

No. 724,186.

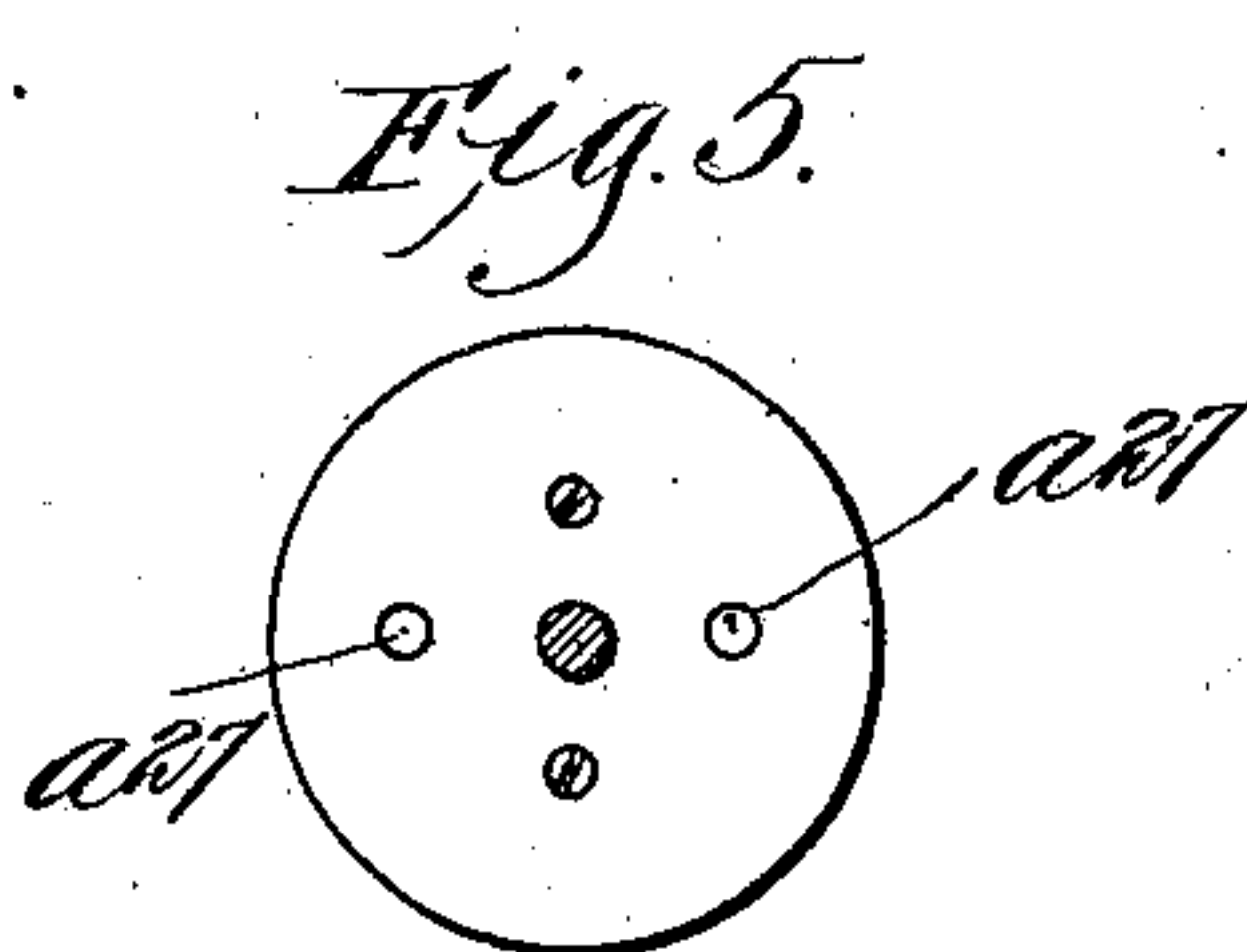
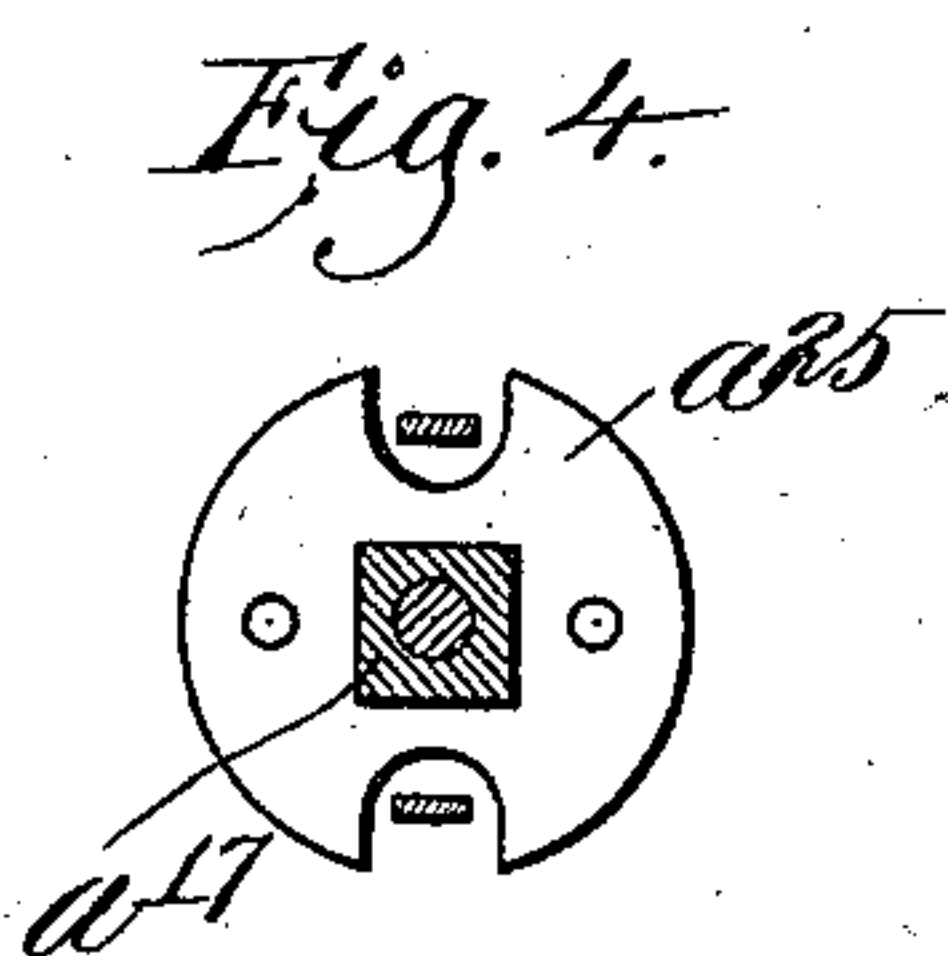
