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SIGNALING METHOD AND ARRANGEMENT THEREFOR

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Fig. 1.

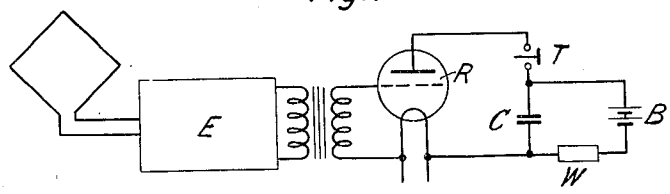
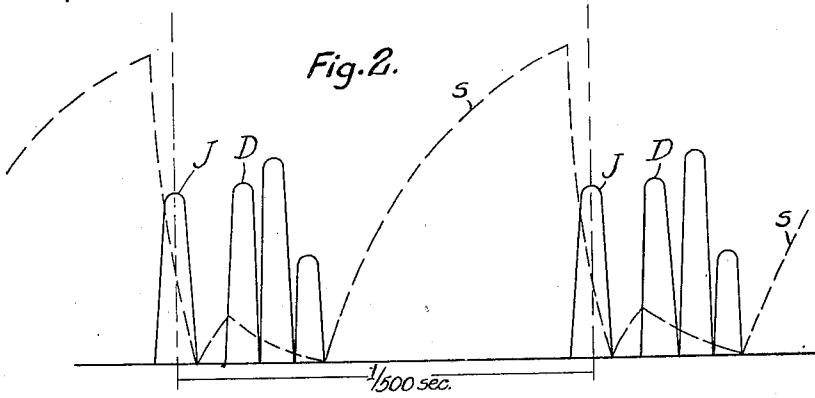


Fig. 2.



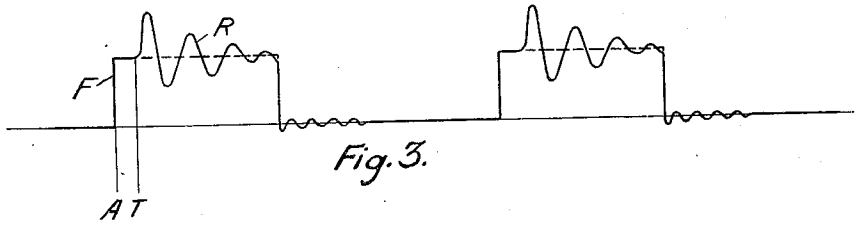
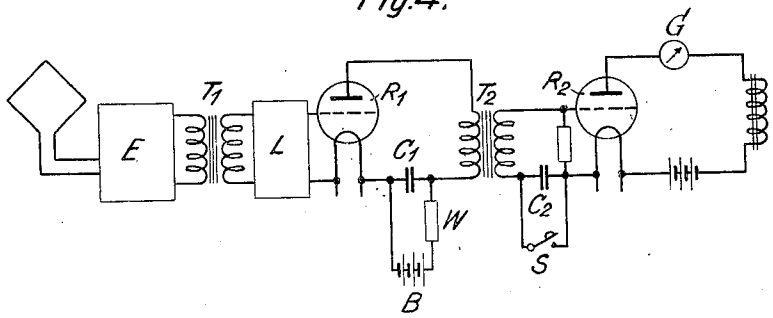


Fig. 3.

Fig. 4.



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SIGNALING METHOD AND ARRANGEMENT THEREFOR

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6 Claims. (Cl. 250—11)

The invention has for its object to separate in the case of double signals or the like the first impulse from those following upon it. This problem is to be solved for instance with respect to direction finding methods effected by means of wireless transmitters and is therefore explained hereafter with reference to method of this kind. The invention is however not limited to such application but may be adopted whenever a similar problem requires attention, such as in reception of signals which are transmitted by wireless and which on the one hand arrive at the receiver along a direct path (ground wave) and on the other hand reach the receiver owing to reflection by the Heaviside layer. The reflected signal in a well-known manner arrives somewhat later than the direct signal and this fact brings about inaccuracies of the received signal.

According to the invention a condenser is discharged by the first impulse and then allowed to recharge slowly.

A direction finding method has been proposed with which short impulses are radiated by the transmitting station at equal intervals. This method is therefore called the impulse method. In the output circuit of the receiver a Braun tube is located. This tube allows to separate the directly arriving signals from those reflected by the Heaviside layer and to use only the ground wave for bearing. This method has the advantage that errors due to the so-called night effect, that is, due to the signals reflected by the Heaviside layer, are avoided as these signals are for the purpose of bearing separated with the aid of the Braun tube. It will be readily seen that the Braun tube on account of its high sensitiveness over mechanical shocks and also on account of the requisite great expenditure in means is not adapted to be employed everywhere.

