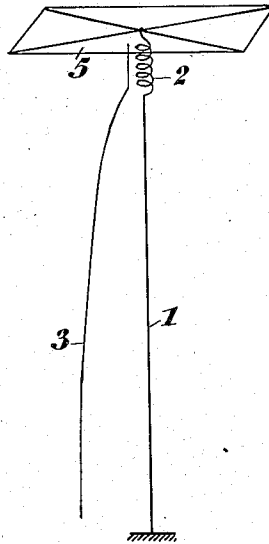


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AERIAL CONDUCTOR.
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930,746.

Patented Aug. 10, 1909.



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SIMON EISENSTEIN, OF KIEW, RUSSIA.

AERIAL CONDUCTOR.

No. 930,746.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SIMON EISENSTEIN, a subject of the Czar of Russia, residing in Kiew, in said Empire of Russia, have invented new and useful Improvements in Aerial Conductors, of which the following is a specification.

The wave lengths usually employed heretofore in wireless telegraphy do not generally exceed 3000 m. It is, however, known that a large number of problems in wireless telegraphy can be solved much more readily with long waves than when shorter waves are used, as in practice these cause many difficulties. However, undamped vibrations are the more readily obtainable in proportion as the length of wave increases, in other words, the smaller the period time, and these conditions are always applicable no matter in what way such undamped vibrations are produced, that is to say, whether these vibrations are produced by a voltaic arc or by a high frequency machine. For example, with a wave length of 10,000 m. a high frequency machine with a frequency of 30,000 would be required. There is, however, no practical difficulty in constructing such a machine. Again, with an arc lamp an equally high frequency with a very great amplitude may readily be obtained. Although these considerations are very clear, their practical application presents considerable difficulty because with the increase of the wave length the masts by which the periods of the self-vibrations have been defined had to be made so extremely high that the cost of construction was prohibitive, quite apart from the technical difficulties in the construction of such masts. It has therefore been found necessary to have recourse to lengthening coils. The question then arises where they should be inserted. If the lengthening coil is inserted in the lower part of the antenna, the radiating effect must be much smaller. To render the action of these lengthening coils clear, we may imagine an antenna of the length l supplemented by a lengthening coil of a length lc . As, however, it is known that the amplitude of the current is distributed in accordance with the law of sines, it will be obvious that if the coils be inserted in the lower part of the antenna, the current impulse, instead of receiving the maximum J , as would be given by a length

$l+lc$, only receives a maximum i , the ratio between i and J being expressed by the following formula:

$$\frac{i}{J} = \frac{\sin l}{l+lc} \times \frac{\pi}{2} \quad 60$$

Therefore, if we have an antenna 50 m. long and wish to operate with a wave length of 10,000, a coil must be inserted the self-induction coefficient of which corresponds to a length of 2450 m. In this case

$$\frac{i}{J} = \frac{\sin 50}{50 + 2450} \times \frac{\pi}{2} = \sin 1^\circ 48' = 0.032 \quad 65$$

It is therefore obvious that by the insertion of a self-induction coil with so large a self-induction coefficient in the lower part of the antenna no practical results can be obtained. If, however, the self-induction coil be arranged at the upper end of the antenna, another difficulty arises. Owing to the very high tension at the end of the antenna large brush discharges will take place there, so that a large part of the energy is lost. Accordingly this construction cannot be regarded as a solution of the problem.

In the accompanying drawing, the figure is a diagrammatic representation showing the arrangement of parts embodying my invention.

The present invention overcomes the difficulties referred to in the foregoing by arranging the self-induction coil 2 at the upper end of the antenna 1, at the same time employing a large supplementary capacity 5 at the upper end of the antenna in the known manner. As with such antenna only the capacity of the supplementary system need be taken into account, while the capacity of the conductor is quite negligible, the defect in the form of brush discharges, sparks or other losses of energy, which occur with the simple insertion of the lengthening coil at the upper end of the antenna, cannot arise. On the other hand, the diminution of the maximum, which occurs in the arrangement having the coil at the lower end of the antenna, cannot take place. Although in the first place a certain retardation occurs in the development of the curve at the upper end of the antenna 1 of the novel construction, as shown by the line 3 representing the curve of the current, still the strength of the current is fully utilized and in particular the

full effect is produced at the lower part of the antenna in proximity to the ground, where the current maximum is located. The employment of such lengthening coils
5 with antenna provided at their upper end with a large supplementary capacity, therefore permits of operating with great lengths of wave without the creation of difficulties of the kind referred to. The form of the
10 supplementary capacity may of course vary as desired.

What I claim as my invention and desire to secure by Letters Patent is:

In a system for wireless telegraphy and

telephony, in combination, a supplementary 15 capacity, an aerial conductor, and a self-induction in the form of a lengthening coil in series between the supplementary capacity and the aerial conductor, immediately below the capacity and at the top of the aerial con- 20 ductor.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

SIMON EISENSTEIN.

Witnesses:

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