June 6, 1944. P. P. GAMET 2,350,747

AERIAL SYSTEM FOR RADIO BEACONS

Filed May 9, 1942

Fig. 1.

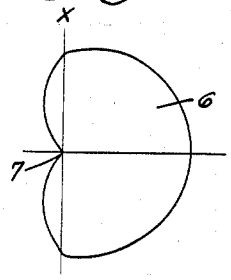


Fig. 2.

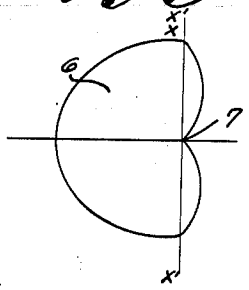


Fig. 6.

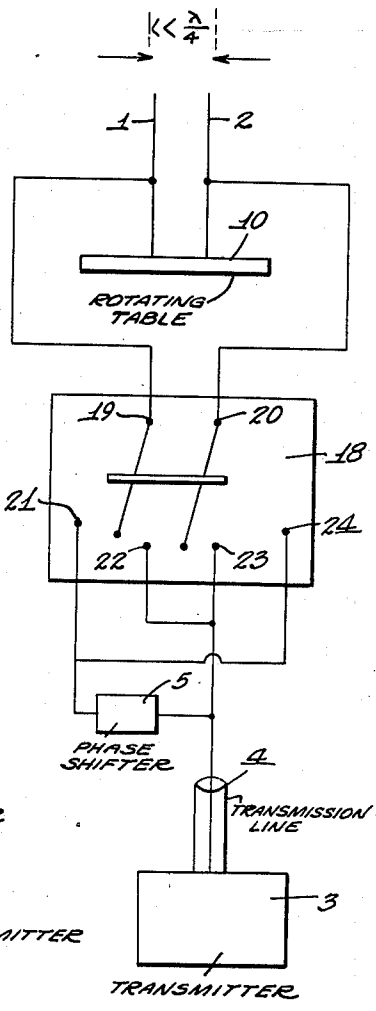


Fig. 3.

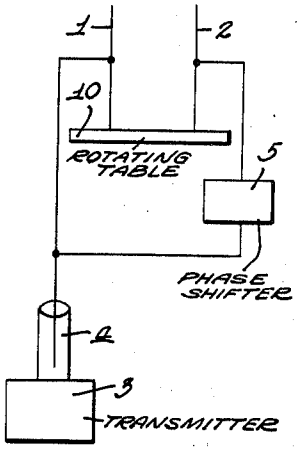


Fig. 4.

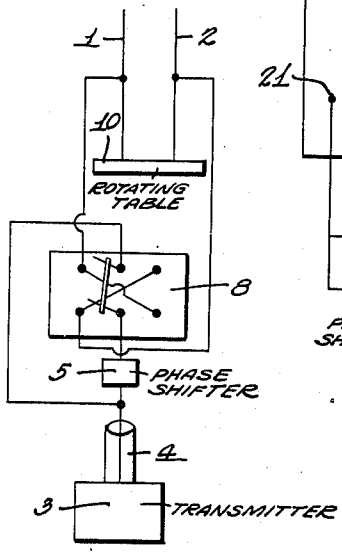
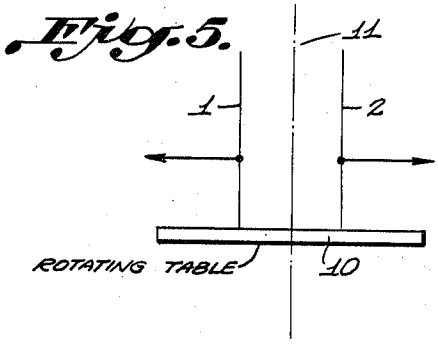


Fig. 5.



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By Attorney.

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2,350,747

AERIAL SYSTEM FOR RADIO BEACONS

Pierre Paul Gamet, Paris, France; vested in the Alien Property Custodian

Application May 9, 1942, Serial No. 442,374
In France May 29, 1941

2 Claims. (Cl. 250—11)

This invention relates to improvements in aerial systems for radio beacons.

It relates more particularly to an aerial system for radio beacons which provides for effecting in a novel manner a well known method of radio direction finding.

In the known aerial systems for radio beacons it is necessary that the distance between the three aerials providing for the transmission of the radio-electric waves in a preferential direction shall be equal to a quarter of the wave length, which offers the disadvantage of requiring a cumbersome device which can be mounted only with difficulty on a rotating plate for obtaining a rotating beam.

Furthermore, these systems require the use of at least three aerials.

The present invention has for its object to remedy these disadvantages and to provide a device with two aerials which are set very close together, the said device permitting to obtain a radiation in a preferential direction and in a given range of frequencies.

On the other hand, if it is desired to obtain a circular pattern of radiated beam, the known aerial systems for radio beacons necessitate a fourth aerial, which still further increases the space required by the system and its cost.

Another object of the present invention is also to do away with this disadvantage by providing an aerial system for radio beacons which necessitates no special additional aerial for the circular radiating beam.

An improved aerial system for radio beacons permitting to attain the above mentioned objects possesses the characteristic features which appear from the following description and especially from the appended claims.

