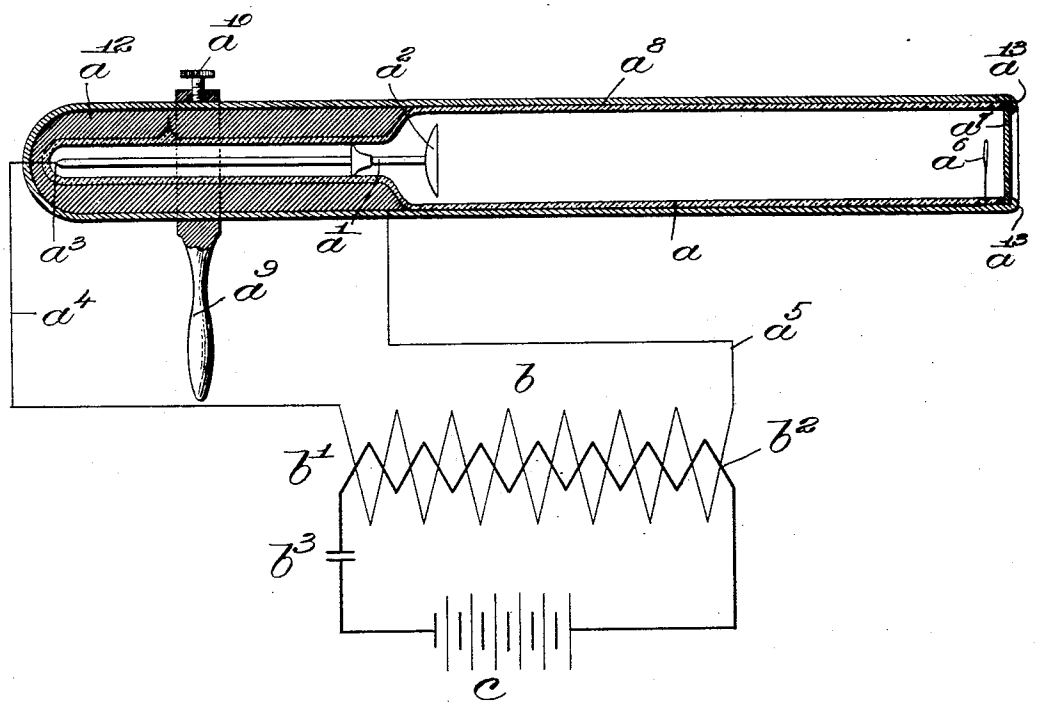
No. 733,343. PATENTED JULY 7, 1903.

F. F. STRONG.

ELECTRICAL APPARATUS FOR USE OF ULTRA VIOLET RAYS.

APPLICATION FILED MAY 11, 1903.

NO MODEL.



Witnesses:
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Samuel W. Lutton.

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by Stanley Gregory & Co. Attys.

No. 733,343. Patented July 7, 1903.

UNITED STATES PATENT OFFICE.

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ELECTRICAL APPARATUS FOR USE OF ULTRA-VIOLET RAYS.

SPECIFICATION forming part of Letters Patent No. 733,343, dated July 7, 1903.

Application filed May 11, 1903. Serial No. 156,565. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK FINCH STRONG, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electrical Apparatus for Use of Ultra-Violet Rays, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawing representing like parts.

My invention is an improved ultra-violet generator or device for generating and applying to the human body or wherever desired waves of short lengths between the green rays of the spectrum and the Becquerel and Roentgen rays, comprising mainly violet light-rays and ultra-violet rays.

The recent activity following the results obtained by the Finsen light has brought forth a number of different forms of apparatus for this general purpose, which, however, are in the main costly and cumbersome and require connection with a dynamo or commercial service-wire. In endeavoring to devise a convenient portable apparatus for general use adapted to the conditions met with by the country physician as well as the city practitioner I have succeeded in producing the herein-described apparatus, which does not depend in any way upon a commercial service-wire, but is operable by a usual dry battery or other form of comparatively small battery in connection with an induction-coil of the Ruhmkorff kind simply by using a Geissler tube or other convenient vacuum-tube provided with a quartz lens or equivalent device transparent to the ultra-violet waves, as herein set forth. This form of apparatus can be economically constructed and used, is entirely portable, and occupies very little space.

In the drawing I have illustrated a preferred form of my apparatus.

