



# UNITED STATES PATENT OFFICE.

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TRANSMITTING AND RECEIVING APPARATUS FOR HERTZIAN WAVES.

SPECIFICATION forming part of Letters Patent No. 726,413, dated April 28, 1903.

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*To all whom it may concern:*

Be it known that I, EUGÈNE DUCRETET, a citizen of the French Republic, and a resident of Paris, France, have invented certain  
5 new and useful Improvements in Transmitting and Receiving Apparatus for Hertzian Waves, of which the following is a specification.

In my various notes upon currents of great  
10 variations and high tension of Tesla, Thomson, and Oudin I have shown after practical experiments that it was possible to use these currents for the transmission of Hertzian waves through space, that they increased the  
15 carrying power, that applied to aerial radiators and collectors (antennæ) some of these devices permitted the regulation or bringing into agreement of the posts with one another, and that it was very necessary, as shown by  
20 Thomson and Tesla in their notes, that the condensers of the discharge-circuit, the capacities, and self-induction circuits of the apparatus should be perfectly regulated with one another in order to obtain the greatest  
25 effect.

The device invented by me herein illustrated is of variable shapes and size and is applicable to the devices of Thomson and of Tesla. It constitutes an important improvement, the exclusive property of which will  
30 hereinafter be claimed.

In the accompanying drawings, Figure 1 shows an apparatus applied to a Thomson or Tesla apparatus. Fig. 2 shows this apparatus applied to a relay-receiver.

The essence of my invention lies in a transformer for induction-currents and especially adapted for use in connection with transmitting and receiving devices for Hertzian waves,  
40 wherein it has been found necessary to exactly regulate the discharge and induction circuits in relation to one another.

My transformer is adapted to enable the relations of the discharge-circuits and the inducing-circuit to be changed at will and as the needs demand. This device consists, essentially, of a solenoid, the number of whose effective coils may be varied to give different effects upon the introduction of a current  
45 thereto and so regulate the discharge with relation to the inductive effects. The means

for accomplishing this will be more fully described. Mounted upon the solenoid S are graduated insulated supports 1 2 3 4. These supports carry sliding contact-pieces R', R'',  
55 R''', and R''', which may be placed in any position with relation to the coils of the solenoid that may be desired. In this manner the number of spirals of the solenoid acted upon by the inducing-current, and hence the inductive effects, may be varied at will. The solenoid may be thus regulated as to either self-induction or as to inducing action, or the length between  $a$   $a'$  may be varied for these purposes by the addition of conductors  
60 or bridges and suppressing at will the effect of any number of the spirals of the solenoid S. As may be desired these ends  $a$   $a'$  may be either connected to suitable sliding contacts of these currents or may be left free.  
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This apparatus permits numberless combinations which can be realized with three sliding contacts; but the four, Figs. 1, 2, give more elasticity to the adjustments. The wound wire S (solenoid) for large sections  
75 may be made of several wires, as in the solenoid of La Rive's condenser. The insulated supports 1 2 3 4 are graduated. They bring the current to their respective sliding contacts.  
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This apparatus is reversible by means of suitable spring sliding contacts R. The number of spirals comprised at  $x$  can be smaller or greater than those comprised at  $y$ , and vice versa. A self-induction compensator  
85 by an adjustable condenser (liquid ones serve in all cases) may be added at  $x$  and  $y$ , according to the uses to which this apparatus is applied.

Fig. 1 shows, by way of example, this apparatus applied to one of Thomson's or of Tesla's devices, with a condenser C<sup>o</sup>, giving an oscillating discharge at O. The tension-current is brought in at  $i$   $i'$ . The condenser C<sup>o</sup>, with any number of jars, is of my invention, the capacity thereof being regulated according to the desired effect. For wireless telegraphy the collector (antenna) is at C<sup>a</sup> and the connection to earth at C<sup>a'</sup>.  
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Fig. 2 shows this apparatus applied to a relay-receiver with radioconductor B<sup>r</sup>. It is also applicable to the Popoff-Ducretet radio-  
100



telephonic receiver without relay. In this application the wire of the solenoid S is much finer than that in Fig. 1.

In both cases, Figs. 1 and 2, C<sup>a</sup> represents the collector (antenna) either simple, multiple, or tubular. Its adjusting means are not shown. It is likewise with the connection to earth C<sup>a'</sup>, Figs. 1 and 2. It can be made with or without a suitable capacity condenser.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

A device of the character described, comprising a solenoid for regulating the relation

of discharge and induction currents in transmitting and receiving Hertzian waves, sliding contacts for said solenoid, supporting means therefor, adjusting means for the contacts whereby their relation to one another may be varied, and the number of spirals in circuit may be altered, and receiving and discharging circuits connected to the said sliding contacts, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

EUGÈNE DUCRETET.

Witnesses:

J. ALLISON BOWEN,  
GEORGE E. LIGHT.