Systems made according to the invention are shown diagrammatically in the appended drawing, in which:

Figures 1 and 2 are radiation diagrams of the systems;

Figures 3 and 4 are circuit diagrams of the system;

Figure 5 is a view of a system for obtaining a rotating radiation pattern by rotating the antennas on a rotating plate, and

Fig. 6 shows an arrangement for selectively obtaining a desired one of a variety of radiation patterns.

The diagram of Figure 3 comprises an aerial 1 which is supplied directly by the transmitting station 3 by means of a transmission line 4.

An aerial 2 is supplied by the same transmitting station 3 by means of the transmission line 4 and of a phase shifting unit 5 so that the supply voltage of this aerial is shifted in phase by a certain value with respect to that of the other aerial 1.

The operation of the device is identical to that of the device which is generally used for obtaining the radiation pattern transmitted in a preferential direction and in which a system of two aerials is used which are spaced from one another by a quarter of a wave length, this spacing effecting the difference of course giving the phase shifting which is necessary for the operation of the system and permitting to obtain the radiation diagrams of Figures 1 and 2.

This phase shifting obtained by a difference of course is effected, in the device according to the present invention, through a phase shifting circuit which permits by adjusting the phase in a convenient manner to set the aerials at any distance from each other. Thus a radiation diagram with a radiation pattern shown by the cardioid 6 is obtained, the axis of the aerials being at 7.

This device permits to easily set up all the relations which are necessary for the operation of apparatus such as rotating radio beacons or beaconing devices for a channel, namely:

(1) Reversing of the direction of radiation;
(2) Obtaining a rotating radiation beam;
(3) Obtaining a circular radiation pattern.

Referring to Fig. 4, the desired direction of the radiation is obtained by reversing the supply connections of the aerials 1 and 2.

The aerial 1 is then supplied through the medium of the phase shifting circuit 5 and the aerial 2 is supplied directly. For carrying out this operation one may provide a reversing switch 8 which effects the changes of connections which are necessary for directing the radiating beam sometimes in one direction and sometimes in the other, by reversing the supply connections of the two aerials.

For obtaining a rotating directional radiation beam the aerials are mounted on a plate 10 revolving about an axis 11, and are connected to the transmitter in convenient manner.

The rotation of this plate 10 effects the rotation of the directional radiating beam.

This system offers the advantage that it can be mounted on a plate of small dimensions since the aerials can be very close to each other contrary to the known systems where the distance between both aerials must be equal to a quarter of a wave length.

A circular radiating beam is obtained by feeding the aerials 1 and 2 in phase.

Such an arrangement is shown in Fig. 6, which shows a modification of the arrangement of Fig. 4, in which there is employed a three-position switch 18, which in one of its positions will feed both the aerials 1 and 2 in phase directly from the transmitter 3 and transmission line 4. In its other two positions, the switch 18 will act like the switch 8 in Fig. 4, to connect one aerial direct to the transmitter, and the other aerial to the phase shifter, in either combination desired. The switch 18 is arranged and wired to provide the third operating position. When the transmitter 3 is connected directly to both aerial 1 and aerial 2 without passing through the phase shifter 5 at all, the aerials are fed in phase, and there is produced a circular radiation pattern.

In Fig. 6, the aerials 1, 2, the transmitter 3, the transmission line 4, and the phase shifter 5, correspond to the similar elements of Fig. 4, and the rotating table 10 carrying aerials 1 and 2 corresponds to rotating table 10 of Fig. 5. In the three-position switch 18, the blade terminals 19 and 20 are respectively connected to aerials 1 and 2. The outside contact terminals 21 and 24 are connected together and to phase shifter 5. The inner contact terminals 22 and 23 are connected together and through transmission line 4 directly to transmitter 3. In its extreme right position the switch 18 connects transmitter 3 directly to aerial 1, and connects through phase shifter 5 to aerial 2, while in the extreme left position of switch 18 the connections to the aerials 1 and 2 are reversed. In its middle position, switch 18 connects both aerials 1 and 2 in phase directly to transmitter 3 through transmission line 4.

Since these aerials 1 and 2 are set at a small distance from each other, they form a unit which is equivalent to a single aerial and thus radiate equally in all directions.

With respect to the known systems this device offers the advantage that it requires no special aerial for obtaining a circular radiation pattern.

I claim:

1. In an aerial system for radio beacons, a pair of aerials mounted very close together relative to a quarter wave length, a source of high-frequency oscillations, a first transmission line connected to a first one of said aerials, a second transmission line connected to a second one of said aerials, a phase shifting impedance unit, and selective connecting means for selectively connecting either the both of said transmission lines to said source without passing through said phase shifting unit, or connecting either one of said transmission lines to said source through said phase shifting unit and at the same time connecting the other one of said transmission lines directly to said source without passing through said phase shifting unit.

2. In an aerial system for radio beacons, a pair of aerials, a rotatable plate, said aerials being mounted on said plate very close together relative to a quarter wave length, a source of high-frequency oscillations, a first transmission line connected to a first one of said aerials, a second transmission line connected to a second one of said aerials, a phase shifting impedance unit, and selective connecting means for selectively connecting either the both of said transmission lines to said source without passing through said phase shifting unit, or connecting either one of said transmission lines to said source through said phase shifting unit and at the same time connecting the other one of said transmission lines directly to said source without passing through said phase shifting unit, and at all times maintaining both of said aerials energized from said source.

PIERRE PAUL GAMET.