May 18, 1943. R. A. BECWAR 2,319,760

ANTENNA SYSTEM

Filed Dec. 2, 1939

Fig. 4.

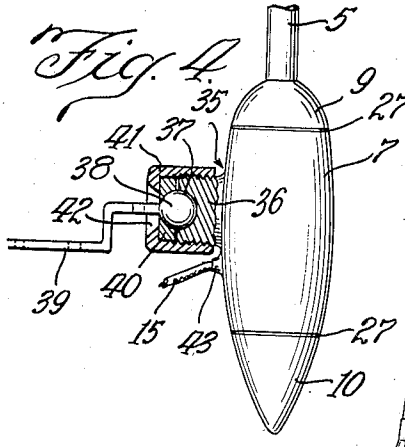


Fig. 1.

Fig. 2.

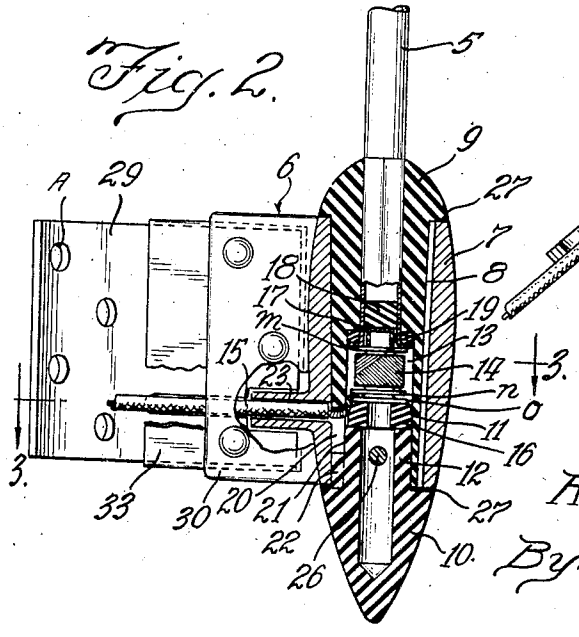
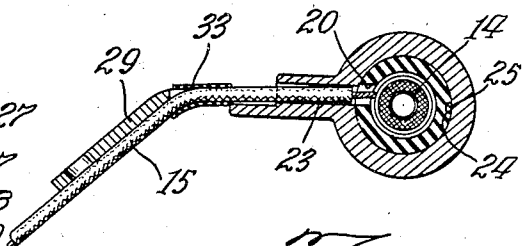


Fig. 3.



Inventor:
Rudolph A. Becwar
By: Norman L. Mueller
Atty.

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ANTENNA SYSTEM

Rudolph A. Becwar, Chicago, Ill., assignor to Galvin Manufacturing Corporation, Chicago, Ill., a corporation of Illinois

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7 Claims. (Cl. 250—33)

This invention relates to antenna systems for radio receiving apparatus and in particular to an antenna system or aerial system for automobiles and the like.

An aerial of telescopic or rod-like type has been found to give very satisfactory reception in connection with the operation of automobile radio receivers. However, its use for this purpose has been restricted because of the disadvantages which have heretofore accompanied an aerial of this type. In the automobile field particularly, appearance is of extreme importance, and many people forego satisfactory radio reception in preference to an unsightly appearing aerial, or to an aerial which is mounted on an outside portion of the car necessitating cutting holes in the body of the car, which might subsequently spoil the appearance of the car. It is substantially impossible to utilize an aerial within an all-metal car body, and an undercar aerial is inefficient so far as signal pick-up is concerned, and is subject to many types of electrical interference and physical deterioration. An aerial mounted on a bumper portion of the car requires a long lead-in which subjects the aerial system to possible interference, and the cost of installation is high.

It is an object of this invention, therefore, to provide an improved antenna system for radio receiving apparatus.

It is further object of this invention to provide an aerial of telescopic type positioned on the outside of an automobile body and in a position relative to the car receiver to require but a very short aerial lead-in, yet which may be mounted in a manner so that neither the car finish, nor the body of the car are defaced.

Another object of my invention is to provide an automobile aerial which is extremely efficient electrically, having a high signal gain, and which is sturdy mechanically.

It is also an object to provide an aerial which may be very easily and quickly mounted on an automobile.

A still further object of this invention is to provide an aerial which is completely weather-proof as to its electrical contacts and structure so that its efficiency is not impaired by long exposure to the weather.

It is a still further object of this invention to provide an antenna system which is economical in cost, and appealing in appearance.

Further objects and advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawing in which:

Fig. 1 shows a complete assembly view of the antenna or aerial system operably mounted on the body portion of an automobile.

Fig. 2 is an enlarged sectional view of the antenna supporting structure.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2 and

Fig. 4 is a modified form of the invention.

With reference to the drawing, there is shown an aerial or signal collector 5 which is suitably secured in a supporting structure 6. The structure 6 includes a barrel shaped body portion 7 having a centrally located axial bore 8 extending therethrough for the reception at opposite ends thereof of insulator members 9 and 10, which have outside contours of a shape to provide a stream-lined form with the body portion 7. The insulator 9 engages substantially the entire wall of the bore 8 and is formed at the lower end thereof, as viewed in Fig. 2, with an annular recess 11 for telescopic engagement with a projection 12 on the insulator 10. The projection is shorter in length than the recess so as to provide for a cavity 13 between the insulators 9 and 10. It is to be noted that the cavity 13 is thus completely insulated from the body portion 7.