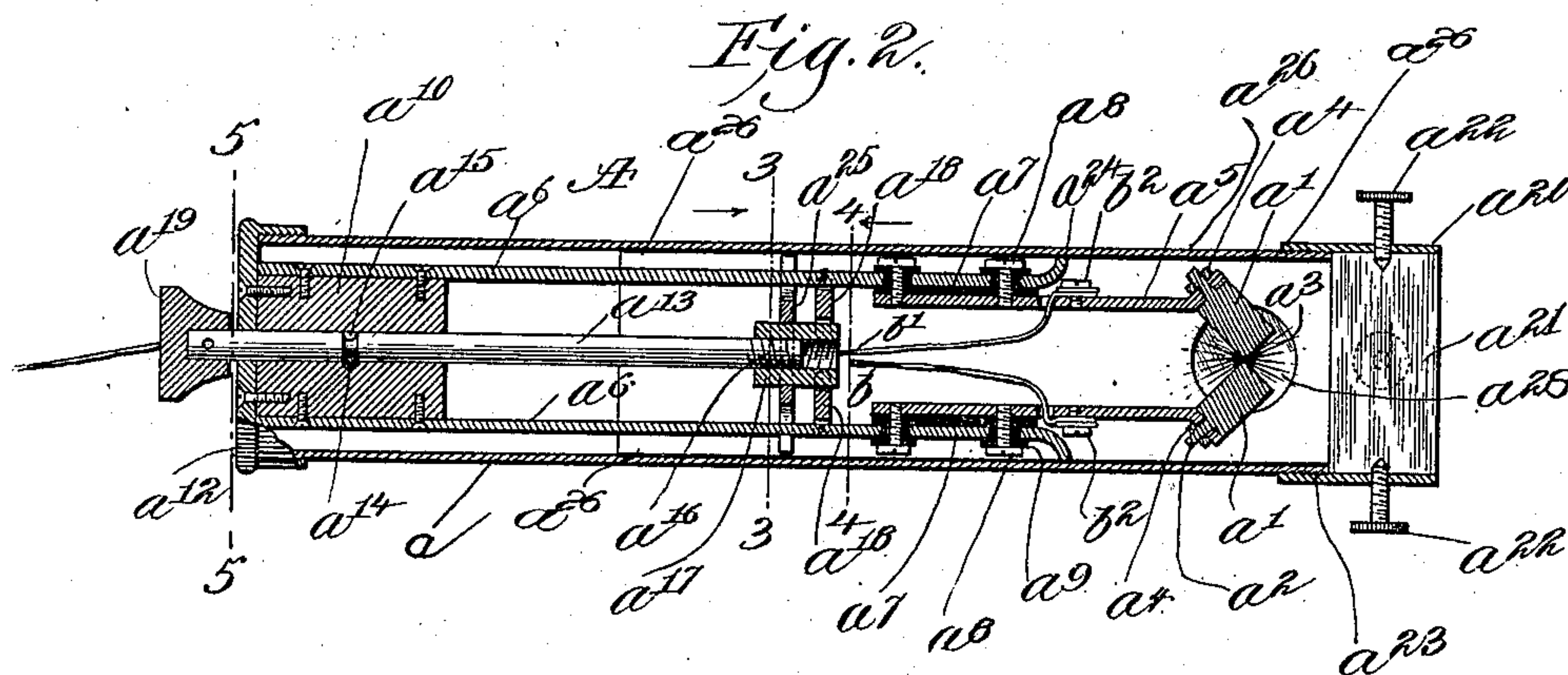
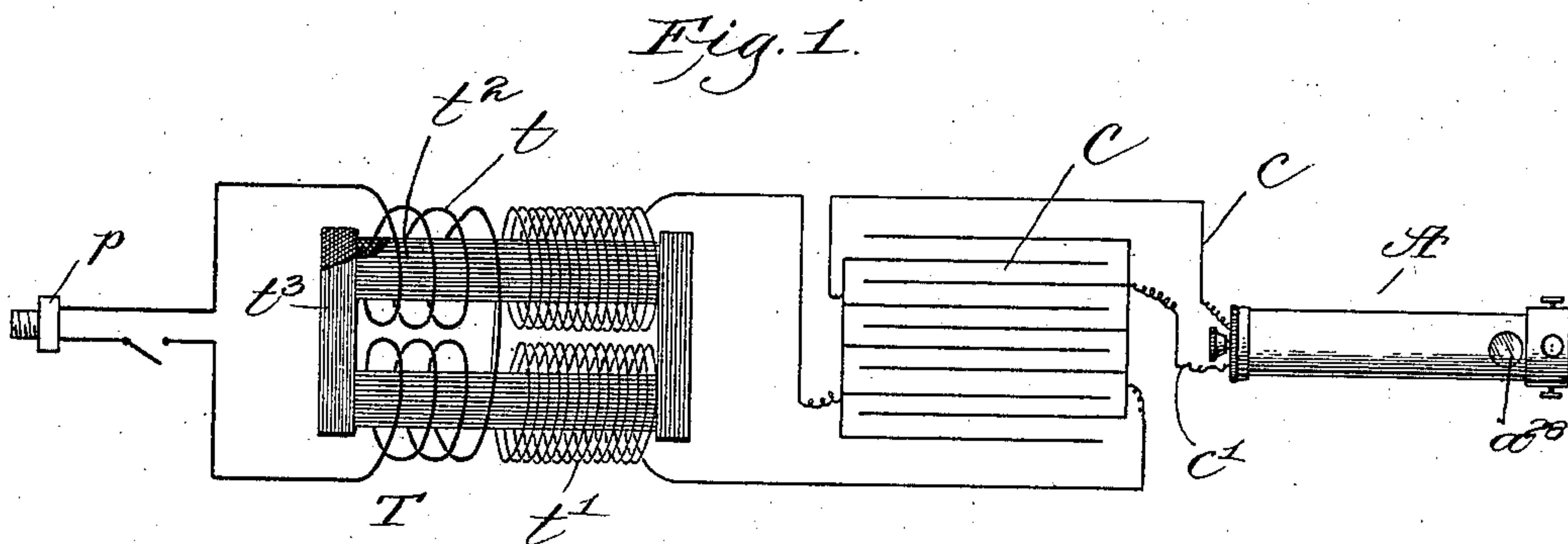
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ELECTRICAL APPARATUS FOR THERAPEUTICAL WORK.

