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MONITORING MEANS FOR REFLECTOR TYPE AERIALS

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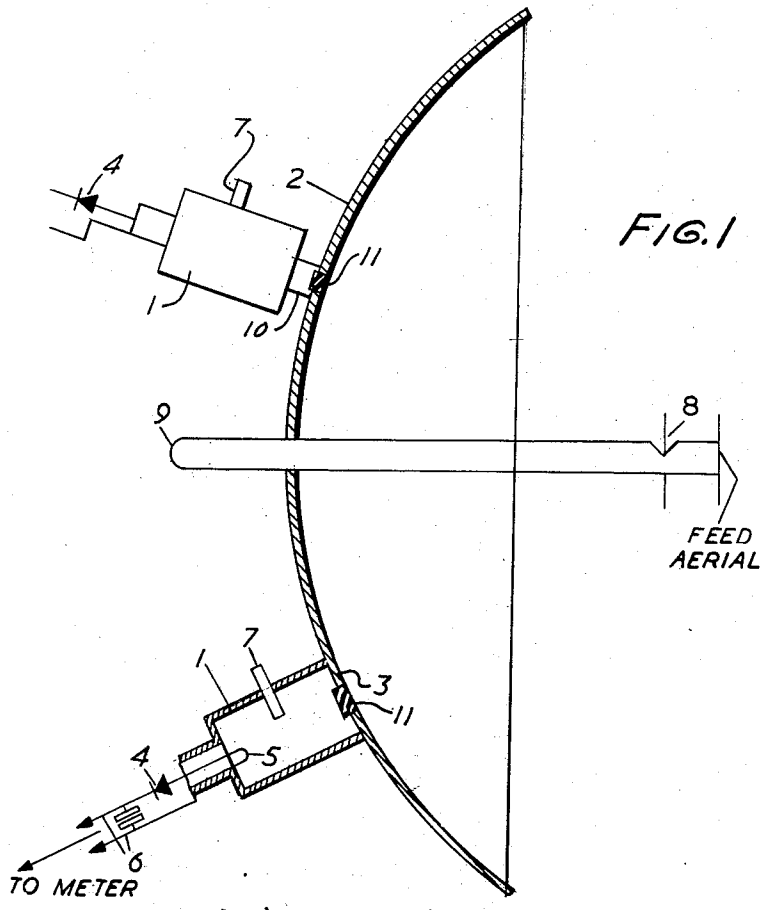


FIG. 1

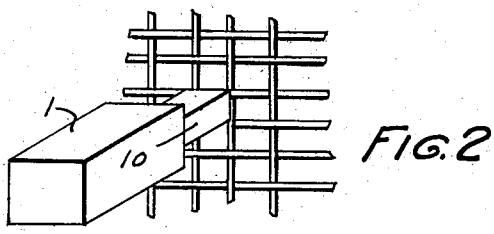


FIG. 2

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MONITORING MEANS FOR REFLECTOR TYPE AERIALS

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6 Claims. (Cl. 343—703)

This invention relates to monitoring means for reflector type aerials.

In equipment utilising the radiation of electromagnetic energy it is often desired to have some indication, preferably continuous, that the whole equipment, including the radiating system, is functioning correctly. This object is frequently achieved by placing a small aerial in the vicinity of the radiating system and by detecting the presence of radio frequency energy in this monitoring aerial. The radio frequency energy so detected is normally caused to provide some indication of its presence on a meter or some such device located in a convenient position for observation by the operator of the equipment.

The monitoring aerial commonly takes the form of a half-wave dipole mounted adjacent to the radiation system. In the case of U.H.F. systems utilising aerials with extensive reflectors the monitoring dipole is frequently fastened to the reflecting surface so that its operation is independent of any movement of the reflector, which may take place, for instance, if the main aerial is required to scan, as for example, in a radar set.

In the case of point to point communication circuits utilising frequencies in the V.H.F. bands and upwards, it is a common practice to connect several sets of equipment to the same aerial. The several sets of equipment are differentiated by operating on different frequencies, the frequencies usually being contained in a fairly narrow band, e.g. in the 865–960 mc./s. band, the band being allocated by international agreement to a specific type of service. The object in connecting more than one equipment to a common aerial is to save duplication of aerials and also to make possible the most effective utilisation of the best aerial sites.

It is desirable in such cases to be able to monitor separately and simultaneously the radiation from the aerial produced by each and every set of equipment connected to it.

The present invention is a simple means for achieving this end in cases where the radiating system incorporates a metallic surface in which radio frequency currents are induced, such as for example the well known paraboloidal reflector type of aerial.