The method according to the invention has not these disadvantages.

The invention will be understood from the following description and be particularly pointed out in the appended claim, reference being had to the accompanying drawing in which

Fig. 1 is a diagrammatic view of an arrangement for effecting the novel method, Fig. 2 a diagram relating to the operation of this arrangement, Fig. 3 a diagram illustrating a modification of the mode of operation shown in Fig. 2, Fig. 4 shows a circuit arrangement wherein the arrangement represented in Fig. 1 is contained for a purpose disclosed hereafter.

In the output circuit of the receiver E an electron tube R is included in whose anode circuit a telephone T and a condenser C are disposed. The condenser is in connection with the battery B over a resistance W.

Let it be assumed that the condenser is in a charged condition. When then the impulse of the ground wave arrives from the transmitter, it is led from the tube R to the telephone T. The tube is permeable because the necessary anode potential is supplied by the charged condenser C. On the arrival of the double signal, i. e. the signal reflected by the Heaviside layer, the condenser has already been discharged and the tube R cannot operate any longer as no anode potential is now applied to it. The condenser slowly recharges during the arrival of the double signals but will not be recharged perfectly until the arrival of the next impulse of the ground wave. These relationships will appear from Fig. 2. Here the impulses are designated J, while *s* is the curve by which the condenser voltage is shown. The double signals are designated D.

It is assumed that the condenser C is in a discharged condition and then charged from the battery B over the resistance W, whereby the voltage *s* across its terminals increases according to an *e*-function. The operating point of the tube lies at the lower bend of the operating characteristic so that no current flows. In the moment when the first impulse J is applied to the grid of the tube R, a plate current flows, which completely discharges the condenser C, i. e. the condenser voltage decreases to zero according to an *e*-function during the signal interval. After the first impulse J is finished, the re-charge of the condenser is immediately started and its voltage again rises in accordance with the first *e*-function. A high voltage, however, is not reached, as the reflected impulses D meanwhile arrive and nullify the existing low charging voltage. When these impulses have ceased, a recharge over a longer period occurs so that on receipt of the succeeding first signal the condenser presents a sufficiently high voltage for making the tube R permeable.

As mentioned already the novel method may especially be employed for bearing purposes. In this case it is advantageous to key the radio beacons in a manner adapted for the purpose. As is well known, special measures are nowadays adopted with radio beacons in order to avoid an upward radiation or an upward radiation component. In this regard especially the so-called Adcock system has become known with which four vertical aerials are erected in the corners of

a square and are in the requisite phase relations fed from the centre thereof. Special means are here employed in order to prevent the horizontal leads from radiating to the vertical aerials. This antenna system must be made up very carefully and hence is rather costly. Further it has the disadvantage that it cannot be quickly built up anywhere.

Therefore the proposal is made to omit the particular measures intended to suppress the space radiation and to make up the beacon in such a manner that it does possess space radiation, that is to say, to construct it simply in the customary manner. In order however to eliminate despite this the night effect the signals (dots and dashes or *a*- and *n*-signals) are subdivided into individual impulses with intervening pauses which are equal to each other, while the described method is employed on the receiving side in order to eliminate the first impulse and to cause it to be indicated. In the zone of the continuous dash line there will then be obtained not a constant amplitude but a tone, a result that is by no means disadvantageous. By the application of the reception method described herebefore the double signals reflected by the Heaviside layer are eliminated. A brief calculation shows that this method can be carried into effect if on the transmiting side 500 impulses p. s. are given. However, not a tone should be used for modulating but actual telegraphic impulses must be given.

The invention as thus far described is intended to use the entire first impulse for discharging the condenser.

An additional step of the invention is to employ only the first part of the signal. This method may especially be used if telegraphic signals are employed and if in consequence of the night effect the signal transmitted by the ground wave is in part rendered unavailable.

The relationships due to this modification will be seen from Fig. 3 which shows the signal arriving at the receiving station. The signal F transmitted by means of the ground wave (telegraphic dash signal) is of the usual rectangular shape. Superposed however on the ground wave is the space wave, so that owing to the space wave component R the rectangular shape of the signal is from a definite moment T converted into an irregular shape.

The invention therefore further proposes to so arrange the device shown in Fig. 1, as for example by dimensioning the discharging or charging circuit for the condenser accordingly, that the discharge of the condenser is caused only by the initial portion of the signal not yet influenced by the night effect. If the discharge of the condenser occurs in the period of time between the instants of time A and T then the discharge is started by the first part of the received signal, that is that part of the arriving signal which still has the original rectangular shape.

