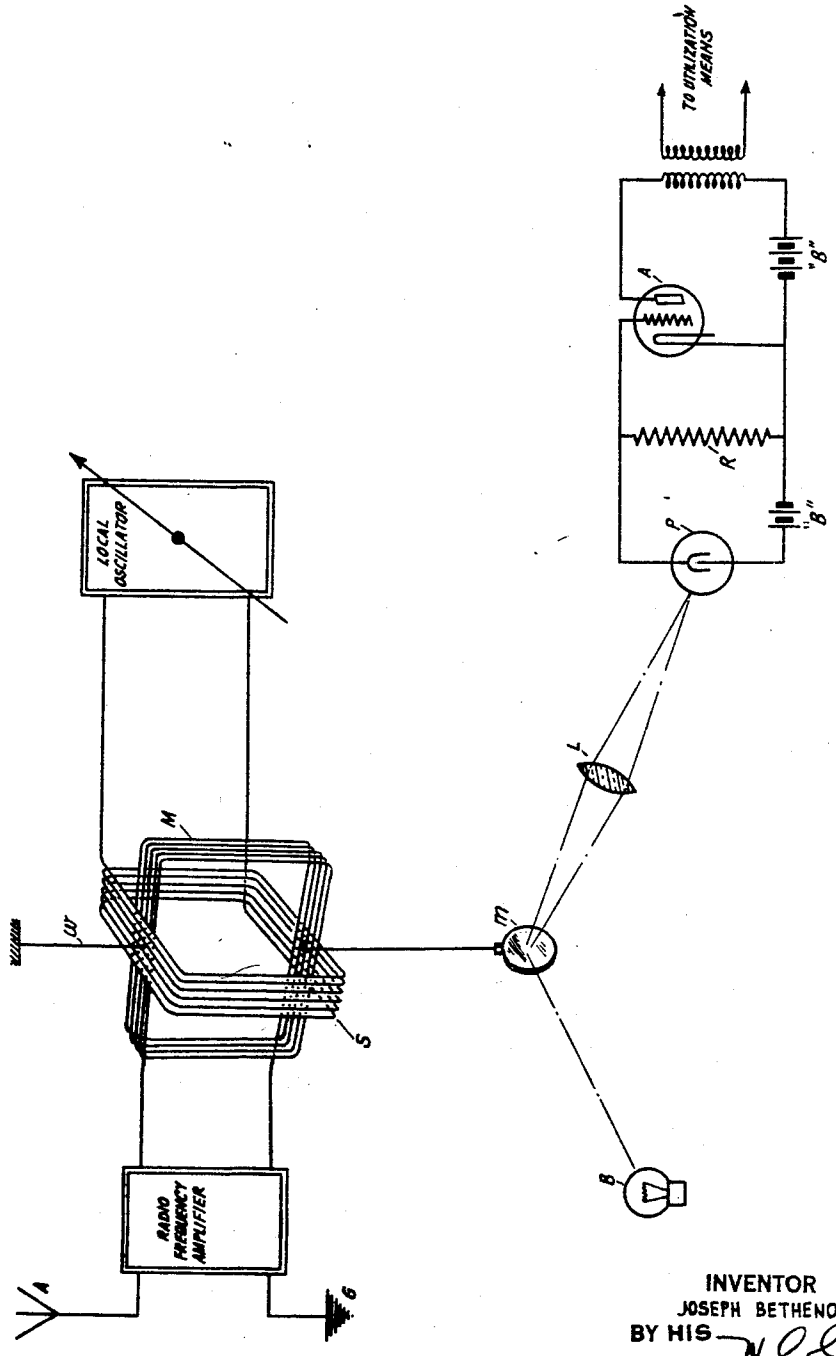
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STRAY AND ATMOSPHERICS ELIMINATING SYSTEM

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## STRAY AND ATMOSPHERICS ELIMINATING SYSTEM

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All of the apparatus and methods heretofore disclosed, as a protection against stray and atmospheric disturbances in radio signalling, are more or less directly based upon the use of a characteristic property of sinusoidal currents. This characteristic is the resonance effect of such currents. In order to more completely eliminate the effects of stray disturbances, in accordance with the present invention, use is made of another characteristic of these sinusoidal currents. The following method of protecting against disturbances may be considered from the above viewpoint.

In disclosing my novel method let us assume that the stray manifests itself in the receiver apparatus by the creation of a current of any shape whatever. In accordance with the present invention, detection of the received radio signal is dispensed with. The current picked up by the aerial is first amplified at radio frequency and then fed to the movable system of a galvanometer device. This galvanometer may be of the resonant type. Instead of being energized by a magnet or an electromagnet of the direct current type, it is first assumed that the magnetic field of this device is produced by an alternating current generated locally, and having the same frequency as that of the desired signal waves picked up by the aerial.