The tube, as herein shown, is cylindrical, this form being best adapted to certain surgical purposes; but it will be understood that any other form of tube may be used, as desired.

In a Geissler tube a is mounted, in usual manner, an electrode a', containing a mirror a^2 and connected at a^3 with a terminal wire a^4, leading from a suitable generator of high-voltage current, (herein shown as an induction-coil b,) said terminal a^4 leading from one end of the secondary b' thereof, the other end a^5 of said secondary, when required by the form of apparatus used, leading to an opposite electrode a^6 within the vacuum-tube. At its outer end I provide a lens a^7, of quartz or other material transparent to the ultra-violet rays, this lens being cemented or ground into place and properly fixed so as not to interfere with the vacuum within the tube. The tube contains a residue of gases or vapors which have the power of giving out large quantities of ultra-violet rays in their spectrum, especially when excited by a high-voltage current with a pressure of, say, about one one-thousandth of an atmosphere, among such gases or vapors being acetylene gas, iodin vapor, mercury vapor, and hydrogen gas. The tube a is preferably incased in a hard-rubber or other covering a^8. The primary b^2 of the coil b is connected through a suitable interrupter b^3 to a suitable battery c. This apparatus may be inclosed in a small case, so that the entire apparatus is portable, and the rays can be generated independently of any arc-lamp or other electric circuit or expensive high-frequency machine or apparatus.

The tube a preferably has a length sufficient to reach the affected part—*e. g.*, the cervix uteri—and to project conveniently for proper manipulation, and in connection therewith I may use a handle or supporting-standard a^9, adjustable at a^{10} to suit special requirements. Preferably insulating material a^{12} is filled in at the outer end to give solidity and strength. The incasing part a^8 is preferably sealed around the lens at a^{13}, and this also provides means for pressing against and confining the tissue being treated, tending to dehematize the tissues, thereby rendering them permeable to the ultra-violet rays.

I believe that I am the first to develop for use the rays in question by a vacuum-tube, and in practice I have found that very satisfactory results may be obtained by this simple and convenient form of apparatus.

In use the tube is introduced to the part to be treated, and the quartz lens is pressed against the tissues at the seat of the disease.

The battery-current being turned on through the primary of the coil, causes the high-voltage current to flow through the residual vapor in the vacuum-tube, causing the particles of said vapor to vibrate at such a rapid rate as to impinge upon the surrounding ether and cause ultra-violet rays to fill the tube and radiate out through the lens a^7 upon the diseased tissue, thereby producing the desired action thereon. The glass a being nearly opaque to these rays, reflects them back from the sides of the tube, concentrating them in a stream which passes freely through the transparent lens a^7.

It will be understood that I do not restrict myself to all the constructional details, arrangement, and combination of parts, as shown herein and specifically set forth, inasmuch as many variations may be resorted to within the spirit and scope of my invention, all as will be more apparent from the appended claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A device of the kind described, comprising a vacuum-tube having a discharge-electrode and a lens transparent to ultra-violet rays opposite said electrode combined with a source of high-voltage current of electricity.

2. A device of the kind described, comprising a vacuum-tube containing a gas, such as described, having large capacity for ultra-violet rays in its spectrum, and said tube having a discharge-electrode, and a lens transparent to ultra-violet rays opposite said electrode, combined with a source of high-voltage current of electricity.

3. A device of the kind described, comprising a vacuum-tube having a discharge-electrode, being inclosed in a protecting covering a^8, and a lens transparent to ultra-violet rays opposite said electrode, combined with a source of high-voltage current of electricity.

4. A device of the kind described, comprising a vacuum-tube having a discharge-electrode, and a lens transparent to ultra-violet rays opposite said electrode, combined with an induction-coil, interrupter, and battery, said induction-coil having its secondary connected to said electrode and its primary connected through said interrupter to said battery.

5. A device of the kind described, comprising a vacuum-tube provided with a discharge-electrode, a lens in one end of said tube transparent to ultra-violet rays and a projecting bearing beyond said lens for resting upon the part being treated by the device.

6. A device of the kind described, comprising a vacuum-tube having a discharge-electrode, a lens in the end of said tube transparent to ultra-violet rays, and a handle adjustably mounted on said tube.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK FINCH STRONG.

Witnesses:
GEO. H. MAXWELL,
FRED S. GREENLEAF.