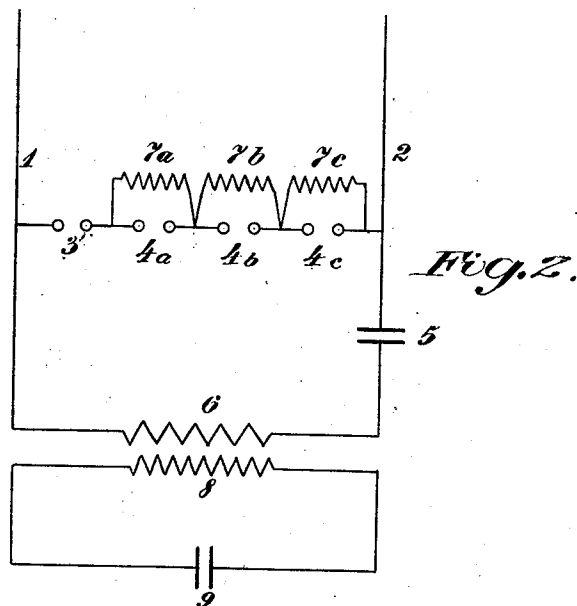
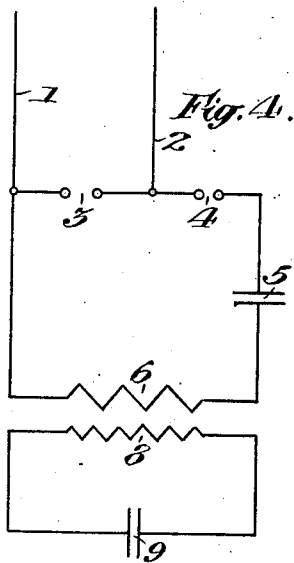
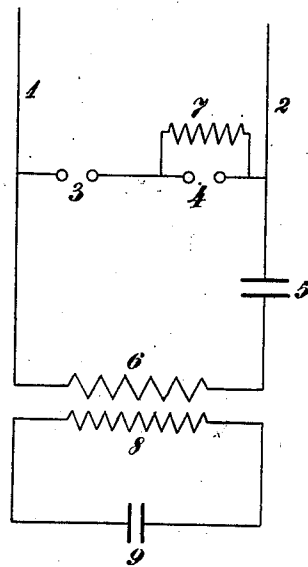
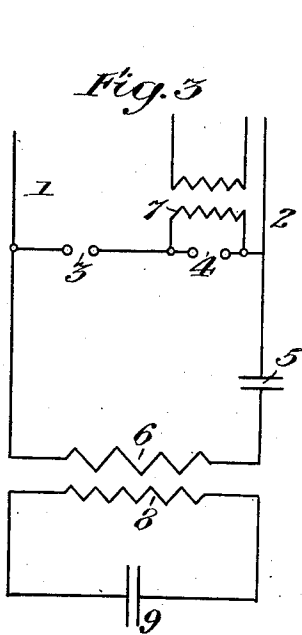


A. MEISSNER.
 MEANS FOR PRODUCING SLIGHTLY DAMPED OSCILLATIONS BY SHOCK EXCITATION.
 APPLICATION FILED JUNE 7, 1910.

1,077,733.

Patented Nov. 4, 1913.



WITNESSES
H. H. Knight.
Ray J. Ernst.

INVENTOR
 Alexander Meissner
 by his attorneys
Wm. H. Smith

UNITED STATES PATENT OFFICE.

ALEXANDER MEISSNER, OF BERLIN, GERMANY, ASSIGNOR TO GESELLSCHAFT FÜR DRAHTLOSE TELEGRAPHIE, M. B. H., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

MEANS FOR PRODUCING SLIGHTLY-DAMPED OSCILLATIONS BY SHOCK EXCITATION.

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Specification of Letters Patent.

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Application filed June 7, 1910. Serial No. 565,558.

To all whom it may concern:

Be it known that I, ALEXANDER MEISSNER, a subject of the German Emperor, and residing at Berlin, Germany, have invented certain new and useful Improvements in Means for Producing Slightly-Damped Oscillations by Shock Excitation, of which the following is a specification.

My invention relates to means for producing slightly dampened oscillations with the aid of a primary oscillation circuit, to which current impulses are imparted and means acting upon some of the spark gaps of this circuit in such manner that the gaps do not limit the charging tension.

In arrangements for producing quenched sparks, such as in Wien's system, arrangements employing mercury vapor lamps or the like, which consist, as is well known, of two circuits coupled with each other in suitable manner and tuned to each other, there are limits both for the maximum admissible energy per spark and for the degree of coupling between the quench gap circuit and the secondary circuits which should not be exceeded, for otherwise the quench effect if present at all is obtained only imperfectly.