The signal collector 5 is centrally mounted in an axial direction in the member 9 and extends within the cavity 13 for electrical contact with one end *m* of an inductance coil unit 14 which is disposed in the cavity 13. The end *m* is provided in metal and serves as one terminal for the winding of the coil unit, as well as the end member for such unit. The opposite end *n* of the coil 14 is in electrical connection with a lead-in 15 from the car radio receiver (not shown). To provide an efficient electrical contact between the coil and lead-in, a metal washer o is soldered to the free end of the lead-in wire in an obvious manner. The inductance coil in the unit 14 is thus in series connection with the signal collector and radio receiver lead-in, and is provided with such characteristics that it resonates the antenna circuit, including the aerial and such coil, over as broad a band of frequencies as possible to match carrier wave frequencies in the receiver within such range. These characteristics may be chosen to either increase the signal energy over a portion of the complete broadcast spectrum which is most generally used in a particular locality, or to operate with a signal collector to increase the signal energy over a frequency or group of frequencies in which a particular receiver circuit is weak and normally relatively ineffective. A positive elec-

trical contact of the coil with the aerial 5 and lead-in 15 and protection to the coil from shocks which might be encountered during the normal operation of an automobile, is obtained by the provision of a resilient member 16 which is arranged adjacent the end *n* of the coil as shown in Fig. 2. Possible danger to the coil unit as a result of forcing one of the telescoping members downwardly is prevented by a cup-shaped spacer 17 positioned within the bottom portion of the tubular aerial rod, and resting on the end *m*. A resilient stop 18 is pressed into the tube to rest upon the spacer to seal the tube at that portion and further absorb shocks.

The lead-in 15 enters the cavity 13 through an aperture 20 in the wall surrounding the recess 11. The aperture 20 is formed as part of a slot 21 in the insulated recess wall, the remainder of the slot being filled by a companion key 22 formed on the projection 12 of insulator member 10. A proper registering of the aperture 20 with the lead-in aperture 23 in the body portion 7 is obtained by a particular relative positioning of the member 9 in the bore 8 as determined by the engagement of the slot 24 in member 9 with the key 25 formed in the portion 7 and extending within the bore 8.

In the assembly of the above described structure the aerial 5, with a resilient sealing ring member 19 properly placed thereabout to seal the internal structure against moisture, is firmly positioned within the member 9, turning thereof relative to the member 9 being eliminated by a substantially square cross-section of the aerial portion engaging the insulator 9. This portion of the antenna system is assembled in a press fit engagement with the side walls of the bore 8. The coil 14 is placed in the recess 11 and the lead-in 15 inserted through the aperture 23 and slot 21. The aperture 23 and slot 21 are relatively positioned by means of the key 22 and by slot 24 and key 25. The washer on the antenna end of the lead-in wire is soldered to such end, and the resilient ring 16 is positioned in the recess 11 in contact with the lead-in washer *o*. The member 10 is assembled with the projection 12 within the recess 11, the projection or key 22 being arranged so as to be in sliding engagement with the slot 21. The member 10 is maintained in assembly by a holding or set screw 26, which extends through the body portion 7 for threaded engagement in the projection 12 of member 10. To prevent the seepage of moisture or the entry of grit into the cavity 13, suitable gaskets 27 are provided between the insulators 9 and 10 and each end of the body portion 7.

The above described assembly is adapted for outside mounting on a body portion 28 of a car 32, such as the portion 28, (Fig. 1) by means of an angle member or mounting plate 29, which is suitably fixedly secured to the lateral extension 30 on the body portion 7, in a manner to form a smooth and a continuous connection between the portion 7 and the member 29. The member 29 is preformed to fit on the body portion 28 and to extend outwardly from the car body between the end 31 of the car hood and the body portion 28. The engine or car hood, thus assumes its normal position and fits over the member 29 so that the aerial 5 and its supporting structure 6 are positioned on the outside of the car. A yieldable insulating means, such as a rubber sleeve 33 is positioned about that portion of the member 29 which contacts the hood to further insulate the lead-in 15 from the car body (Fig. 3) and to eliminate a metal to metal contact of the member with the hood. The shield surrounding the lead-in may be suitably grounded to the member 29, by means of one of the mounting screws 34. The antenna may thus be mounted on the outside of a car in close proximity to the radio receiver which is generally positioned below or behind the dash board of the car. The shielded lead-in 15, therefore, may be very short so that any local static noises which are created in the car body or which might result from engine operation are reduced to a minimum in the antenna circuit.

