May 12, 1942. E. GOSSEL 2,283,054

DIRECTIONAL TRANSMITTER

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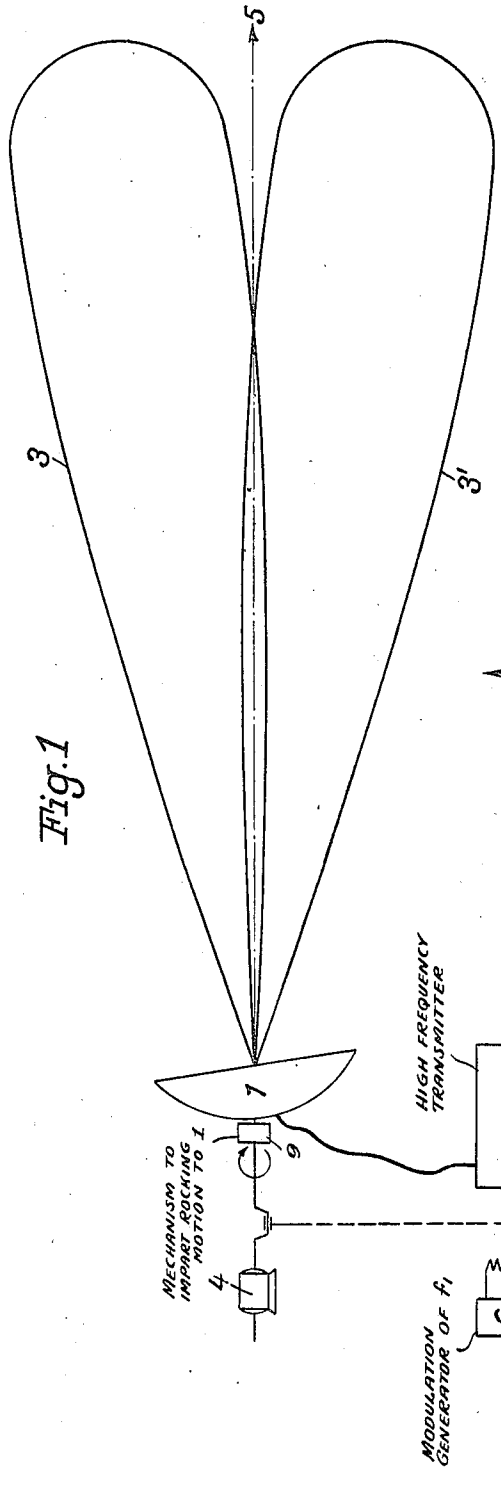


Fig. 1

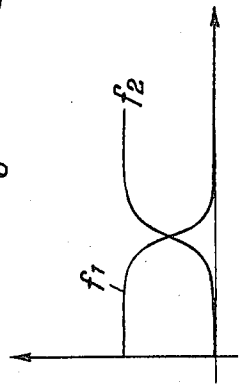


Fig. 2

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DIRECTIONAL TRANSMITTER

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2 Claims. (Cl. 250—11)

This invention relates to directional transmitters, and more particularly to new and useful means for obtaining course lines for guiding aircraft and the like.

There is a variety of different arrangements for producing electromagnetic course lines. Apart from the directional transmitter systems for producing aircraft guide lines of equal field intensity by emitting intermittently keyed, or continually effective but differently modulated and mutually intersecting directional radiation patterns, suggestions have been made to utilize oscillations of very short wavelengths, e. g. in order of a few decimeters, for producing radiation patterns and to provide reflecting means, such as mirrors, for concentrating such oscillations to a sharply defined bundle in order to ensure high direction finding accuracy at low amplitude of transmission. In order to simplify the last-mentioned arrangement, attempts have been made to produce the two directional radiation patterns by one single antenna or reflecting system by subjecting the corresponding system to a rocking motion.

It is the main object of this invention to provide improved means for obtaining guiding course lines. In certain respects this novel arrangement may be considered as a development of the fundamental principles upon which the last-mentioned type of runway localizer is based. According to the main feature of this invention, I provide a transmitter arrangement capable of producing a sharply defined ultra short wave directional radiation pattern which is subjected to a continuous rocking motion during which the amount of modulation applied to the transmitter from each of the two modulation generators of different frequencies is caused to vary in opposition to each other.