The principal object of my invention is to provide a connection for facilitating the quench effect of spark-gaps, in order to be able either to employ closer degrees of coupling when the usual quench gaps are used and to increase the energy per spark, or to employ spark-gaps which do not otherwise quench, to obtain the quench effect. The new connection simultaneously admits of the succession of sparks being increased beyond the limits customary heretofore, because owing to the sparks being more rapidly quenched the resistance in the spark gaps rises more rapidly and consequently the time during which the spark-coil or transformer is short-circuited is shortened. This end is substantially attained by interpolating in the primary oscillation circuit which I shall call hereafter the quench gap circuit an additional spark-gap having a high-frequency current resistance connected therewith in parallel, if necessary, but in any event so, that it does not limit the charging voltage. By high frequency current resistance the art understands nowadays means which offer a high resistance

to high frequency currents only, but which not necessarily also constitute resistances for low frequency currents. For instance, a coil which may have a practically negligible inductance in low frequency circuits may offer a considerable resistance to the current in a high frequency circuit. These means may for instance also be ohmic resistances or condensers or the like, and their function will be explained in detail hereinafter.

All quench spark-gaps known heretofore, whether constructed as short Wien spark-gaps, as mercury-vapor lamps, as quench tubes or otherwise, have a twofold duty to perform in the connection in which they were used heretofore. First, before the spark occurs they serve for limiting the charging of the condenser, second after the spark is formed they aid the quenching of it, because the resistance of the discharging gap is rapidly increased by the continuous delivery of energy to the secondary circuit. According to my invention these two duties are separated. One spark-gap serves, as usual, for limiting the voltage for starting the sparks, but together with the additional spark-gap it serves for causing them to be rapidly quenched.

Some illustrative embodiments of my invention are represented in the accompanying drawing, wherein:

Figure 1 shows the use in connection with an ordinary oscillatory circuit of a supplementary spark gap bridged by an inductance. Fig. 2 shows a plurality of such supplementary spark-gaps in such a circuit. Fig. 3 shows an arrangement similar to that in Fig. 1, wherein the choking coil 7 forms the secondary of a spark coil. Fig. 4 shows an arrangement similar to that in Fig. 1, wherein the feeder 2 is arranged between spark-gaps 3 and 4.

Referring firstly to Fig. 1, 1 and 2 designate the charging feeders, 3 denotes the main spark-gap, 6 the primary coil of a transformer, 5 the condenser of the quench circuit, 4 an additional spark-gap, 7 a high frequency resistance, for instance a choking coil connected in parallel with the latter, 8 the secondary transformer coil, coupled with coil 6, and 9 the capacity of the tuned secondary circuit which is generally formed as an aerial for the purpose of radioteleg-

raphy. During the charging operation, the additional spark-gap 4 is practically short-circuited by the choking coil 7, so that the charging tension is limited solely by the spark gap 3. When the tension at which the gap 3 is broken down is reached and the spark occurs, this gap becomes conductive and the potential of conductor 1 is now directly at one of the electrodes of gap 4, and thus also at the corresponding end of the high frequency resistance 7. The other electrode of gap 4 and the corresponding end of resistance 7 were connected before with the other side of the condenser, and therefore the potential of that condenser side exists already at that side of gap 4 and of the resistance. From this it will be seen that at the moment gap 3 is broken down the total tension is transferred to gap 4, and the high frequency resistance 7. The latter has the effect that the potential difference can not be equalized immediately and since this difference is greater than the tension at which gap 4 commences to break down, the gap will be broken down immediately. The difference in time between the breaking down of gaps 3 and 4 would be difficult to measure on account of the rapid succession in which these two gaps break down. From the foregoing it will be noted that this function of the high frequency resistance as characterized before may be performed by any kind of resistance, which is large enough to prevent the immediate equalizing of the potential difference between the two electrodes of gap 4, and aside from inductances and capacities, also ohmic resistances have been successfully used for this purpose. When thus as explained above gap 4 has been broken down choking coil 7 is practically cut out of circuit, and the quench gap circuit consists of the transformer coil 6, capacity 5 and the two spark-gaps 3 and 4. The choking coil 7 or its equivalents, as defined above, must be proportioned in the arrangement according to Fig. 1 only for a quite small strength of current, because it is not traversed by large currents either during charge or discharge. High frequency resistance 7 may be formed as the secondary coil of a spark-coil, as shown in Fig. 3, wherein 7 is the secondary and 10 the primary coil of an inductorium. In this event the discharge can be brought about by the latter. Under certain circumstances the spark-gaps 3 and 4 may be ordinary spark-gaps. But the efficiency of the entire arrangement is considerably increased when either the one or the other or both are formed as quench spark-gaps.

