March 9, 1937. J. A. COOK 2,073,336

RADIO GROUND COUNTERPOISE

Filed Sept. 22, 1934

Fig. 1.

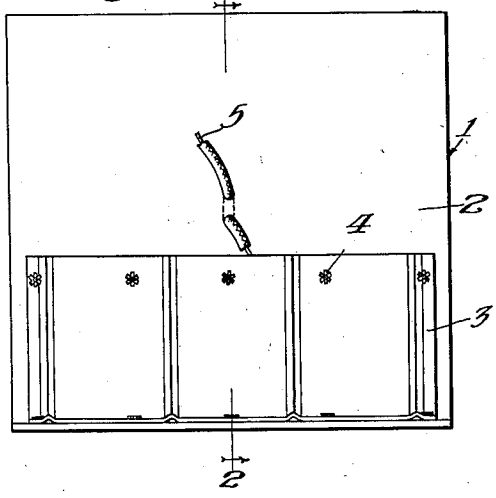


Fig. 5.

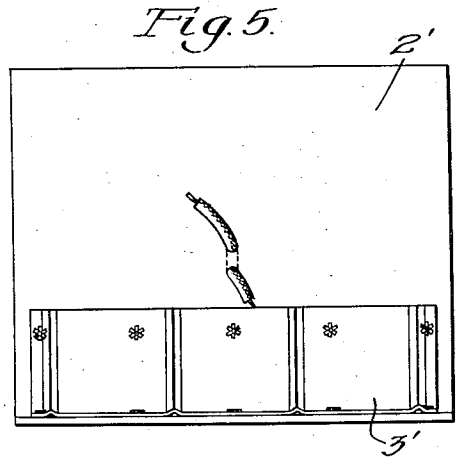


Fig. 3.

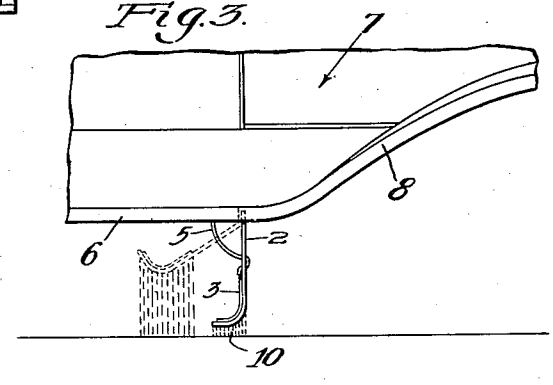


Fig. 2.

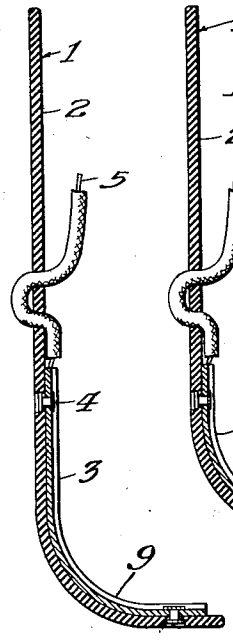


Fig. 6.

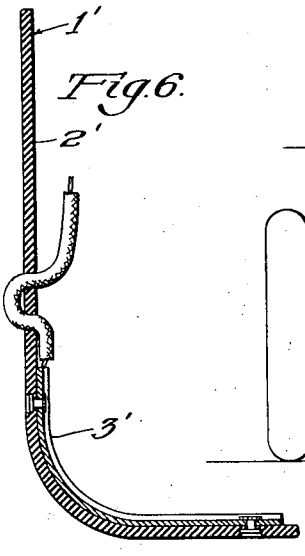
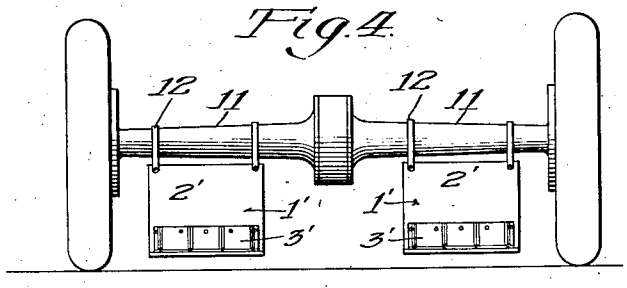


Fig. 4.



Inventor:
Judson A. Cook,
By: Lee J. Gary
Attorney.

