R. A. WEAGANT.

RADIOSIGNALING APPARATUS.

APPLICATION FILED FEB. 1, 1918. RENEWED SEPT. 16, 1919.

1,336,398. **Patented Apr. 6, 1920.**

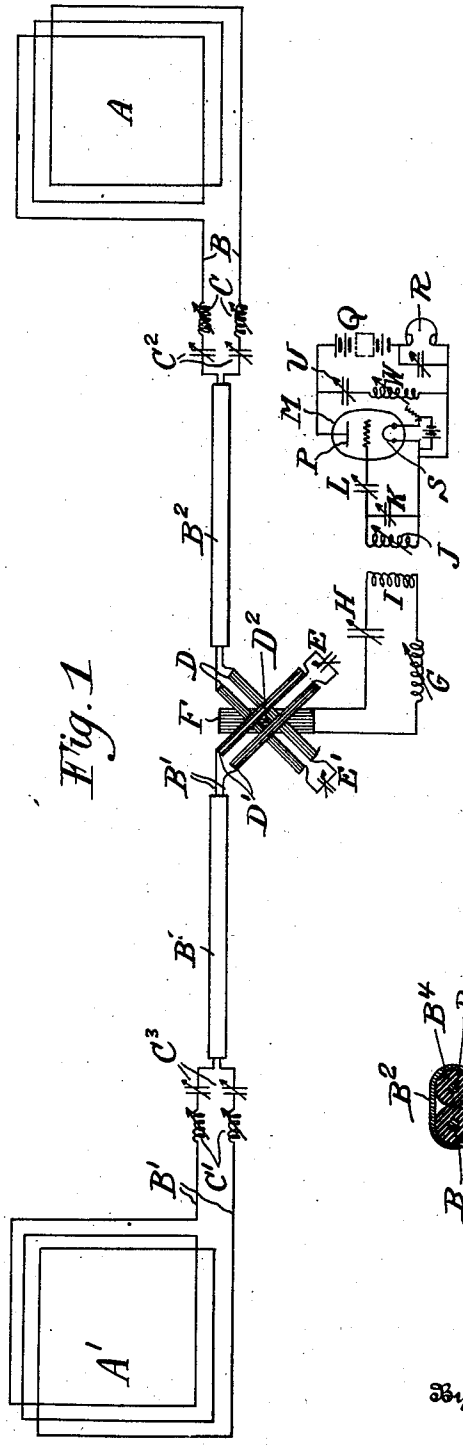


Fig. 1

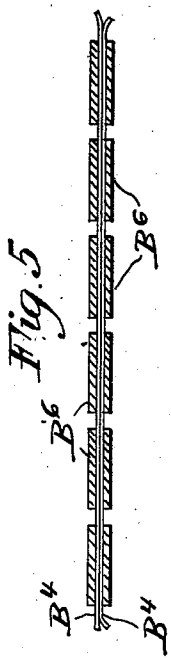


Fig. 5

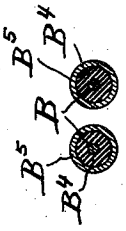


Fig. 4

Fig. 2

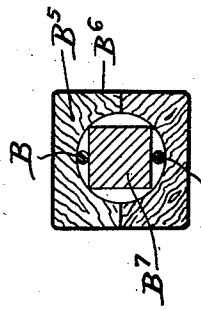


Fig. 3

Inventor

Roy Alexander Weagant

By his Attorney

Herbert E. Ogden

UNITED STATES PATENT OFFICE.

ROY ALEXANDER WEAGANT, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO RADIO CORPORATION OF AMERICA, A CORPORATION OF DELAWARE.

RADIOSIGNALING APPARATUS.

1,336,398. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed February 1, 1918, Serial No. 214,828. Renewed September 16, 1919. Serial No. 324,217.

To all whom it may concern:

Be it known that I, ROY ALEXANDER WEAGANT, a citizen of the United States, and resident of Douglas Manor, county of Queens, city and State of New York, have invented certain new and useful Improvements in Radiosignaling Apparatus, of which the following is a specification, accompanied by drawings.