The feeder 2 can be connected equally well between the spark-gaps 3 and 4 without changing the effect of the arrangement. In this event the choking coil 7 may be done away with if the additional spark-

gap 4 be sufficiently small as compared with the spark-gap 3. This arrangement is shown in Fig. 4, wherein the reference numerals are the same as in Fig. 1.

The quench effect is particularly increased when, instead of one additional or auxiliary spark-gap and a high frequency resistance connected in parallel therewith, several such combinations are connected in series. Fig. 2 shows such an arrangement as an example. In this figure, 1 and 2 designate the charging feeders, 3 is the main spark-gap, 4^a, 4^b, 4^c are the additional spark-gaps, 5 designates the capacity, and 6 denotes the transformer coil of the extinguishing circuit; 7^a, 7^b, 7^c are choking coils, or one choking coil having branches, arranged in parallel with the additional spark-gaps. The tuned secondary circuit is formed by the transformer coil 8 and the capacity 9. It will be noted that in this case, where each of the several spark gaps has its high frequency resistance, the gaps are broken down consecutively since one after the other receives the entire potential of the condenser.

In the arrangement according to Fig. 1 the disruptive voltage of the additional spark-gap 4 may be greater, than that of the main spark-gap 3, when the choking coil 7 is suitably dimensioned. In the arrangement according to Fig. 2, each individual spark-gap 4^a, 4^b, 4^c may be larger than or approximately as large as the main spark-gap.

By suitably dimensioning the starting tension of the auxiliary spark-gaps 4 or 4^a, 4^b, 4^c it is possible to obtain a maximum transmission of energy from the quench circuit to the secondary circuit, exactly as this was obtained heretofore by a suitable selection of the coupling between the quench and secondary circuits.

In the annexed claims I have referred to the spark gaps 3 and 4, described hereinbefore, as "two kinds of gaps." By the term "kind" I mean to convey the idea that these gaps have different characteristics, so far as their function in the circuit is concerned, as explained before, and as also explained in the subsequent portions of the claims. The term "kind" is not to be understood, however, to imply two kinds of gaps which are constructively different from each other, though as also explained hereinbefore I may use for both gaps 3 and 4 quench gaps, or also only for one a quench gap and for the other an ordinary gap, so long as their above defined characteristics are only of a different kind.

What I claim is:

1. An arrangement for producing slightly dampened electrical oscillations by shock excitation, comprising a primary oscillation circuit, containing a capacity, a self-induc-

tion and two kinds of spark-gaps, of different characteristics, the first kind adapted to limit the charging tension, the second kind having means for causing it to only participate in the discharge of said first kind of spark-gap, a secondary, slightly dampened oscillation circuit coupled with and tuned to said primary circuit.

2. An arrangement for producing slightly dampening electrical oscillations by shock excitation, comprising a primary oscillation circuit, containing a capacity, a self-induction and two kinds of spark-gaps of different characteristics, the first kind adapted to limit the charging tension, the second kind having high frequency resistances in shunt with it causing it to only participate in the discharge of said first kind of spark gap, said resistances being suitably proportioned to form a low resistance for the charging current, and a secondary slightly dampened oscillation circuit coupled with and tuned to said primary circuit.

3. An arrangement for producing slightly dampened electrical oscillations by shock excitation, comprising a primary oscillation circuit, containing a capacity, a self-induction and two kinds of spark-gaps of different characteristics, the first kind adapted to limit the charging tension, the second kind having means for causing it to only participate in the discharge of said first kind of spark-gaps, two feeders connecting the electrodes of the spark-gap of the first kind with a current source, the total bridging distance of the spark-gaps of the second kind being less than that of spark-gaps of the first kind,

and a secondary slightly dampened oscillation circuit coupled with and tuned to said primary circuit.

4. An arrangement for producing slightly dampened electrical oscillations by shock excitation, comprising a primary oscillation circuit, containing a capacity, a self-induction and two kinds of spark-gaps of different characteristics, the first kind adapted to limit the charging tension, the second kind having means for causing it to only participate in the discharge of said first kind of spark gaps, one of said two kinds of spark-gaps being formed as quench gaps proper, and a secondary slightly dampened oscillation circuit coupled with and tuned to said primary circuit.

5. An arrangement for producing slightly dampened electrical oscillations by shock excitation, comprising a primary oscillation circuit, containing a capacity, a self-induction and two kinds of spark-gaps of different characteristics, the first kind adapted to limit the charging tension, the second kind having means for causing it to only participate in the discharge of said first kind of spark-gaps, said spark-gaps being formed as quench gaps proper, and a secondary slightly dampened oscillation circuit coupled with and tuned to said primary circuit.

In testimony whereof, I affix my signature in the presence of two witnesses.

ALEXANDER MEISSNER.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.