Under these conditions the force or the mean couple set up by the moving system may be quite high, supposing that the radio frequency amplification is sufficient, and that the current producing the magnetic field is kept in phase with the current circulating in the moving system.

Assuming, then, that a stray action manifests itself in the form of a current of constant intensity also circulating in the moving system, the mean couple set up will be of zero value and the protective action will be complete and perfect. It will remain satisfactory as long as the current variations of the stray are slow, compared with the frequency of the signal current. For this protection to become ineffective, it is necessary, as a matter of fact, that the curve of the stray current resolved into a Fourier series, contain a strong, or marked, term having a frequency coming close to that of the signal waves.

As to the rest, ways and means are known to plot the curve in question, and their application in this connection is suggested in accordance with one of the characteristics of this invention. One serious difficulty could be found as regards the necessity of maintaining a co-phasic condition between the current exciting the recording apparatus, and the signal current picked up by the aerial. This may be overcome by choosing for the former a frequency $F_2$ slightly different from that of the useful or signal waves $F_1$, so that the couple, brought to act upon the moving system, will become periodical at a frequency equal to the difference between the two frequencies $F_1$ and $F_2$.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically one circuit organization whereby my invention may be carried into effect.

In the drawing the signal energy, after being collected by a grounded antenna A, G, is amplified in any well-known form of radio frequency amplifier. The latter may be of the tuned input type, if desired. The amplified output is impressed upon the moving coil M of a resonant galvanometer, the coil being suspended by an elastic suspension means *w* of any well-known form.

The magnetic field is created by a coil S energized by a source of local oscillations, the source being variable in order to adjust the same to a frequency $F_2$, slightly different from the desired signal frequency $F_1$.

The constants of inertia and elasticity of the system in question should suitably be so chosen that its natural period will be equal to this difference. In this manner, supplementary selection is obtained by virtue of mechanical resonance, the damping of the vibratory movement being then, if desired, artifi-

cially increasable so that the signals will be reproduced faithfully.

Finally, the moving coil is provided with a mirror *m*, illuminated from a convenient artificial source B. The reflected light is focussed, through a lens L, upon a photo-electric cell P, or an equivalent instrument.

The variable output from the cell P is impressed upon an amplifier A, the latter being of any type desired, and, for example, having a resistor R connected across its input, the amplified output being utilized to actuate any desired type of utilization means, as a telegraphic recorder etc. It is to be noted that the mirror *m* may be replaced by a shutter of extra light weight, if desired.

While I have indicated and described only one system for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organization shown and described, but that many more modifications in the circuit arrangement may be used, as well as in the apparatus employed, without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. In a static-eliminator, a radio frequency circuit, a resonant galvanometric instrument having a moving system connected to the output of said circuit and a fixed system, alternating current generating means connected to said fixed system, the frequency of said alternating current being slightly different from the frequency of the incoming radio signal, a reflecting means supported by said moving means for modifying by its vibration the luminous intensity which is brought to act upon a photo-electric device, the variable current thus obtained being utilized, after detection, to actuate a telegraphic recording apparatus of suitable kind.

2. A receiving system comprising signal energy collecting means, a radio frequency amplifying means connected to the first means, resonant means including a movable coil adapted to be energized by the output from said amplifier, a local oscillator, means, energized by said local oscillator, adapted to produce a magnetic field, said coil being disposed in said field, a light reflecting means supported by said coil, means to project a beam of light on said reflecting means, and photo-electric means, responsive to variations in light reflected from said reflecting means.

3. A receiving system comprising an antenna, a radio frequency amplifier coupled thereto, a resonant galvanometer including a pair of coils, one of said coils being movable and connected to the amplifier output, a source of local oscillations connected to the other coil, and means, responsive to relative movement between both coils for producing electrical variations corresponding to variations in the collected signal energy.

4. A method of protection against stray and atmospheric disturbances when receiving signals on a radio receiver in combination with a resonant indicating means having a moving system and a fixed system which includes the steps of, collecting the signal energy, feeding the signal energy without detection to the moving system of said resonant indicating means, supplying the fixed system of said resonant indicating means with alternating current at a frequency slightly different than the frequency of the incoming signal, tuning the moving system of said resonant indicating means to a frequency determined by the difference between the frequency of the incoming signal and the frequency of the supplied alternating current, and impressing deviations of the moving system upon the receiving system.

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