My invention will be fully understood from the following description taken in conjunction with the accompanying drawing, in which

Fig. 1 schematically shows one embodiment of this invention in plan view, while Fig. 2 is a diagram illustrative to the modulation curves of Fig. 1.

Referring to Fig. 1, reference numeral 1 indicates an ultra short wave emitter, such as a parabolic mirror, radiating a sharply bundled directional radiation pattern. This emitter is fed from a high frequency transmitter 2. The lobe or club-shaped directional radiation diagram 3 is produced when the emitter 1 obtains the position shown in the drawing. An electromotor 4 mechanically coupled with the emitter over control mechanism 9 serves to impart a rotational or rocking motion to the latter so as to continually move this lobe between the two positions 3 and 3' as shown in this figure. Suitable mechanisms for producing a rocking motion from a continuous rotary motion are well-known, such mechanisms being frequently used for rocking developer trays in photography or for operating advertising displays. The central line between the extreme positions 3 and 3' of the lobe is designated by reference numeral 5. According to the invention there are provided two modulation generators 6 and 7 each adapted to produce a modulation frequency which differs from that of the other. These two modulation frequencies $f1$ and $f2$ are impressed upon the high frequency transmitter through a variometer device 8 which is mechanically coupled with the means actuating emitter 1. The potentiometer 8 has for its object to change the amplitudes of the modulation frequencies $f1$ and $f2$ from the generators 6 and 7 in such manner during the rocking or rotational movement of the emitter 1 that, by way of example, the frequency $f2$ from the generator 7 reaches its maximum value when the lobe is directed as indicated by 3, while the generator 6 involves its maximum amplitude when the lobe approaches its opposite extreme position as indicated at 3'. The amplitudes of the two modulating frequencies $f1$ and $f2$ are caused to vary in opposite sense. When the axis or central line of the lobe passes through the center line 5, both modulation frequencies involve equal amplitudes. This amplitude coincidence is indicated in receiving equipment for defining the course line to be flown.

The specific improvement involved by the above-described arrangement over the heretofore known systems of this type is the considerable amplitude difference obtained between the modulation frequencies $f1$ and $f2$ on either side of the central or course line 5. Because of the high amount of regulation with respect to the amplitude modulation variations in response to the rocking or rotating movement of the emitter 1 sharply defined course lines are provided. According to a preferred embodiment of this invention, the amplitudes of the modulation frequencies $f1$ and $f2$ are caused to change in accordance with a non-linear characteristic in response to the movement of the emitter 1 as shown in Fig. 2, in which the degree of modulation is plotted as ordinate versus the abscissa which represents the momentary position of the lobe.

The present invention is by no means limited

to the embodiment described and schematically illustrated in the drawing since it includes all improvements concerning the means for effecting the movement of the emitter and for controlling the amount of modulation involved by the different modulation generators as will be pointed out in the appended claims.

What is claimed is:

1. A high frequency transmitter system for obtaining course lines, comprising a pivotally mounted emitter capable of continually producing a sharply concentrated club-shaped directional radiation pattern, a high frequency generator therefor, a mechanical drive for imparting a regular rocking motion to the said emitter, two modulation generators adapted to produce two different frequencies for modulating said high frequency generator, and non-linear resistance means controlled by said mechanical drive for gradually varying the amplitudes of said modulation frequencies non-linearly in a mutually opposing sense in timed relation with the regular movement of the said emitter.

2. A high frequency transmitter system for obtaining course lines, comprising a pivotally mounted emitter capable of continually producing a sharply concentrated club-shaped directional radiation pattern, a high frequency generator therefor, a mechanical drive for imparting a regular rocking motion to the said emitter, two modulation generators adapted to produce two different frequencies for modulating said high frequency generator, and means physically coupled to the said mechanical drive for varying non-linearly the amplitudes of said modulation frequencies in a mutually opposing sense in response to the regular movement of the said emitter.

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