The modified form of the invention shown in Fig. 4 is similar in some respects to the preferred embodiment and similar reference numbers are used therefore, to designate similar parts. The supporting structure 35 is provided with a body portion 7 having an annular laterally extending projection 36. The free end of the projection is formed with a socket 37 for bearing engagement with a ball 38 which is provided at one end of an angular plate 39 for mounting the structure and aerial 5 to a body portion of an automobile. The ball and socket are operatively assembled by a split washer 40 and a hollow nut 41. Each half of the washer is formed with a mating socket portion for engagement about the ball 38 and for a flush engagement with the end of the projection 36. The nut is provided with an aperture 42 for passage over the ball 38 and is adapted to encase the washer for a cooperative assembly about the ball 38 with the socket 37 by a threaded engagement about the projection 36. It is thus seen that a variety of mounting plates 39 may be used with similarly constructed supporting structures 35 and aerial 5, whereby the same antenna system can be readily mounted on all different makes of cars. The ball and socket further provides for a wide range of relative positions between the mounting plate 39 and the supporting structure 35 the plate 39 being shown as rotated an angular distance of 90° from the position of the plate 29 in Fig. 2. The lead-in 15 is connected to the coil 14 in the manner explained in connection with Fig. 2, by passage into the body portion 7 through an aperture 43.

It is thus seen that the present invention provides for an aerial system which is of compact structure, of pleasing appearance and of economical cost. The number of parts forming the aerial apparatus have been reduced to a minimum and have been designed to attain a simple, fast, and positive assembly of the aerial system. It is to be noted further that the assembly is of weather proof construction throughout and is adapted to be mounted on the outside of a car without impairment of the car finish.

It is to be understood that only preferred embodiments of the present invention have been described and illustrated and that modifications and alterations thereof may be made within the scope of this invention as defined by the appended claims.

I claim:

1. Radio antenna apparatus adapted to be connected by a conductor to a radio receiver, including a signal collector, supporting means for said signal collector having a substantially cylindrical portion with an axial bore centrally thereof, insulators assembled in said bore from opposite ends thereof in a manner and being of such configuration as to form a cavity therebetween, the signal collector passing through one of said insulators to the cavity formed between the said insulators, and an inductance coil in said cavity in series

connection with said signal collector and with the conductor for the radio receiver.

2. Radio antenna apparatus adapted to be connected by a conductor to a radio receiver including a signal collector, supporting means for said signal collector having a bore extending entirely therethrough, an insulating lining over the length of said bore having an insulated cavity therein, said signal collector being secured in said lining and extending to said cavity, and an inductance coil in said cavity in series connection with said signal collector and the conductor for the radio receiver.

3. Antenna apparatus for a radio receiver having a signal collector with a free end, and a supported end for connection to the radio receiver, supporting means for said signal collector having a bore extending therethrough at one portion, an insulating member at the supported end of said signal collector having a recess therein and adapted for a press-fit engagement within said bore, a second insulator member having a projection thereon for substantially telescopic connection with said first insulating member at said recess, with said projection being shorter than said recess whereby to form a cavity between said insulator members at said recess, said signal collector extending at the supported end to said recess, and a mounting portion extending laterally from the bore portion of said supporting means for mounting said apparatus.

4. Antenna apparatus for a radio receiver having a signal collector with a free end and a supported end, supporting means for said signal collector having a substantially cylindrical portion with an axial bore centrally thereof, an insulator at the supported end of said signal collector in press-fit engagement within said bore with said insulator having a walled recess therein, a second insulator in substantially telescopic assembly with said first insulator at said recess to form a cavity between said insulators, said substantially cylindrical portion of the supporting means and the wall of said recess having apertures in alignment and in registry with said cavity for receiving a conductor extending into said cavity for electrical connection with said signal collector to electrically connect said radio receiver with said signal collector.

5. Radio antenna apparatus for ready mounting on the outside of an automobile in a manner to provide the advantages of an outside mounted antenna and yet without defacing normally visible portions of the automobile body, said antenna apparatus including a metal body portion having an axial bore therein, insulating means providing an insulating lining for said bore and having a portion extending out of each end of said bore, an aerial supported in said insulating means and extending axially out of one of said insulating means portion, said metal body portion having an extension at one side intermediate the insulating means portions, an apertured mounting plate operatively connected with said extension, and means including a ball and socket joint operatively connecting said mounting plate and said extension.

6. Radio antenna apparatus including a metal body portion having an elongated axial bore therein, insulating means providing an insulating lining for said elongated axial bore having portions extending out of each end of said bore, with said insulating means being of less length within said bore than said bore itself to provide a recess intermediate the same within said bore, an aerial supported by said insulating means and extending axially above one of said insulating means portion said aerial having an integral portion at the bottom thereof extending into said insulating means portion to said recess for electrical connection with circuit means from said apparatus, circuit means having a portion in said recess, and mounting means for said metal body portion.

7. Radio antenna apparatus for mounting on an automobile, including a body portion, a signal collector supported on said body portion, said body portion having an integral extension thereon, an apertured plate portion on said extension for mounting on the automobile, said extension having a threaded portion on the outside and a socket centrally of said threaded portion, said apertured plate portion having a ball-like portion at one end resting in the extension socket, and threaded means engaging the threaded portion on the extension and acting to retain the ball-like portion of the apertured plate portion in said socket.

RUDOLPH A. BECWAR.