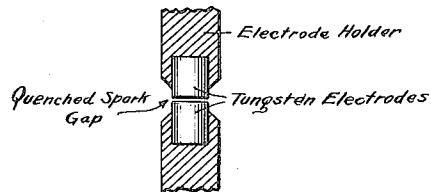


H. BOAS.
ELECTRIC SPARK GAP.
APPLICATION FILED OCT. 22, 1912.

1,152,272.

Patented Aug. 31, 1915.



Inventor:
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UNITED STATES PATENT OFFICE.

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ELECTRIC SPARK-GAP.

1,152,272.

Specification of Letters Patent.

Patented Aug. 31, 1915.

Application filed October 22, 1912. Serial No. 727,247.

To all whom it may concern:

Be it known that I, HANS BOAS, of Berlin, a subject of the King of Prussia, and residing at 52 Krantstrasse, Berlin, Kingdom of Prussia, German Empire, have invented a new and useful Electric Spark-Gap, of which the following is a specification.

It is known by the experimental work of Tesla that a spark gap consisting of a large number of single spark gaps with very small distance between the electrodes is very useful in producing electric oscillations. Wien has found that the reason for this fact is the large damping action on the electric vibrations, and that by coupling in a certain manner the circuit containing the spark gaps with a secondary circuit having capacity and self-induction, a transfer of electrical energy can be effected in the same manner as it is effected by exciting the secondary circuit by the primary by one impact only. On this principle is also based the spark gap of Lepel who uses flat plates of metal arranged a small distance from each other. The large plate was intended to exert a cooling effect on the spark, and for this reason he and others have used plates of silver or copper. With these spark gaps a coupling up to 19.5% could be obtained as degree of coupling at which degree the damping effect allows the most favorable transfer of energy from the primary to the secondary circuit.

I have myself used spark gaps of platina-iridium with a coupling of 30% and more. These spark gaps consisted of small flat electrodes of platina-iridium with a diameter of $\frac{1}{2}$ inch (approximately 10 mm.) and a distance of 0.02 of an inch (approximately 0.05 mm.). The damping effected by the spark gap increases according to my experiments nearly inversely to the distance apart of the electrodes. The distance itself depends very much upon the kind of the material used for the electrode. For instance using silver or copper electrodes a distance smaller than 0.01 mm. is impracticable because these electrodes melt together by the heat of the sparks. With electrodes of platina-iridium a much smaller distance can be used, less than the half, because the platina-iridium by reason of its high melting point and its mechanical strength opposes a much larger re-

sistance to the melting by the heat of the spark. The platina-iridium, however, has certain disadvantages. It is relatively easily evaporated, and this evaporation alters the distance of the electrodes. In the spark gap itself there is much metal vapor exerting a disturbing effect on the action of the spark gap.

I have now found that tungsten is a material which is better suited for the construction of spark gaps than any other material. The tungsten is unmelttable at the temperatures which can arise and is not liable to be destroyed by being atomized into minute articles, which form a kind of a dust, and dissolve into spray. The consequence is that two electrodes of tungsten can be adjusted at very much smaller distances without danger of a short-circuit by the melting of the electrodes. With the tungsten there is practically no spraying action and therefore no vapor in the spark gap. The electrodes are practically indestructible so that the distances of the electrodes once determined are nearly continually maintained. The use of tungsten permits of a further reduction of the diameter of the electrodes. The spark between the tungsten electrodes is nearly noiseless and has no tendency to surpass the edges of the electrode, the consequence being that with a spark gap having tungsten electrodes practically pure sounds are produced. Even if there is a wrong coupling between the primary and secondary circuit there is no essential alteration of the sparks between the electrodes so that the wrong coupling has no disadvantageous influence on the spark gaps of tungsten. These excellent qualities which are peculiar to spark gaps having electrodes of tungsten allow, without prejudicing the operation, the obtaining of critical coupling degrees of more than 45% between the primary and secondary circuit. It may be said that the tungsten air gap is a source of energy for producing the vibrations of high frequency that are substantially perfect, and which were not known heretofore.

I have illustrated in the accompanying drawings a quenched spark gap with tungsten electrodes embodying my invention.

In a similar way as tungsten tantalum

and molybdenum may be used for the same purpose.

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is:—

1. In quenched spark gaps for producing quickly quenched vibrations, an electrode consisting of tungsten.

2. In quenched spark gaps for producing

quickly quenched vibrations, electrodes consisting of tungsten.

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

HANS BOAS.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.