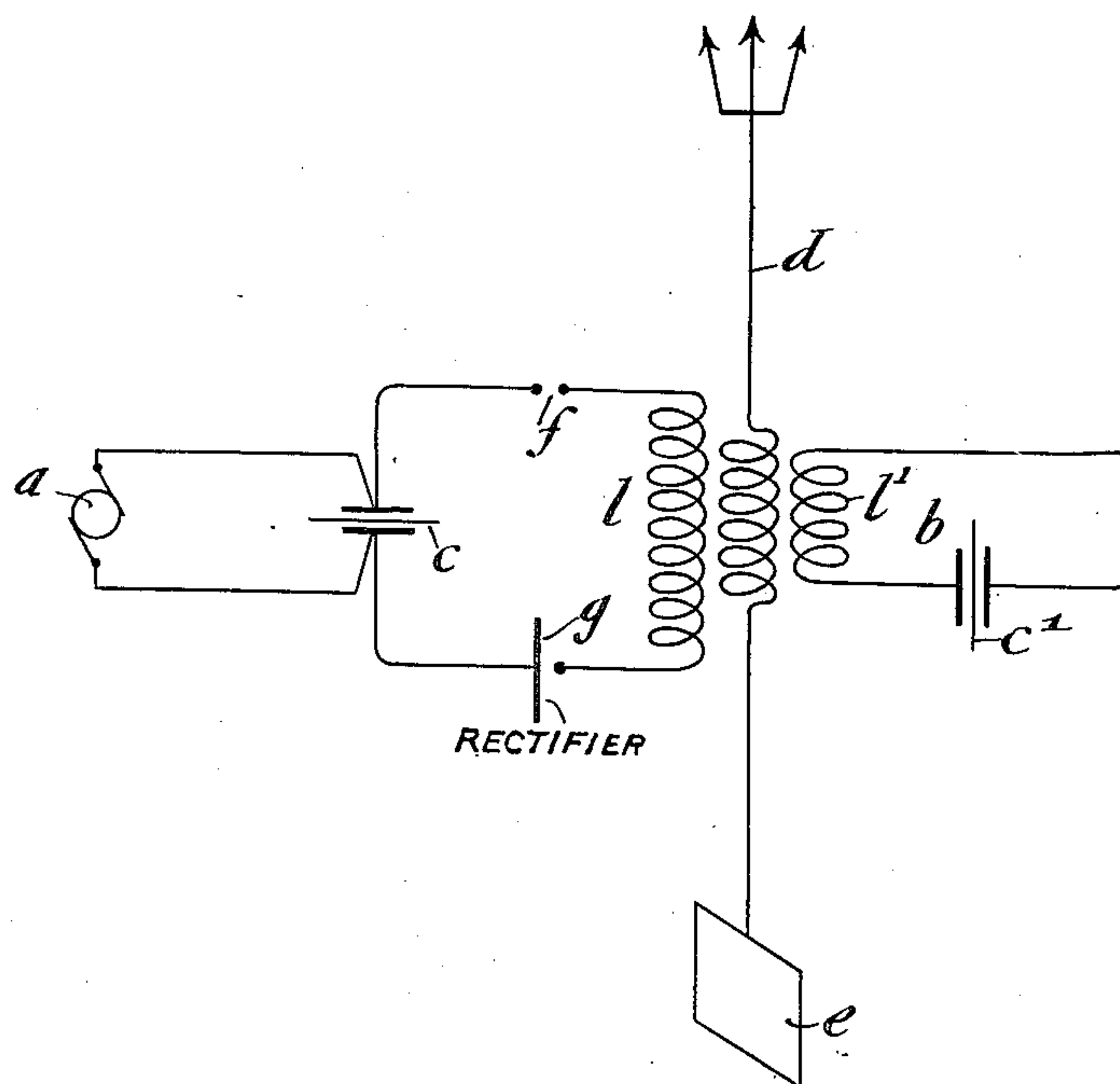


I. SCHÖNBERG.
APPARATUS FOR PRODUCING HIGH FREQUENCY OSCILLATIONS.
APPLICATION FILED MAR. 19, 1909.

948,348.

Patented Feb. 8, 1910.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ISAAC SCHÖNBERG, OF ST. PETERSBURG, RUSSIA, ASSIGNOR TO SIMON EISENSTEIN, OF ST. PETERSBURG, RUSSIA.

APPARATUS FOR PRODUCING HIGH-FREQUENCY OSCILLATIONS.

