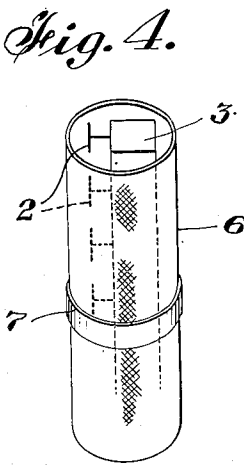
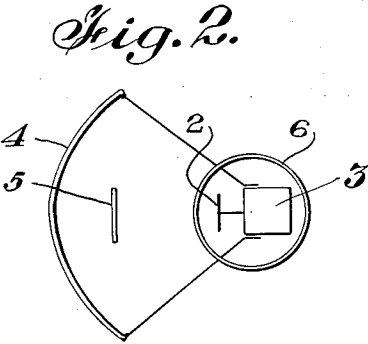
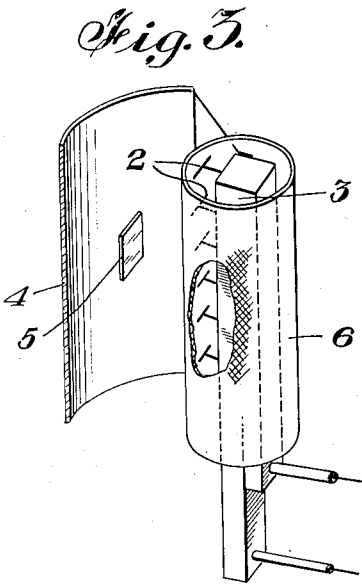
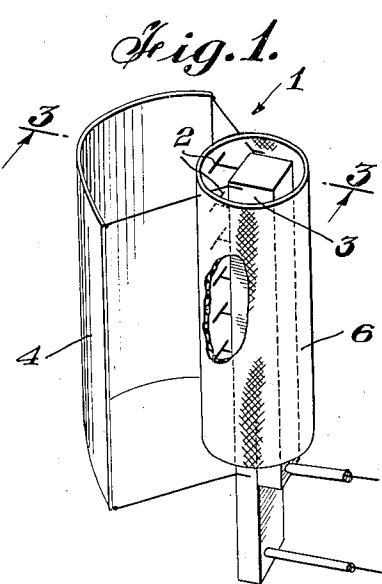


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DIRECTIVE ANTENNA SYSTEM
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DIRECTIVE ANTENNA SYSTEM

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This invention relates to antenna arrays of the type comprising a plurality of radiating elements and particularly to means for adjusting the elements to produce a desired radiating pattern.

Antennas operating at ultra high frequencies usually comprise a plurality of radiating elements connected to a wave guide in such a way as to be excited in a proper phase to produce a desired radiation pattern. The testing of the antenna array after assembly is quite involved, as a slight malpositioning of one of the radiators is apt to cause an undesired irregularity in the radiation pattern. When a desired pattern does not meet the specification, it is the normal procedure to isolate the undesired elements and then to remove them. This is a difficult and tedious process and takes considerable time.

An object of this invention, therefore, is to provide means for simplifying the test and manufacture of ultra high frequency multiple element antenna arrays.

Another object of this invention is to provide means for substantially eliminating the directivity effects of certain malpositioned antenna radiating elements on the antenna directivity pattern without necessitating their removal.

Another object of this invention is to correct the directivity pattern of an antenna system by an adjustable shielding means.

The above mentioned and other features and objects of this invention will become more apparent and the invention itself, although not necessarily defined by said features and objects, will be best understood by reference to the following description of an embodiment of the invention, taken in connection with the accompanying drawings wherein:

Fig. 1 is a perspective side view of a dipole array set in a wave guide and arranged in front of a parabolic cylindrical reflector;

Fig. 2 is a top view of the embodiment of Figure 1;

Fig. 3 is a diagram illustrating a method for checking dipoles contributing to directivity pattern irregularities.