This invention relates to radio signaling apparatus and more particularly to conductors for radio frequency currents. I have shown the invention applied to radio signaling apparatus of the same general character as that described in my co-pending application, Serial Number 181,458, filed July 19, 1917, but the invention is applicable to any suitable type of apparatus.

In that application I disclosed a method and means for eliminating the effects of static disturbances in radio communication. A plurality of separated antennæ are employed, so located and adjusted that static effects produce currents therein substantially similar in phase, while signal waves produce currents dissimilar in phase. I am thus enabled, by suitable circuits and apparatus, to detect the signals while eliminating or at least greatly reducing the interference due to static disturbances.

As stated in my application referred to, the antennæ may be separated, for instance, by a distance equal to one-half a wave length, and in receiving on long wave lengths, this distance will be considerable measured in actual linear units, so that considerable length of connecting leads is required betwen the receiving apparatus and the antennæ, assuming that the receiving apparatus is located at some point intermediate to the antennæ, preferably midway between. These leads are capable of acting as antennæ themselves and may respond to both signals, and effects due to static disturbances, so that it is desirable to eliminate as far as possible the effects in the leads themselves.

I have found that if these connections or leads are prevented from picking up the signals and the effects due to static disturbances, the reception of signals in the receiving apparatus is still further improved and the slight residium of disturbances, which I am led to believe originates in the long conducting leads, is eliminated.

Various means may be employed for electrically shielding the leads, and in the accompanying drawings I have shown suitable and preferred means for carrying out the invention. In the drawings—

Figure 1, is a diagrammatic representation of circuits and apparatus embodying the invention;

Fig. 2, is an enlarged, detail, transverse, sectional view of one form of shield for the leads or connections, and

Figs. 3, 4 and 5 are views of modifications.

Referring to the drawings, A A′ represent two antennæ, shown in this instance by way of illustration, as loop antennæ, preferably in substantially the same plane and adapted to receive signals from a distant transmitting station which may be in the same general plane as that of the two antennæ A A′, or at an angle to said plane.

Pairs of leads or connections, B and B′, extend from the antennæ A A′ to a receiving station provided with suitable receiving apparatus for combining the effects due to received signal waves and heterogeneous waves due to static disturbances, in the manner described in detail in my application referred to. Each of the pairs of leads, B and B′, preferably has included therein suitable tuning inductances, C and C′, and variable capacities in the form of condensers C^2 and C^3, from which tuning means the connections B and B′ lead to pairs of coils D and D′. The circuits of the coils D and D′ are shown in this instance completed through capacity elements or variable condensers E and E′.

Within the space affected by the coils D and D′ and preferably rotatably mounted on an axis, D^2, parallel to the planes of the coils D and D′ is a coil F, which is subjected to the fields of force set up in coils D and D′, and which is suitably connected to the detecting and indicating circuits. By suitably connecting the coils and adjusting the angular position of coil F, the effects due to the static disturbances neutralize or are combined differentially in the coil F, while the effects due to the signal waves combine cumulatively to produce a resultant current in coil F, all in accordance with my discovery as set forth at length in my co-pending application hereinbefore referred to.

The detecting and indicating circuits may be of any suitable or desirable type, and I have shown the coil F connected through suitable loading inductance G, condenser H, and coupling coil I to the detector. In the arrangement shown, this circuit, F, G, H, I is turned to the frequency of the incoming signals.

The detector shown in this instance, as a three-element vacuum valve M, is connected to the oscillatory circuits J K coupled to coil I. The circuits associated with the detector M may be as shown, including, in addition to the usual plate circuit P Q R S, an oscillatory circuit P U W S.

I have devised a conductor shielded from the affects of arriving radio waves whether signal waves or static disturbances, and by connecting the antennæ A and A' to the receiving apparatus by means of my improved conductors, I am enabled to largely reduce or practically eliminate the residuum of disturbances which might originate in the leads B and B'.