948,348.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed March 19, 1909. Serial No. 484,551.

To all whom it may concern:

Be it known that I, ISAAC SCHÖNBERG, a subject of the Czar of Russia, residing in St. Petersburg, in the Empire of Russia, have
5 invented new and useful Improvements in Apparatus for Producing High-Frequency Oscillations, of which the following is a specification.

For some considerable time there has been
10 a tendency to cause a sparkless oscillation circuit to oscillate by impulse energizing, which, owing to the great reduction in the damping and the attainment of sharper tuning, would be of special importance in wire-
15 less telegraphy. It has so far not been found possible to attain the desired end by purely mechanical means, owing to the difficulties in supplying a sufficient current impulse during the short time occupied in
20 charging a capacity of the oscillation circuit. Already, however, for measuring purposes the small oscillation energy supplied by the impulse of an interrupted current has been regarded as adequate and utilized for
25 certain purposes (for example in the Pischon station tester of the Gesellschaft für drahtlose Telegraphie). This idea is not, however, capable of utilization for transmission to a distance and it is necessary to
30 seek other means for producing a sufficiently powerful energy impulse during the extremely brief charging of the capacity. It was a comparatively obvious step to utilize for this purpose only the first half-oscillation of a condenser circuit with a sparking
35 gap. However, a sparkless oscillation circuit can only cease to oscillate by its self-damping alone when the energizing sparking circuit remains unclosed. This presupposes a method for damping the oscillation
40 circuit with sparking gap so strongly that only the first half-oscillation enters into account for the generation of the impulse. It does not however require any further explanation to show that by interposing suitable resistances which would be capable of producing this necessary effect, not only
45 must the damping be increased but in addition a corresponding diminution of the amplitude of the first oscillation must be caused. If this is the case, however, the influence upon the efficiency is so prejudicial that this proposal likewise has no practical value. Other attempts (M. Wein Gesellschaft für drahtlose Telegraphie) to produce
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a sparking gap losing its ionization very speedily and constituting, after even the first oscillation, such a resistance that further oscillations do not take place present the defect that in following up the idea
60 they must necessarily lead to the known mercury vapor sparking gaps. Many years' experience with such sparking gaps has however demonstrated that even in laboratory work they do not afford adequate certainty
65 of operation. This is still more so in practice. As at the present day the conditions imposed upon radio telegraphic stations, as regards reliability and certainty, are very severe, this proposal affords no help in solving
70 the problem in question.

In accordance with the present invention the impulse charging in question is attained in a fundamentally different manner.

The figure shows diagrammatically the
75 arrangement of my invention.

As shown, the arrangement comprises a primary oscillatory circuit supplied with current by a generator *a* and having therein the condenser *c*, a spark-gap *f*, the rectifier
80 *g*, which forms the main point of the invention, and the self-induction *l*. The generator *a* furnishes either direct or alternating current, and can be changed to supply the one or the other in the well-known manner.
85 In connection with the oscillatory circuit *c*, *l*, *f*, *g* just mentioned, a strongly coupled secondary oscillatory circuit *b* is used, which has no spark-gap and which is provided with capacity *c*¹ and the self-induction *l*¹.
90 The aerial conductor or radiating antenna *d* is grounded at *e* in the well-known manner.

The object of the rectifier *g* is to arrest the oscillation of the primary circuit in anticlockwise direction after the first half of the
95 oscillation has taken place in a clockwise direction. By the use of this rectifier, oscillations are produced in the primary oscillatory circuit which correspond in shape to the first half of a complete regular oscillation. These oscillations of the primary produce, in the secondary, weak dampening oscillations, which induce corresponding oscillations in the antenna *d* from which they are emitted. By this simple and (as has
100 been proved) reliable means, the desired effect can be obtained with certainty without the defects present in the solutions hitherto offered.

Having thus described my invention, I
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claim as new and desire to secure by Letters Patent:

1. In an apparatus for producing high frequency oscillations, an oscillatory circuit
5 having therein a sparking gap and a rectifier whereby the first half of an oscillation is permitted to pass in one direction and the other half is not permitted to return in the opposite direction.
- 10 2. In an apparatus for producing high frequency oscillations, a primary oscillatory circuit, means for causing oscillations there-

in, and a rectifier for arresting said oscillations when moving in one direction and for permitting them to move in the other direction. 15

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

ISAAC SCHÖNBERG.

Witnesses:

A. SHEFTEL,

H. A. LOVIAGUINE.