of the conductor when the snap ring is removed from the slider elements; and

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3 and looking in the direction of the arrows.

Referring now to the drawings, there is illustrated a conventional radio receiver 9 (shown in block form) which is provided with antenna input terminals 10, 11 and a conventional two-conductor power cord 12, terminating in a plug 13 for connecting the power transformer and rectifier circuits of the receiver to a conventional household wall outlet or the like. In the vast majority of radio receivers made at the present time the external portion of this power cord, i. e., the portion outside of the radio receiver, is approximately 60" in length. This parameter is substantially equal to one-half wave length of the carrier mean frequency signal at the middle of the FM broadcast band which extends from 88 to 108 megacycles. In accordance with the invention I provide a folded dipole antenna which comprises a pair of interconnected one-half wave conductor portions or equivalent, such as a physically folded full wave conductor having a half wave conductor portion 15 and a half wave conductor portion 16. The folded end 17 of this conductor is secured to a slider 18. The portions of conductor 15, 16 near to the receiver 9 are fixed to the parallel portions of the power line 12 as by a few turns of tape 8, or the like. The various conductors are shown broken away for purposes of clarity and emphasis. The spacing between the various conductors at the point of embrace by tape 8 is, of course, considerably exaggerated in the drawings for purposes of clarity. It will be understood that the embrace is snug.

The slider comprises a pair of hemispheres 19 and 20 provided with complementary grooves 21, whereby the slider is adjustably movable relative to the power cord and also with complementary grooves 22 and 23 for securing in place the folded end of the dipole. This folded end fits inside of a chamber 25 formed by complementary hollowed out portions 26 and 27 of the hemispheres. The hemispheres are secured together by a removable split resilient lock ring 31 which engages a continuous groove 30 formed circumferentially on the hemispheres.

It will be seen by an inspection of Figs. 1 and 2 that the antenna may be adjusted to a position whereat the conductors are in parallelism with the power cord and the slider is adjacent the power plug (Fig. 1). Under that condition the antenna is equivalent to a short-circuited half wave line, and it theoretically has zero impedance at the terminals 10 and 11. Under that condition the signal pickup characteristic of the antenna is very low.

On the other hand, when the slider is in the opposite position in proximity to the receiver (Fig. 2), the antenna conductors may be spread into loop portions comprising a folded dipole. A folded dipole is equivalent to two half wave antennas in parallel, and it has an impedance of approximately 300 ohms. By adjustment of the slider, therefore, the impedance may be varied from a very low minimum to a maximum of approximately 300 ohms. When the antenna is adjusted for maximum impedance, the pickup characteristic is very high.

This antenna may be easily adjusted as to directivity by the simple manual operation of spreading the loops on a table at the rear of the receiver and orienting the loops as desired. Its pickup characteristics substantially excell those of the power line type of antenna. It does not place an irreducible limit, as does a stiff tubular-conductor dipole, on the minimum amount of space required for a FM receiver. It does not require the use of chokes or other expensive circuit expedients of that character.

It will be understood that the antenna conductors may feed into a twisted pair or other suitable transmission line, coupled to a balanced input circuit **33**. Since these elements are conventional in FM receivers, they are not shown in detail herein. It will be understood that the antenna in accordance with the present invention may be conveniently manufactured, packed, handled, stored, and used by the consumer without danger of shock. Thus it will be seen that I have provided, in a FM radio receiver of the type including an antenna input circuit and a power cord having an internal length approximately equal to one-half of the signal wave length at the center of the FM band, an antenna comprising a physically folded flexible full wave conductor adapted to be coupled to said circuit and a slider mounted on said cord and secured to the folded end of said conductor, said slider being adjustable on said cord from a position adjacent the end of said cord remote from the receiver whereat the impedance of said antenna is very low, to a position adjacent said receiver whereat the conductor may be spread into two half wave portions constituting a "folded dipole" and having an impedance approximating 300 ohms.

While there has been shown what is at present regarded as the preferred embodiment of the present invention, it will be obvious to those skilled in the art that various changes may be made therein without departing from the invention as defined by the appended claims.

Having fully disclosed and described my invention, I claim:

1. In an FM radio receiver of the type including an antenna input circuit and a power cord having an external length approximately equal to one-half of the signal wave-length at the center of the FM band, an antenna comprising a physically folded flexible full-wave conductor adapted to be coupled to said circuit, means for securing the leads of said conductor to said cord at a point adjacent said receiver, and a slider mounted on said cord and secured to the folded end of said conductor remote from said leads, said slider being so adjustable on said cord that the conductor may be spread into two half-wave portions constituting a "folded dipole" or restrained into parallelism with said cord.

2. In an FM radio receiver of the type including an antenna input circuit and a power cord having an external length approximately equal to one-half of the signal wave-length at the center of the FM band, an antenna comprising a physically folded flexible full-wave conductor adapted to be coupled to said circuit, and a slider mounted on said cord and secured to the folded end of said conductor, said slider being adjustable on said cord from a position adjacent the end of said cord remote from the receiver, whereat the impedance of said antenna is very low, to a position adjacent said receiver, whereat the conductor may be spread into two half-wave portions constituting a "folded dipole" and having an impedance approximating 300 ohms.

3. In a VHF radio receiver of the type including an antenna input circuit and a power cord having an external length approximately equal to one-half of the signal wave-length at the center of the band to be received, an antenna comprising a pair of half-wave conductors adapted to be coupled to said circuit but interconnected at their ends remote from said circuit, and a slider mounted on said cord and secured to the interconnected ends of said conductors, said slider being adjustable on said cord from a position adjacent the end of said cord remote from the receiver, whereat the impedance of said antenna may be spread into two half-wave portions constituting a "folded dipole" and having an impedance approximating 300 ohms.

4. In a radio receiver of the type including an antenna input circuit and a power cord having an external length comparable to a substantial fraction of the signal wave-length in the band to be received, an antenna comprising a folded full-wave conductor adapted to be coupled to said circuit, means for securing the leads of said conductor to said cord at a point adjacent said receiver, and positioning means mounted on said cord and secured to the folded end of said conductor remote from said leads, said means being adjustable on said cord from a position at which the conductor portions are restrained in parallelism with said cord, to a position whereat the conductor may be spread into two loop portions.

5. In a radio receiver of the type including an antenna input circuit and a power cord, an antenna comprising at least one conductor portion adapted to be coupled to said circuit, means for securing the leads of said conductor to said cord at a point adjacent said receiver, and a slider mounted on said cord and secured to the end of said conductor remote from said circuit, said slider being adjustable on said cord from a position adjacent the end of said cord remote from the receiver, whereat the conductor is in parallel with the cord, to a position closer to said receiver, whereat the conductor may be looped.

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