

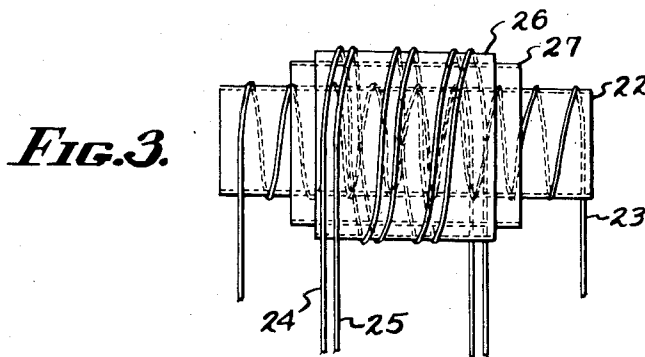
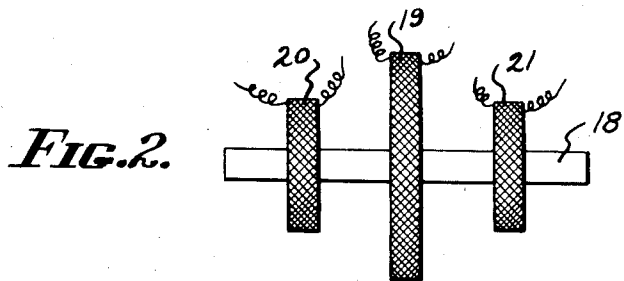
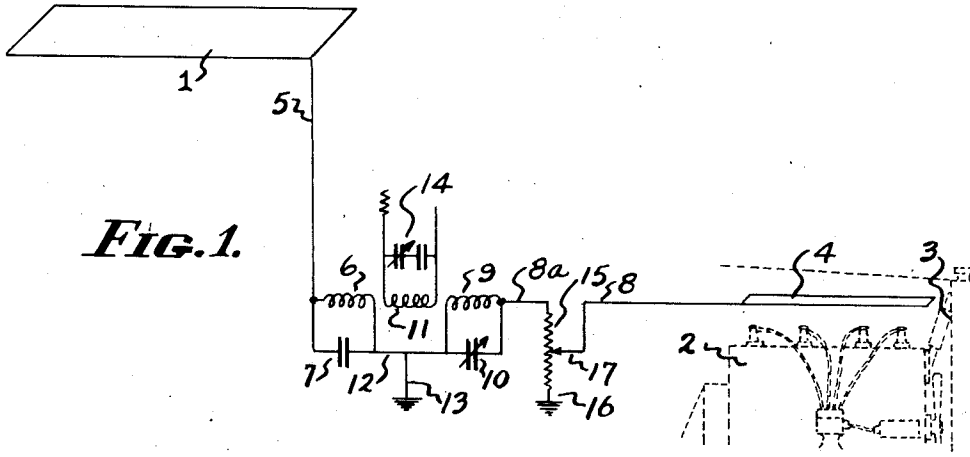
Oct. 11, 1938.

W. H. MYERS

2,132,875

INTERFERENCE SUPPRESSION SYSTEM FOR RADIO APPARATUS

Filed Sept. 28, 1934



INVENTOR.

WILLIAM H. MYERS.

BY

Allen + Allen

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,132,875

INTERFERENCE SUPPRESSION SYSTEM FOR
RADIO APPARATUSWilliam H. Myers, Detroit, Mich., assignor to The
Crosley Radio Corporation, Cincinnati, Ohio, a
corporation of Ohio

Application September 28, 1934, Serial No. 745,959

1 Claim. (Cl. 250—20)

In the operation of automobile radio sets, for example, considerable difficulty has always been had with extraneous noise in the receiver due to electrical disturbances set up by the engine and its associated electrical apparatus. Spark plug and generator suppressors have been used to good effect; but these add to the cost of the installation, and have not, in many instances, entirely eliminated the noise.

It is an object of my invention to provide a new system for the suppression of electrical interference of this type, which is more nearly perfect in operation, which is adjustable to secure the effect desired, and which renders the use and expense of the ordinary suppressors unnecessary. This and other objects of my invention, which will be set forth hereinafter, or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that process, and by that construction and arrangement of parts of which I shall now describe an exemplary embodiment,—namely a system for automobile radio sets. It will be understood not only that modifications may be made in my invention without departing from the spirit thereof, but also that my invention can be applied to other sorts of mobile radio installations, such as those for airplanes, boats and the like, and even to stationary radio sets subject to electrical interference, where the conditions to be set forth hereinafter obtain, or can be made to obtain.

In the automobile, the antenna and its lead wire pick up not only the desired signal, but also "static" due to the electrical interference aforesaid. Briefly, in the practice of my invention I provide another collector which is adapted to pick up the electrical interference, but is shielded with respect to the desired signal. The interference voltage picked up by the second collector is attenuated and is fed to the receiving set in bucking relationship to the voltage picked up by the first collector. The noise voltages therefore cancel each other when the proper relationships obtain, leaving the clear signal voltage for amplification by the receiver. The "conditions" referred to, therefore, are such as permit the location of one collector to pick up signal and undesired radiations, and the location of another collector to pick up the undesired radiations while it is relatively shielded from the signal. It is not necessary that this shielding be perfect. The more perfect the shielding is, however, the less the desired signal will be cut in strength.