If the signals follow very slowly upon each other, such as is the case for instance with the usual telegraphic keying, so that at the receiving station the arriving signal is in consequence of the night effect altered very swiftly in shape as compared with the number of the emitted signals, then difficulties may be encountered on effecting the invention as thus far described.

The further invention therefore proposes to actuate through an arrangement such as shown in Fig. 1 a measuring device well-known per se for designating the voltage leaks (a so-called impulse meter). This combination has advantages with respect to the reception of telegraphic signals and is advantageous also if the method described herebefore is employed for the purpose of bearing impulse-series by wireless.

The circuit arrangement shown in Fig. 4 is an example of the arrangement for effecting the reception of telegraphic signals.

Connected to the receiver E is a transformer T1. The tube R1 acts to rectify the signals taken up by the receiver. In the output circuit of the rectifier a transformer T2 and in series therewith the condenser which is discharged and charged are arranged. The condenser is designated C1, the charging resistance W and the voltage source denoted by B. Tube R2 coacts with the indicating instrument G in the manner of a peak voltmeter, that is, as a very sensitive indicating device for short impulses. The effect of this arrangement is that the anode current of the tube R2 decreases under the influence of each impulse and thereafter slowly reassumes its normal state.

If keying signals are taken up by the receiver the indicating instrument therefore indicates the amplitude value which there is after the signal pause.

As stated before, however, the arrangement may be employed also for effecting bearings. These may be readily obtained if for instance the receiving frame aerial is reversed in polarities or the high antenna of a high antenna frame combination keyed, for example in the *a-n* rhythm (the Scheller dash method employed on the receiving side).

In this case the arrangement is advantageously such that in parallel with condenser C2 of the impulse meter a switch S is disposed by which the condenser is short circuited momentarily during the frame polarity reversal in order to be discharged and thus be ready for being recharged after the frame has undergone the reversal of polarity. The switch S is preferably combined with the means that serves for effecting the reversal of polarity.

The arrangement may advantageously be completed in such manner that the signals arrive over a tone selecting device L which acts to eliminate foreign signals. This device preferably consists of a series resonance circuit which is tuned to the respective frequency and comprised of inductance and capacity, the coupling circuit which by preference consists of a transformer winding, being included in the resonance circuit. Connected to the series and resonance circuit is a rejector circuit comprised of a large capacity and a small inductance. The output circuit is made up in the same manner as the input circuit. By adopting this circuit arrangement, which is known in itself, a tone selection is obtained which in practical relation is free of losses.

What is claimed is:

1. An arrangement for separating the first impulse in the case of double signals or the like, comprising a receiver, a condenser in the output thereof, a battery, means for charging the condenser from said battery, means for causing the condenser to be discharged by the first impulse received by said receiver, and means effective upon discharge of the condenser for recharging the condenser slowly with regard to the rate of discharge thereof, thereby to block the receiver against reception during such recharging of the condenser.

2. An arrangement according to claim 1

wherein the receiver contains a vacuum tube in the plate circuit of which is connected said condenser, and means for causing said condenser to control the voltage of the plate circuit of said tube whereby plate current will flow during the reception of said first impulse.

3. A wireless direction finding system employing radio beacon signals and utilizing the arrangement according to claim 1 characterized by the provision of means for sub-dividing said radio beacon signals into individual impulses.

4. A wireless signaling system employing telegraph signals and utilizing the arrangement according to claim 1 characterized by the provision of means for causing the first part of the telegraph signal received to be the impulse for discharging said condenser.

5. An arrangement for separating the first impulse in the case of double signals or the like, comprising a receiver, a tone selective device in the output of said receiver, a vacuum tube in the output of said selective device, a condenser in the plate circuit of the vacuum tube, means for causing the condenser to be discharged by the first impulse received by said receiver, means including a battery effective upon discharge of the condenser for recharging the condenser solely with regard to the rate of discharge thereof thereby to block the receiver against reception during such recharging of the condenser and an indicating device connected to said plate circuit of said vacuum tube and responsive to the discharge of said condenser.

6. An arrangement for separating the first impulse in the case of double signals or the like, for receiving radio beacon signals, comprising a receiver, a tone selective device in the output of said receiver, a valve in the output of said selecting device, a condenser in the plate circuit of said valve, said condenser being discharged by the first impulse received, means for recharging the condenser slowly with regard to the discharging thereof, a second valve, a transformer, the grid circuit of said second valve being connected to the secondary of said transformer, the primary thereof being inserted in the plate circuit of said first valve, a second condenser in the grid circuit of said second valve, a keying device for short circuiting said second condenser during reversal of polarity of the receiving antenna arrangement and an indicating instrument in the plate circuit of said second valve for indicating the received impulses.

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