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RADIO GROUND COUNTERPOISE

Judson A. Cook, Haledon, N. J., assignor to Raybestos-Manhattan, Inc., Bridgeport, Conn., a corporation of New Jersey

Application September 22, 1934, Serial No. 745,056

3 Claims. (Cl. 250—33)

This invention relates to improvements in an antenna or counterpoise for a radio receiving device carried by a vehicle, such as an automobile, bus, or the like, and refers specifically to the provision of a device of this character whose capacity to receive transmitted signals remain substantially constant during various conditions of operation of the vehicle.

Heretofore, in the operation of radio receiving devices in automobiles, or the like, difficulty has been encountered in obtaining clear, fadeless reception. This is primarily due to the fact that the signal "pick-up" and grounding facilities are more or less limited. As a consequence, the receiver must be operated at a higher degree of sensitivity than would normally be the case, whereby undesired noises, both man-made and atmospheric, are intensified. In addition, by not being able to physically or positively ground the set, interference which would normally be eliminated by grounding, disturbs reception of desired signals.

Aerials and counterpoises have heretofore been proposed with a view to eliminating the hereinbefore described noises, but all have signally failed to do so. Some have been electrically efficient in picking up desired signals but have been equally efficient in picking up "strays", static and the like. Others have been so inefficient electrically as to limit the possibilities of good reception, necessitating increasing the sensitivity of the receiver to the point where internal noises, such as tube noises, are disturbing. Distant reception in the latter case, of course, is out of the question. Some antenna or counterpoises have, due to their physical construction and position, been conducive to fading of signals due to not having sufficient potential pick-up in a more or less dead spot to feed the volume control tube without fading and also due to changes of capacity caused by movements of the aerial or counterpoise.

As a feature of my invention an aerial or counterpoise is provided for a radio receiver carried by a vehicle, which is electrically efficient; conducive to the elimination of undesired pick-up and interference; and can be economically manufactured and simply installed upon a vehicle.

Briefly described, my invention comprises a metallic plate, wire mesh screen, metal grating or any electric current conducting material carried by a relatively flexible slab or sheet of non-conducting material, the metallic plate, screen or grating being bent or curved at one end so that when the carrying slab or sheet is held vertically, a portion of the metal member will be disposed horizontally. The sheet or slab is adapted to be hung from a portion of the vehicle so that the bent portion of the plate is normally disposed adjacent but spaced from the ground and due to the flexibility of the sheet or slab or due to the means of attaching the same to the vehicle the sheet or slab, and hence the metal member carried thereby, is permitted to swing when the vehicle is in motion.

The metal plate extends vertically along the wall of the carrier and consequently when swung, due to the air resistance encountered when the vehicle moves, the projected area of the plate upon the ground increases. However, when said plate is swung backwardly as described the distance between the plate and the ground increases. Consequently, the capacity of the condenser formed by the metal plate as one plate, the ground as the opposite plate and the intervening air space as the dielectric, is maintained substantially constant for various positions of the metal plate, since the projected area of said plate upon the ground increases as the distance of the plate from the ground increases and vice versa. A lead wire may connect the plate to the input circuit of the vehicle receiver. In this manner an efficient antenna or counterpoise is provided which is conducive to obtaining the ideal radio reception obtained in properly installed receivers in the home.

Other objects and advantages of my invention will be apparent from the accompanying drawing and following detail description.

In the drawing, Fig. 1 is a rear elevational view of my improved antenna or counterpoise.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary side elevational view of an automobile, illustrating the manner of positioning the antenna on the car.

Fig. 4 is a rear elevational view of an automobile's rear wheels and axle housing, showing embodiments of my invention disposed in a different position upon the car.

Fig. 5 is a rear elevational view of a slight modification of my invention.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5.

Referring in detail to the drawing, 1 indicates a unit antenna or counterpoise comprising an embodiment of my invention. The unit 1 comprises a relatively flexible carrier 2 constructed of electrical insulating material such as rubber, woven fibrous material rendered water and weather resistant or the like.

In addition, the unit 1 comprises a metal plate 3 which in the embodiment shown is attached to the carrier 2 by means of rivets 4. A lead wire 5 is electrically connected at one end to the plate 3, the opposite end thereof being adapted to be connected to the radio receiver.

In the embodiment shown, plate 3 takes the form of a solid metal plate. As the description

proceeds it will be obvious that plate 3 may be in the form of a metal grating, wire mesh screen, or metal grid and the results obtained will be the same. In addition, plate 3 is shown as being secured to one surface of the carrier 2. Obviously, said plate may be disposed on either face of the carrier or it may be embedded in the thickness of the carrier.