In the automobile, the hood, cowl and radiator form a shield about the engine, where the unde-

sired radiations originate. Since these parts are of metal, it is sufficient to locate the second collector beneath the hood, where it will be effectively shielded from the desired signals. In other types of installation similar conditions prevail or can be caused to prevail, special shielding of the second collector being employed if desired.

Reference is now made to the drawing, wherein Figure 1 is a diagrammatic representation of an exemplary installation embodying my invention.

Fig. 2 shows a type of coil assembly useful for connecting the two collectors to the radio set.

Fig. 3 shows another form of coil construction for the same purpose.

Referring to Fig. 1, I have indicated diagrammatically the ordinary car antenna at 1. I have indicated the engine at 2, and 3 represents the assembly of hood, cowl and radiator. 4 is a collector or antenna located within the shielded space 3, but adjacent the engine. This collector may be of any form desired. It may be a wire stretched beneath the hood; it may be a metal plate or a piece of woven wire screen suitably supported on insulating members, or it may have any other form within the skill of the man in the art. It will be seen that the antenna 1 is connected by means of a lead 5 to a primary coil 6, which may be shunted by a condenser 7. The collector 4 is connected by a lead 8 to another primary coil 9, which is likewise shunted by a condenser 10. It will be seen that the primary coils 6 and 9, in their effect upon a secondary coil 11, located therebetween, are essentially out of phase. I prefer to make the condenser 10 a variable condenser so that the phasing may be accurately controlled. The primaries 6 and 9 are connected together as at 12, and to a common ground 13. The coil 11, which is a secondary coil, in its relationship to the primary coils 6 and 9, may be shunted as at 14 by the usual variable condenser for tuning purposes, and may be connected directly or indirectly to the first amplifying tube of the set in ways which will be well understood.

For purposes hereinabove set forth, I prefer to attenuate the voltage picked up by the collector 4, and for this purpose I have shown a potentiometer 15 connected as at 8a to the primary coil 9, and as at 16 to ground. The lead 8 from the collector 4 may be connected as at 17 to the variable contact member of the potentiometer.

In the operation of my invention the antenna 1 serves as a first collector and picks up not only the desired signal, but also a certain amount of

electrical interference. The antenna or second collector 4, being located close to the source of interference (in this instance the engine 2 and its associated electrical circuits) picks up this interference, but by reason of the fact that it is shielded by the hood and associated parts 3, the collector 4 picks up very little if any signal. If now the voltage picked up by the collector 4 is attenuated to the proper value and is applied against voltage picked up by the antenna 1 so as to buck that voltage, it will be seen that the interference voltages may be caused to cancel each other. The signal voltage from the antenna 1 however, will not be so canceled. Ordinarily the collector 4 picks up substantially no signal voltage by reason of the shielding aforesaid. If it picks up a little signal voltage, this may cut down the signal voltage picked up by the antenna 1, but the effect will be greatly minimized, especially by the attenuation of the voltage picked up by the collector 4 due to the action of the potentiometer 15.

The form factor of the coils 6, 9 and 14 is of importance in properly canceling the interference. A number of well known systems of winding may be employed. I have shown in Fig. 2 a support 18 of insulating material holding a honeycomb coil 19, which is the secondary and which feeds the signal to the radio receiver, and a pair of honeycomb primaries 20 and 21 located upon opposite sides of the secondary 19. Adjustment may be had not only by varying the size and form of these coils, but also by varying the distance of primary coils 20 and 21 respectively from the secondary 19.

In Fig. 3 I have shown an insulating support 22, upon which is wound the secondary indicated at 23. The two primaries are wound together as indicated at 24 and 25 about an insulating support 26, and there may be positioned between the insulating support 26 and the secondary 23 an electro-static shield 27.

The operation of my system is dependent upon accurate phasing in the application of a voltage produced by interference against a voltage produced both by the desired signal and the same interference. The system is flexible and adjustable.

The main phasing is, of course, attained by the connections and associations of primary and secondary coils, but may be modified accurately as by means of the variable condenser 10 in Figure 1. The modification of the interference voltage of the second collector to bring it to the value of the interference voltage collected by the first collector is likewise variable by means of a suitable attenuation device, as described. These adjustments may be varied for different conditions. When the proper adjustment has been reached, the operation of the radio set will be very quiet; and I have attained in this way under adverse circumstances, greater quietness of operation than I have found possible to attain by the other means which have hitherto been suggested. Modifications may be made in my invention without departing from the spirit thereof. The system as shown in my drawing is essentially aperiodic, but this is not a necessary limitation upon my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

In an automobile, a radio set, a capacitative signal receiving antenna, a second capacitative antenna located beneath the hood of said automobile and adjacent sources of electrical interference produced by the ignition system of said automobile, and shielded from signal by said hood, and means for applying the voltages picked up by said two antennas to said radio set in out of phase relationship, said means comprising a transformer having a coil connected to said radio set, a second coil connected to said signal receiving antenna, a fixed condenser shunting said coil, a third coil connected to said second antenna, a settable capacity shunting said third coil whereby phase adjustment may be made in installing said radio set, said several coils being in inductive relationship, and the coupling between said coils being fixed, and a potentiometer with a leg to ground located in the connection between said third coil and said second antenna whereby to attenuate the voltage picked up by said second antenna.

WILLIAM H. MYERS.