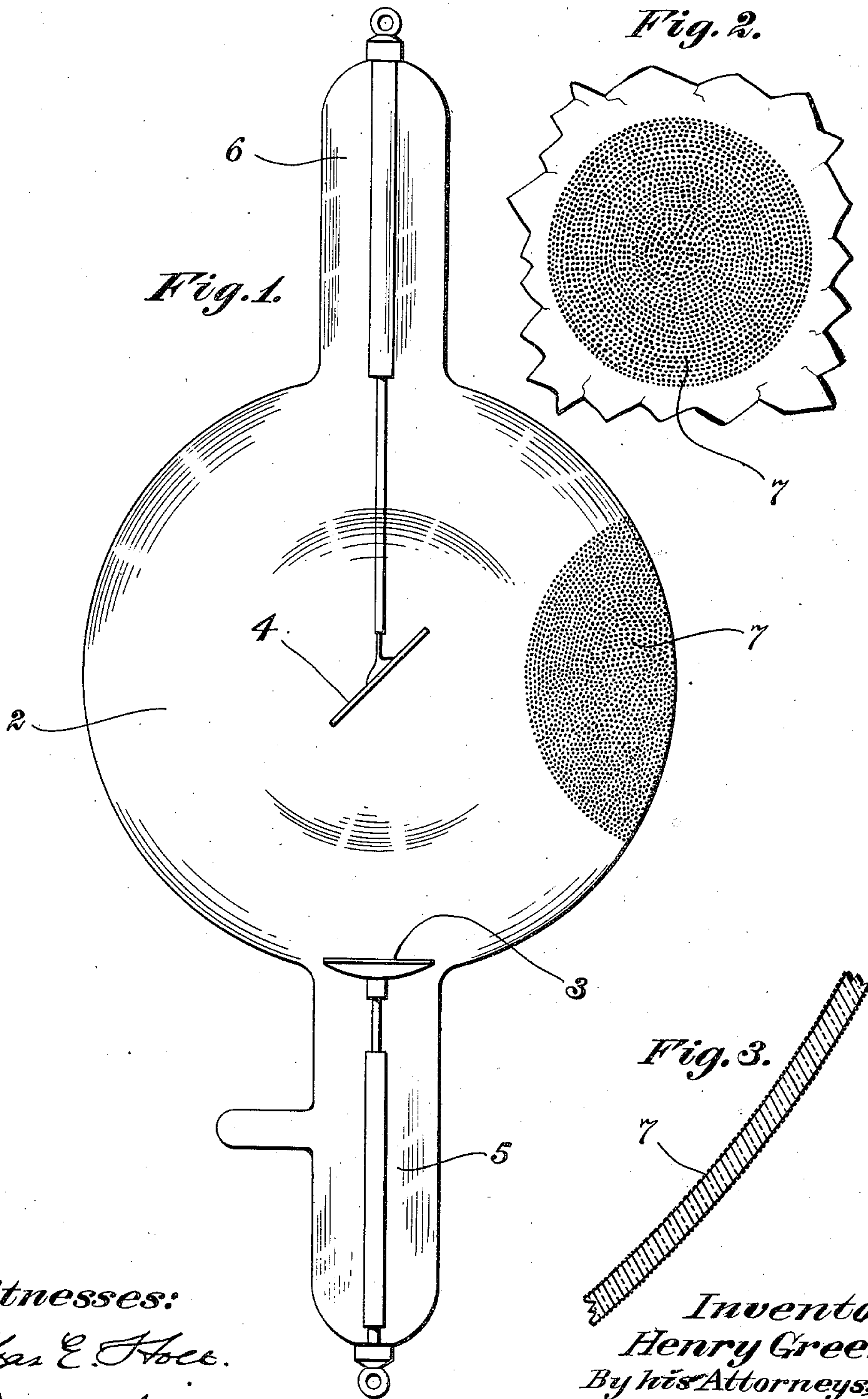


H. GREEN.  
X-RAY TUBE.

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958,488.

Patented May 17, 1910.



Witnesses:

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# UNITED STATES PATENT OFFICE.