The lead wire 5 may be connected to the aerial side of the receiver input circuit (not shown) in which case the unit 1 functions as a counterpoise, and the body of the car an aerial. This ordinarily reversed the high tension end of the input coil which would ordinarily reduce the pick-up but, due to the increased efficiency of the counterpoise, the pick-up is better than a great many roof aerials. The ground side of the input circuit in this instance would be connected to the frame of the vehicle. If desired, the wire 5 may be connected to the ground side of the input circuit of the receiver and the aerial side thereof may either be connected to the frame of the vehicle or connected to a conventional aerial. In this case, the unit 1 serves as a counterpoise and is extremely efficient in capacitatively grounding the receiver.

Referring particularly to Fig. 3, unit 1 may be secured to the lower portion of running board 6 of automobile 7. The upper portion of the carrier 2 may be secured to said running board by any suitable means, for instance, as shown, the carrier may be confined in the juncture of running board 6 and front mud-guard 8. The carrier 2 is so hung from the car that the end thereof carrying plate 3 is disposed adjacent the ground as shown.

Plate 3 may be bent intermediate its length so that when the carrier is hung in place a portion of the plate will project an area of substantial dimensions upon the ground. When the car 7 is standing still or is moving slowly unit 1 will occupy the position shown in full lines in Fig. 3 and the projected area comprises the product of the width of the plate 3 by the length of the bend 9, as indicated at 10. The capacity of the condenser thus formed obviously depends upon this area and the distance between the bent portion 9 of the plate and the ground. When the vehicle 7 is in relatively rapid motion, unit 1 will be swung to an oblique position, for instance, as indicated by the dotted lines in Fig. 3. When in this position the distance between the plate 3 and the ground has increased but to compensate for this the projected area of the plate upon the ground has also increased and, hence, by suitably dimensioning the plate and properly bending the same the capacity of the condenser formed may be maintained approximately constant thereby eliminating variation in the reception of a signal of predetermined strength.

It is contemplated that one or more units 1 may be used simultaneously, for instance, a unit 1 may be mounted beneath each opposite running board. In the use of more than one unit the leads 5 will be connected in cascade or parallel.

Referring particularly to Fig. 4, units 1 may be slung from the rear axle housing 11 of the usual automobile instead or in addition to those on the running board, the units being swingably attached in any desired manner, as by bands 12. The function and action of units 1 in this location of course, is similar to those mounted upon the running board.

When it is desired to mount the units beneath the rear axle housing as shown in Fig. 4, units 1' may be used. Units 1' comprise carrier 2' and plate 3' both of which are similar to carrier 1 and plate 3 with the exception that the plate is bent so as to give a greater initial projected area. Of course, it is to be understood that I do not wish to be limited to the precise dimension or form of the plates 3 or 3', which may be constructed to meet requirements of different type vehicles and radios.

In mounting my devices upon a vehicle, under the running boards, rear axle housing, or other selected points, consideration must be given to the shielding effect of the metal of the vehicle and also the location or seats of electrical disturbances created by the operation of the vehicle itself. The selection of the location of the units, of course, is within the province of those skilled in the art.

I claim as my invention:

1. A device of the character described which comprises, a carrier constructed of electrical insulating material adapted to be swingably suspended from a vehicle, said carrier being swingable along the line of travel of the vehicle whereby motion of the vehicle subjects the carrier to air resistance causing the same to swing, a metal member having substantial area and of greater width than thickness carried by said carrier, a portion of said member being disposed with its width horizontally adjacent the ground and a portion thereof being disposed at an angle to the ground when the vehicle is at rest, the projected area of the metal member upon the ground being increased when the carrier is swung and means electrically connecting said plate to the input circuit of a radio carried by said vehicle.

2. A device of the character described which comprises, a metal member of greater width than thickness having a substantial area, said member having an intermediate bend so as to dispose a portion of said area in a plane at substantially a right angle to the plane of the remaining portion of said area, electrical insulating means swingably supporting said member from the under carriage of a vehicle, and means electrically connecting said member to the input circuit of a radio carried by said vehicle.

3. A device of the class described which comprises, a flexible carrier adapted to be swingably suspended from a vehicle, said carrier being swingable along the line of travel of the vehicle, a metal member of greater width than thickness carried by said carrier, a portion of said member being normally disposed vertically to the ground and a portion thereof being normally disposed horizontally with its width substantially parallel to the ground, to project a predetermined area upon the ground when the vehicle is stationary, means connecting said member to the input circuit of a radio carried by said vehicle whereby said horizontal portion comprises one plate of a condenser of predetermined capacity, said member being adapted to swing when said vehicle is in motion due to air resistance upon the carrier whereby a greater area is projected on the ground thereby maintaining the capacity of the condenser so formed substantially constant.

JUDSON A. COOK.