According to this invention monitoring means for aerials having an extended metallic reflector comprises a cavity tunable to the frequency of the radiated energy disposed behind and connected to the reflector and an aperture in the reflector whereby the cavity is coupled to the radiated energy.

From another aspect the present invention is a means of obtaining a sample signal from the field produced by a certain class of radiating system at a point adjacent to the radiator, characterised in that:

(*a*) The sample signal is obtained by cutting an aperture in a metallic surface forming part of the radiating system, and

(*b*) The aperture is coupled to a tunable resonator so that a detector connected to the resonator is excited only by signals occurring in a very narrow range of frequencies.

Reference will now be made to the drawing lodged with this specification which shows diagrammatically and in section a radiating system including a parabolic metallic reflector and also including monitoring means according to this invention,

A large class of radiating systems currently in use comprises a metallic reflector shaped to give a desired spatial distribution of radio frequency energy when irradiated by power from a primary source of energy such as a dipole. In particular the paraboloidal reflector illuminated by a horn or disc-dipole feed radiator is commonly used in fixed point to point radio links operating in the U.H.F. frequency range.

A better understanding of the invention may be had from the particular description thereof made in connection with the accompanying drawing in which Fig. 1 illustrates a preferred embodiment thereof and Fig. 2 illustrates a fragmentary view showing a modification of the arrangement of Fig. 1.

A preferred method of applying the invention to this case is shown in Fig. 1. A tuned cavity resonator **1**, which may have round, rectangular or other form in the manner familiar to those skilled in the art, is fastened to the back of the paraboloidal reflector, and coupled to the radio frequency field by means of an aperture **3** in the reflector.

The coupling between the tuned cavity resonator and the reflector may be effected in various ways e.g. the reflector may form part of the wall of the resonator as shown in the lower part of Fig. 1 in the drawing. Alternatively, the resonator may be coupled to the reflector by means of a tube **10**, preferably cylindrical, which surrounds the aperture in the reflector as shown in the upper part of Fig. 1. If this tube is long i.e. greater than say ½ inch the coupling may be improved by locating a loop or probe within the cylindrical tube.

The radio frequency field in the resonator is detected by a crystal rectifier connected to a hair-pin lead **5** and the resulting direct current connected by leads **6** to a meter located at some convenient point. The resonator may be tuned by a tuning screw or plug **7**. The dipole aerial is shown at **8** and the coaxial feed thereto at **9**.

A feature of the invention is that a large number of such resonators may be fastened to the same reflector, and in cases when the dipole is supplied simultaneously with energy of different frequencies the individual resonators may each be tuned to respond to one only of the several frequencies.

It is not necessary in all cases for each resonator to be coupled to a separate aperture, for at times a resonator may be used which responds to several discrete frequencies.

The apertures in the reflector have dimensions small compared with a wavelength, so that each aperture has negligble effect on the radio frequency currents in the reflector even when the cavity which it feeds is tuned to the frequency of the currents. For weather-proofing purposes, the aperture may be filled or covered by a suitable low loss dielectric material **11** such as polytheylene.

The paraboloidal reflector need not be constructed of continuous sheet metal; it may have the form of a wire-netting reflector in which case one of the openings in the netting may constitute the coupling aperture to the cavity disposed at the back of the reflector as shown in Fig. 2.

What I claim is:

1. An aerial system comprising an extended conductive reflector, an antenna mounted in cooperative relation with said reflector on one side thereof and a monitor means for energy from said antenna comprising a cavity reso-

nator, having an aperture, positioned on the other side of said reflector and tunable to the operating frequency of said antenna, said reflector being provided with a coupling aperture, and means for providing a conductive connection around and interconnecting said apertures to supply energy to said resonator.

2. An aerial system according to claim 1, wherein said last-named means comprises connections between walls of said resonator and the rear surface of said reflector around said aperture, whereby said rear surface forms one wall of said resonator.

3. An aerial system according to claim 1, wherein said last-named means comprises a tubular conductor fastened between said resonator and said reflector around said apertures.

4. An aerial system according to claim 1, further comprising a low loss dielectric element providing a radiation permeable closure for said aperture.

5. An aerial system according to claim 1, wherein said reflector is formed of a perforate screen having a plurality of perforations, said aperture being one of the perforations of said screen.

6. An aerial system according to claim 1, provided with additional apertures, further comprising other cavity resonators positioned on said other side of said reflector and means providing coupling connections between said other resonators and said reflector through different ones of said apertures.

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