No. 775,050. PATENTED NOV. 15, 1904.

D. W. TROY.

METHOD OF SELECTING ELECTRICAL IMPULSES.

APPLICATION FILED APR. 8, 1904.

NO MODEL.

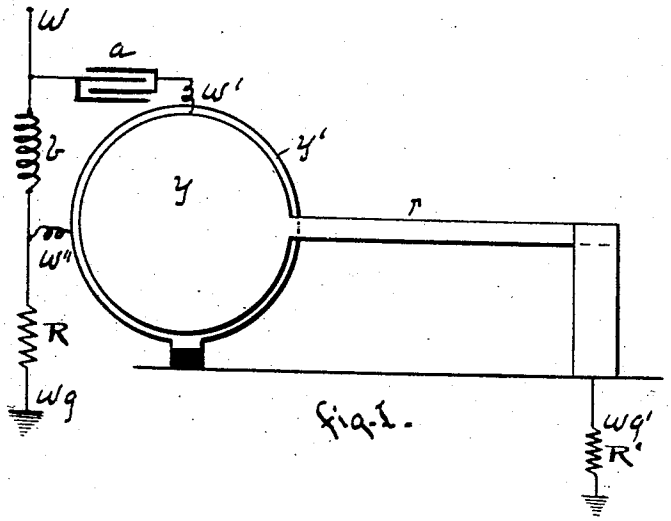

fig. 1.

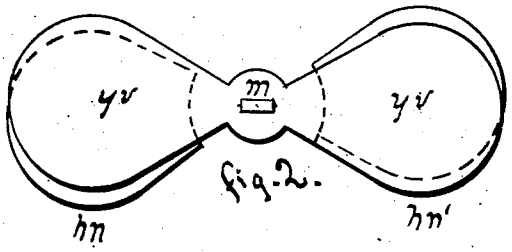

fig. 2.

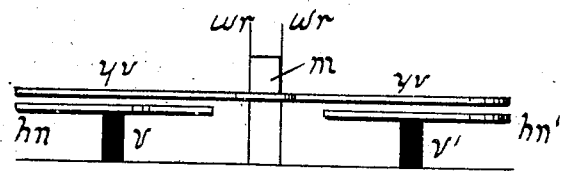

fig. 3.

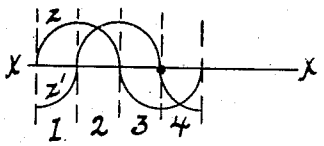

fig. 5.

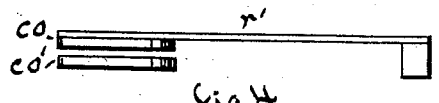

fig. 4.

Witnesses
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No 775,050. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

DANIEL WATTS TROY, OF NEW YORK, N. Y.

METHOD OF SELECTING ELECTRICAL IMPULSES.

SPECIFICATION forming part of Letters Patent No. 775,050, dated November 15, 1904.

Application filed April 8, 1904. Serial No. 202,269. (No model.)

To all whom it may concern:

Be it known that I, DANIEL WATTS TROY, a citizen of the United States of America, residing in the city, county, and State of New York, (with a post-office address at No. 32 Broadway, in said city,) have invented certain new and useful Improvements in Methods of Selecting Electrical Impulses, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to the selective reception of electrical impulses, such as those used in wireless or space telegraphy, wireless control of apparatus at a distance and otherwise, and to the selective reception of electrical currents of alternating, pulsatory, or oscillatory character. The method herein set forth and claimed is shown to some extent in my prior application, Serial No. 165,152, filed July 11, 1903, and is subordinate to the general method therein claimed.

The object of the present invention is to provide a simple and efficient method of selectively receiving electrical impulses of one or approximate frequency to the exclusion of such impulses of other frequencies. This method does not involve necessarily the use of syntonic receiving-conductors, though it may be used to advantage in connection therewith, if desired.

In the present invention the method of phase-splitting described in my said prior application is utilized in a somewhat different manner from that claimed in said application. This method is intended to have the scope of my general method in so far as possible in application to practice as set forth in said prior application.

In the drawings, Figure 1 is one type of apparatus illustrating the method. Figs. 2 and 3 are a modified type; Fig. 4, a type of apparatus utilizing the electromagnetic effect, while Fig. 5 is a diagram illustrative of the description of the effect of the ninety-degree phase-splitting.

Broadly, the method herein claimed consists in splitting the phase of the received impulses and then energizing by the respective components, which are ninety degrees apart in phase at the proper frequency, apparatus of a vibratory character having a frequency of twice that of the received impulses. For example, if there be a split of phase of such degree the current direction in the branches of the split will be for each quarter-cycle as indicated in Fig. 5, where it will be seen that for the first quarter-cycle the currents will be opposite in direction, for the next quarter in the same direction, and so on, alternating every quarter-cycle, 1, 2, 3, and 4, z and z' representing the curves of the components of the split upon a line of zero values $x\,x$.

