

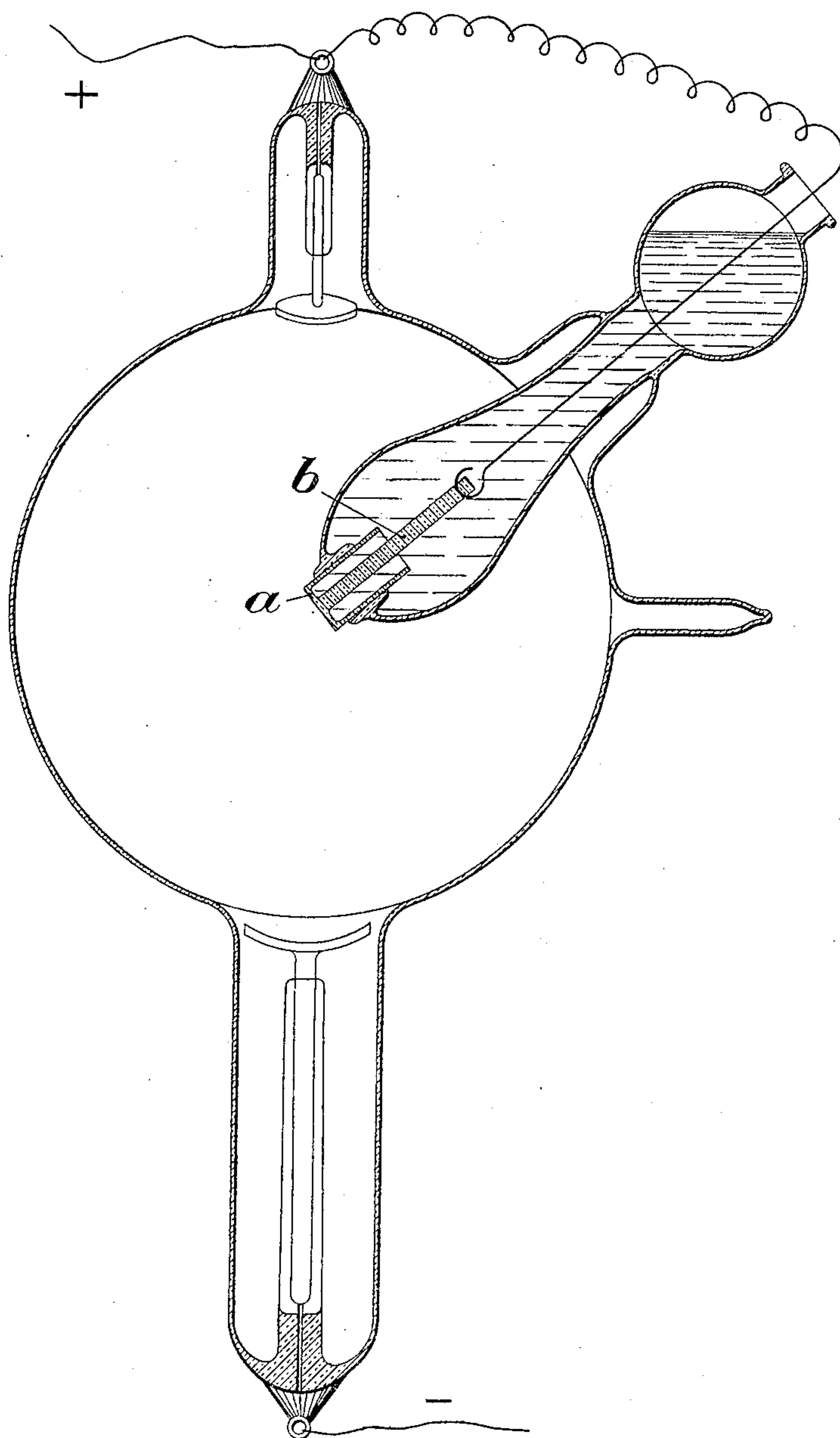
No. 807,673.