Fig. 4 is a perspective view illustrating a detailed embodiment of applicant's invention.

Figs. 1 and 3 show a radar search antenna 1 comprising a line of horizontally polarized dipoles 2 connected to a wave guide 3 in such a way as to be excited in proper phase to produce a desired radiation pattern. The array is located in front of a reflector 4. When the pattern does not meet specifications, it is a normal procedure to place a metal shield 5 (Figs. 2 and 3) between a certain

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dipole and the reflector, thus substantially eliminating the directive radiation from this dipole. If this improves the pattern, the array is dismantled and the probe of the dipole in front of which the shield was held, is pulled out of the guide so that it receives less energy. The antenna is then put back together again and retested. The process is continued until the antenna passes inspection.

In accordance with applicant's invention, an antenna arrangement is provided which eliminates dismantling process.

In applicant's invention, a shield used to improve the pattern, is made part of the final antenna. To this end, a cover, for example of resin impregnated canvas 6 is provided for the wave guide and dipole array as shown in Figure 2. This cover may be made of any material permitting substantially free passage of radiant energy.

This cover may have any desired configuration and when positioned with respect to the antenna, results in apparently no reduction in radiated power since any energy which is reflected from the shield is apparently returned to the antenna array in such a way that it is reradiated in the desired manner. In a desired arrangement a parabolic strap 7 of conducting material and preferably of one-half wave length long at the antenna operating frequency and in the direction of antenna polarization, is strapped over the cover as shown in Figure 4. This strap is slid up and down the cover of the wave guide until the undesired dipoles are located. The strap is then taped onto the cover and remains a permanent part of the arrangement. As a permanent arrangement, the strap is usually constructed of aluminum foil, taped and covered over by a phenolic varnish. Marks are made on the wave guide and the cover so that the shield would always be in the same place if the cover has to be removed.

In some instances, where many undesired dipoles are located, several straps may be used in the antenna system, or the straps may be combined into larger straps covering several of the dipole elements.

While I have described the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation of the scope of my invention.

What is claimed is:

1. An antenna system comprising, a reflector, a plurality of dipoles arranged parallel and in

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front of said reflector, means for phase exciting said dipoles to produce a directivity pattern, non-radiant energy acting support means mounted about said dipoles, said support means being cylindrical with the axis thereof transverse to said dipoles, shielding means substantially one-half wavelength long at the antenna system operating frequency in the direction of polarization, adjustably mounted about said support means and interposed between said reflector and certain of said dipoles, whereby the directivity effect of said certain dipoles on said directivity pattern is substantially eliminated.

2. An antenna system comprising a wave guide, a plurality of radiating elements, means for phase energizing said elements to produce an antenna directivity pattern comprising said wave guide coupled to said elements, reflecting means disposed adjacent said elements, mounting means permitting the free passage of radiant energy mounted on said wave guide about said radiating elements, metallic shielding means substantially one-half wavelength long at the radiating element operating frequency in the direction of element polarization adjustably mounted on said mounting means and interposed between said reflector and certain of said elements, whereby said directivity pattern is substantially changed.

3. An antenna system according to claim 2 wherein said mounting means comprises a cylindrical piece and said metallic shielding means

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comprises circular straps adjustably mounted about said cylindrical piece, said straps having circumferences of one half wave length.

4. An antenna system according to claim 1, wherein said shielding means comprises circular straps substantially one half wave length in circumference adjustably mounted about said support means in the planes of certain of said dipoles.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,112,282	Fritz	Mar. 29, 1938
2,258,953	Higgins	Oct. 14, 1941
2,342,721	Boemer	Feb. 29, 1944
2,368,663	Kandoian	Feb. 6, 1945
2,369,808	Southworth	Feb. 20, 1945
2,407,057	Carter	Sept. 3, 1946

FOREIGN PATENTS

Number	Country	Date
545,936	Great Britain	June 18, 1942
678,010	Germany	June 24, 1939