In Fig. 1, r is a reed of normal frequency or rate N and having at its free end a disk of metal y. Approximated to y is a similar disk y'. w is a receiving-conductor, as a vertical in wireless telegraphy, or a conductor energized through such vertical by induction, as may be desired. a is a condenser connected between w and y at w', and b a coil having self-induction connected similarly to y' by w''. a and b are so proportioned to the impulses desired to be selected as to produce a phase difference of ninety degrees in the two branches of the split, and hence between the disks y and y', at the frequency of the said impulses. In the figure, wg and wg' are grounds, in this case the direct impulses received by the vertical being used. The construction in the case of selectively receiving an alternating current is obvious. From the fact that the disks y and y' will mutually attract and repel twice every half-cyle if energized as described it is obvious that with such an apparatus only approximately the related frequency will be able to operate the device. Aside from the novel utilization of the phase split in energizing the device the operation is analogous to the devices hereto well known in harmonic telegraphy.

It is to be understood that the connections to earth $wg\,wg'$ are made through resistances R and R′ of sufficient value to prevent instantaneous reduction of the potential of the opposing plates to that of earth, and in cases where the out-of-phase plates are embraced in a circuit suitable resistance is obviously intended to be interpolated in the conductors, as in wg and wg' in Fig. 1, for the same purpose.

In Fig. 2 and Fig. 3 a somewhat different

type of vibrating member is shown, though energized in the same manner as the apparatus shown in Fig. 1. A double-bladed vibrating member *yv yv* is suspended by a bifilar suspension (shown at *wr wr*, Fig. 3) over insulated plates *hn* and *hn'*, which are supported by insulating supports *v* and *v'*. The operation is the same as in Fig. 1. The connections of the plates in Figs. 2 and 3 are not shown in the figures. The upper double-bladed vibratory member would be energized by, say, the lagging branch of the split, while the two lower and fixed plates would be energized by the leading branch, or vice versa. The lower fixed plates correspond to the fixed plate *y'* of Fig. 1. A mirror *m*, carried on the vibrating member, serves to indicate the movement of the device by the displacement of a spot of light in a manner well known in electrical art. It is obvious that any desired means may be used to indicate the movement of the vibrating members under this method. The rate of the vibrating member in Figs. 2 and 3 is controlled, of course, by the tension and distance apart of the suspension-wires *wr wr*.

In Fig. 4 the vibrating reed *r'* has at its free end a coil *co*, opposite to which is a fixed coil *co'*. The coils obviously have for each quarter-cycle the frequency presumed to be N/2, or half that of the reed itself, oppositely-directional currents, and hence mutually attract twice and mutually repel twice in each cycle.

Owing to the extremely-high frequencies used in wireless or space telegraphy and in the wireless control of apparatus it is obvious that the electrostatic types of instrument and modifications thereof would be preferable as entailing no great loss due to magnetic reactance. However, where the frequency is low the coils offer certain advantages. There is also a limitation in that the frequency of the reed must be twice that of the received impulses. It is obvious that at very high frequencies mechanical difficulties would intervene; but for such frequencies as are contemplated in the application filed by me March 19, 1903, Serial No. 148,529, the reed could be easily made with the requisite rate. It is not of course intended that a mere mechanical reed could be made to vibrate normally at a rate twice that of the waves used in Hertzian telegraphy, where the frequencies are enormous. Where used in connection with waves of such high frequency, the mechanical difficulty of course would limit the use of this method as described herein.

Having described my invention, what I claim is—

1. The method herein set forth consisting in operating vibratory receiving apparatus by the mutual action of components of received impulses at approximately ninety degrees difference of phase, substantially as set forth.

2. The method herein set forth, consisting in splitting the phase of received impulses by means related to the frequency of the impulses desired to be selected, and operating vibratory receiving apparatus by the mutual action of the phase-differing components of the split at a difference in phase of such components of approximately ninety degrees, substantially as set forth.

3. The method herein set forth, consisting in splitting the phase of received impulses by means related to the frequency of the impulses desired to be selected, and operating vibratory receiving apparatus by the mutual action of the phase-differing components of such split, substantially as set forth.

4. The method herein set forth, consisting in producing a phase split of approximately ninety degrees in the received impulses and energizing by the mutual action of the components so produced vibratory apparatus of a rate related to the frequency of the impulses to be selected, substantially as set forth.

5. The method herein set forth, consisting in utilizing the alternate mutual attraction and repulsion of components of received impulses at a phase difference of approximately ninety degrees to operate vibratory receiving apparatus of a rate related to the frequency of the impulses to be selected, substantially as set forth.

6. The method herein set forth, consisting in utilizing the alternate mutual attraction and repulsion of split-phase components of received impulses at approximately ninety degrees phase difference to produce vibratory motion in a receiving apparatus, substantially as set forth.

7. The method herein set forth, consisting in producing vibratory motion in receiving apparatus by the mutual alternate attraction and repulsion of components of received impulses at approximately ninety degrees phase difference, substantially as set forth.

8. The method herein set forth, consisting in producing vibratory motion related to the frequency of the impulses to be selected by the mutual alternate attraction and repulsion of components of received impulses at approximately ninety degrees phase difference, substantially as set forth.

In witness whereof I have hereunto set my hand, at New York, N. Y., this 12th day of March, 1904.

DANIEL WATTS TROY.

Witnesses:
EDWARD S. HULL,
W. T. PATTERSON,
WILLIAM L. PATTERSON.