PATENTED DEC. 19, 1905

E. GUNDELACH.

X-RAY TUBE.

APPLICATION FILED DEC. 16, 1904



Witnesses:
John Brown.
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UNITED STATES PATENT OFFICE.

EMIL GUNDELACH, OF GEHLBERG, GERMANY.

X-RAY TUBE.

No. 807,673.

Specification of Letters Patent.

Patented Dec. 19, 1905.

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To all whom it may concern:

Be it known that I, EMIL GUNDELACH, manufacturer, a subject of the Duke of Saxe-Coburg-Gotha, residing at Gehlberg, in the Duchy of Saxe-Coburg-Gotha and the German Empire, have invented certain new and useful Improvements in X-Ray Tubes, of which the following is a specification.

My invention relates to improvements in Roentgen tubes.

Heretofore in order to remedy the injurious effects of heating of the anticathode in Roentgen tubes use has been made with good results of anticathodes in the form of hollow bodies of platinum, which are fused into the glass body of the tube, so that direct wetting with water or some other suitable fluid for cooling purposes was feasible. As long back as in 1897 Breton in his work "*Rayons Cathodiques et Rayons X*," on page 90, described this kind of water-cooled anticathode; but this method found little support at the time in view of the difficulties experienced in fusing hollow metallic bodies or tubes of such large section onto the glass body. Such difficulties have, however, been overcome, and such anticathodes consisting of hollow platinum bodies are fused into glass in a durable manner by several manufacturers. These anticathodes, in which the metallic surface is cooled by direct application of water, permit the taxing their power of resistance to a far higher extent than is possible with an uncooled cathode. With very powerful currents, however, particularly when using a very high induction, and more especially with Wehnelt's interrupter, the heating effect produced in the small area in which the rays from the cathode converge is so great as to render it nevertheless red-hot. On the one hand "Leidenfrost's phenomenon" will occur. On the other hand the hollow platinum body itself will become a "steam-pot," as the strong generation of steam will prevent the water from coming into contact with the surface of the anticathode, and hence a danger arises lest the plate should be melted through at the focus unless the intensity of the current is reduced in time or the tube is thrown out of circuit. Therefore notwithstanding their greater power of resistance as compared with uncooled anticathodes a certain degree of intensity of

the current and a certain limit of duration of the experiment cannot be exceeded even with these constructions. The term "Leidenfrost's phenomenon" may be explained as follows: If a little water is placed in an incandescent metal cup, it forms a spherical drop which is not in direct contact with the wall of the vessel, but is supported by a thin layer of steam, moves about very quickly, and quickly evaporates without boiling. This phenomenon is named after its discoverer, Leidenfrost.

By constructing the anticathode according to my invention, as described hereinafter, the taxing of the endurance of the tube to the highest imaginable extent is permissible without causing Leidenfrost's phenomenon or such an excessive generation of steam as to expel the water from the hollow platinum body. The above effect is attained by attaching to the front face *a* of the hollow platinum body a solid metallic rod *b*, which will present a larger surface to the cooling-water, so that this rod itself will remain cold enough to prevent the face of the platinum body from getting overheated or at least reduce its heat to such an extent as to prevent the occurrence of objectionable attendant effects.

The construction will be understood from the annexed drawing.

a is the front face of the hollow platinum body.

b is the solid metallic rod attached to the hollow platinum body.

Having now particularly described and ascertained the nature of my invention, what I claim is—

In a Roentgen tube, a water-cooled hollow platinum body forming an anticathode and having a solid metal rod united to its front face and projecting into the cooling liquid, said rod being spaced from the inner wall of the hollow platinum body and of a size to permit free circulation of water between it and said wall.

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

EMIL GUNDELACH.

Witnesses:

BERNHARD KIRCHNER,
MAX SCHUSTER.