As illustrated in the drawings, the leads B and B' may be provided substantially throughout their length with electrical shields of conducting material which may be in the form of continuous lead covered cables B^2 and B^3 as shown in Fig. 1, or the lead covering may be in sections B^6, as shown in Fig. 5. In Fig. 2 a sectional view is shown of the cable B^2. The connections or leads B are preferably first provided with an insulated covering B^4 and surrounded by the conductive covering B^2 forming the cable. The discontinuous conductive covering B^6 still further tends to prevent signal waves or static disturbances from setting up oscillatory currents in the leads.

In the modification shown in Fig. 3 the leads or connections B are separated within a wooden, boxlike covering in the form of a tube B^5 provided with separating blocks B^7. This wooden tube is preferably provided with an outer covering of foil B^6 or similar conductive material which may be continuous or in longitudinal sections. The lead covering, or covering of wood and foil, or any other suitable covering, effectually serves to electrically shield the leads or connections from the undesired effects. In Fig. 4, two separate covered leads are shown which may be used instead of a cable.

Owing to the capacity existing in the lead covered cable, which will be somewhat reduced in the wooden covering, it is desirable to provide the tuning means in the form of the inductance C C' and condensers C^2 C^3, at points in the leads remote from the receiving apparatus and between the coverings of the leads and the antennæ. This necessitates some suitable form of remote control for the most convenient operation so that the tuning may be effected from the receiving station. I have not, however, shown actual electrical connections for such remote control of the tuning means but I have merely indicated the tuning means diagrammatically since controlling connections are common and well understood by those skilled in the art.

I claim and desire to obtain the Letters Patent following:

1. In combination, at a radio receiving station, a plurality of separated antennæ, means for receiving signals while excluding the effects of static disturbances, and connections between the receiving means and the antennæ, said connections being electrically shielded from signal waves and static disturbances.

2. In combination, at a radio receiving station, a plurality of antennæ separated from one another by an appreciable fraction of a wave length in the direction of desired reception, receiving apparatus including means for eliminating the effects of static disturbances, and leads connecting the receiving apparatus with the antennæ, said leads being electrically shielded from signal waves and static disturbances.

3. In combination, at a radio receiving station, a plurality of separated antennæ, means for receiving signals while excluding the effects of static disturbances, and connections between the receiving means and the antennæ, said connections being provided with coverings for electrically shielding said connections from signal waves and static disturbances.

4. In combination, at a radio receiving station, a plurality of separated antennæ, means for receiving signals while excluding the effects of static disturbances, connections between the receiving means and the antennæ, said connections being electrically shielded from signal waves and static disturbances, and tuning means for the antennæ located in said connections remote from the receiving means.

5. In combination, at a radio receiving station, a plurality of separated antennæ, means for receiving signals while excluding the effects of static disturbances, connections between the receiving means and the antennæ, said connections being electrically shielded from signal waves and static disturbances, and tuning means for the antennæ located in said connections at points between the shielding means and the antennæ.

6. In combination, at a radio receiving station, a plurality of separated antennæ, means for receiving signals while excluding the effects of static disturbances, and conductors between the receiving means and the antennæ, said conductors being provided with insulation, and outer conductive coverings on said insulation for shielding the con-

ductors from the effects of signal waves and static disturbances.

7. In combination, in apparatus for radio reception, a plurality of antennæ separated by an appreciable fraction of a wave length, receiving apparatus at a common receiving station, tuning means local to the antennæ for tuning the antennæ to the incoming signal, tuning means for said antennæ at the common receiving station, and leads between said tuning means, said leads being shielded against electro-magnetic waves.

8. In combination, in apparatus for radio reception, a plurality of antennæ separated by an appreciable fraction of a wave length, reciving apparatus at a common receiving station, and leads connecting said antennæ and receiving apparatus, said leads being shielded against elctro-magnetic waves by a grounded conducting inclosure.

In testimony wherof I have signed this specification in the presence of two subscribing witnesses.

ROY ALEXANDER WEAGANT.

Witnesses:
HERBERT G. OGDEN,
I. BATENDORF.