HENRY GREEN, OF HARTFORD, CONNECTICUT.

X-RAY TUBE.

958,488.

Specification of Letters Patent.

Patented May 17, 1910.

Application filed November 23, 1909. Serial No. 529,567.

*To all whom it may concern:*

Be it known that I, HENRY GREEN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in X-Ray Tubes, of which the following is a specification.

This invention relates to X-ray tubes the object of the invention being to increase the efficiency of the tube with respect to those now in general use. Heretofore after the manufacture and thorough testing of an X-ray tube the same was put into the hands of a user and after it was put into every day operation several months would be required to "cure" the tube, as it is known, or before it became effective for the best possible results.

My invention provides a means whereby I can assure in the first instance the same effects as obtained by a thoroughly cured tube and while there are probably several ways in which I can secure the desired object I prefer to attain the same by making that part of the tube which is in the normal passage of the X-rays of cellular formation, the cells being artificially produced, for example by frosting the glass of the tube with acid or otherwise, and preferably though not necessarily interiorly thereof. I will however hereinafter point out the reason for the preference. The frosting of the glass produces a multiplicity of minute cells and I find in practice that the cellular formation provides a ready passage for all the X-rays. Of course I am aware that strong rays of the type noted will pass practically through any substance but this is not always so with the weaker rays. I believe though that the cellular formation of the glass makes the same more permeable to the weaker rays so that I secure the maximum volume of light. I am also inclined to believe that the refractive power of the glass has the effect of deflecting these weaker rays from their normal path and the frosting of the glass eliminates this difficulty and the frosted area does not effect the passage of these weaker rays therethrough; in fact it is quite transparent to such rays. Therefore as a feature of the invention is a tube having interiorly thereof an X-ray nonrefracting surface which is

transparent to the rays, and this feature I propose to claim broadly whether it is secured by frosting the glass or otherwise. It is therefore my opinion that there are two factors which contribute to the efficiency of the tube.

In the drawings accompanying and forming part of the present specification I represent in detail one simple form of embodiment of the invention which to enable those skilled in the art to practice the invention will be set forth fully in the following description while the novelty of the invention will be included in the claims succeeding said description. From this it will be apparent that I do not restrict myself to the disclosure thus made.

Referring to said drawings, Figure 1 is a side elevation of an X-ray tube including my invention, Fig. 2 is a detail view of a portion of the bulb of the tube, and, Fig. 3 is a sectional view of that part of the tube shown in the preceding figure.

Like characters refer to like parts throughout the several figures.

In Fig. 1 I have represented rather fully an X-ray tube which so far as its shape is concerned is practically like those now in general use. This tube comprises a bulb portion 2, a cathode 3 and an anode 4 the leads for these electrodes being set in tubular extensions 5 and 6 respectively from the bulb 2 all after the usual manner. It is quite unnecessary for me to describe further in detail the construction of the tube. The tube as intimated hereinbefore has an artificially produced frosted area or surface and while this may be located either interiorly or exteriorly of the tube I prefer that it be within the tube and such a surface is shown at 7. There are several ways in which the tube can be frosted but I find that it can be very easily done with the aid of acid which bites into the glass in such a manner as to form a large number of cells which present a zone which is pervious to the weakest of the X-rays. The shape of the frosted portion 7 may vary although it is preferably circular in form the size of the circle being preferably a little larger than the maximum cross sectional area of the stream of X-rays where such stream leaves the bulb 2. This

frosted surface it will be observed is directly in the path of the X-rays and owing to its presence the interior of the bulb will refract none of the X-rays, not even the weakest, so that I secure the best possible results.

What I claim is:

1. An X-ray tube having an artificially-formed cellular portion disposed in the path of the X-rays.
- 10 2. An X-ray tube having an interior artificially-formed cellular portion disposed in the path of the X-rays.

3. An X-ray tube having a frosted surface disposed in the path of the X-rays.

4. An X-ray tube having interiorly thereof, a frosted surface disposed in the path of the X-rays. 15

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

HENRY GREEN.

Witnesses:

HEATH SUTHERLAND,  
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