APPLICATION FILED JAN. 22, 1903.

NO MODEL.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL APPARATUS FOR THERAPEUTICAL WORK.

SPECIFICATION forming part of Letters Patent No. 724,186, dated March 31, 1903.

Application filed January 22, 1903. Serial No. 140,161. (No model.)

*To all whom it may concern:*

Be it known that I, HOWARD JACKSON, a citizen of the United States, residing at Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Electrical Apparatus for Therapeutical Work, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an apparatus for producing ultraviolet rays for Finsen treatments, and by the latter term I intend to include the various forms of treatment suggested by medical men in the general line of Dr. Finsen's experiments, whereby various bacteriological growths are destroyed or their growth retarded by exposure to strong ultraviolet rays.

The object of my experiments and investigation has been to render this great discovery practically available to the medical profession generally by producing an apparatus capable of generating a superior light at minimum cost, thereby bringing the apparatus itself within the reach of all and making it possible to reduce the time required for successful treatment to such a short period as to adapt it to the frailest subject.

The constructional details and further advantages of my invention will be pointed out in the course of the following description, reference being had to the accompanying drawings, in which I have shown a preferred embodiment of my invention.

In the drawings, Figure 1 is a diagrammatic view of the apparatus complete. Fig. 2 is a central longitudinal section of the light-tube. Figs. 3 and 4 are cross-sectional views of the latter, taken, respectively, on lines 3 3 4 4, Fig. 2. Fig. 5 is an end view of said tube, taken on line 5, Fig. 2.

Referring more particularly to the light-producing tube A, which constitutes one of the important features of my invention, it will be seen that it comprises a tube  $a$ , which may be of any desired material suitable for the purpose and capable of withstanding the usage to which it is put, and mounted suitably in a tube are the electrodes and operating mechanism therefor.

The electrodes which I prefer to use are

composed of iron, as indicated at  $a'$ , said electrodes being short and provided at their supported ends with threaded studs  $a^2$  and made square at their free ends  $a^3$ , being held in position by any suitable means, as by nuts  $a^4$ , which serve to clamp them against supports  $a^5$ , carried on an adjusting-frame, herein shown as consisting of opposite rods  $a^6$ , insulated from said supports at  $a^7$  and connected thereto by screws  $a^8$ , mounted in insulating-bushings  $a^9$ . The frame  $a^6$  has a block  $a^{10}$  at one end, preferably secured to a cap  $a^{12}$ , provided for closing the tube at one end, and in said block is mounted a rod  $a^{13}$  free to rotate, but held against longitudinal movement by a pin  $a^{14}$ , occupying a groove  $a^{15}$  in said rod. At its inner end the rod  $a^{13}$  is in threaded engagement at  $a^{16}$  with a nut  $a^{17}$ , connected by toggle-links  $a^{18}$  to the frame, so that upon rotating the rod  $a^{13}$  by its thumb-nut  $a^{19}$ , which projects through the cap  $a^{12}$ , the electrodes  $a'$  may be adjusted as required. Adjacent the end carrying the electrodes I provide a screen-holder  $a^{20}$ , adapted to receive a block of ice, rock-salt, or other suitable substance  $a^{21}$ , which may be held therein in any suitable way, as by means of set-screws  $a^{22}$ , and is removably mounted by threads or otherwise on the tube, as indicated at  $a^{23}$ . The frame  $a^6$  preferably has its free end turned out, as indicated at  $a^{24}$ , to center the same and also preferably carries a spider or centering means  $a^{25}$  intermediate its length, and the tube  $a$  has an insulating-lining  $a^{26}$ , of asbestos or other material, adapted to withstand the heat and insulate the outside case or tube. Feed-wires  $b b'$  are secured at  $b^2$  to the supports  $a^5$  and pass out through the cap  $a^{12}$ , as indicated at  $a^{27}$ . Suitable sight-windows  $a^{28}$  are provided for watching the electrodes.

One main purpose of my invention is to obtain a light of maximum efficiency, whereby the time required for an exposure is reduced to a minimum, so as to avoid the necessity of a tedious and dangerous exposure or treatment.

I have found that by my apparatus the exposure can be reduced to an exceedingly-short period, five minutes being sufficient in some instances.

The iron electrodes are very rich in actinic



rays, and by having their ends square I get an exceedingly sharp effect, and a further very important feature of my invention resides in providing, in connection with a condenser C, a step-up transformer T, which may receive its current from any usual alternating commercial circuit of one hundred to one hundred and ten volts, to which it may be connected by a usual electric-light plug *p*.

For general use the transformer may be wound with eight layers of three hundred and four turns of No. 16 magnet-wire for the coarse winding *t* and twenty layers of sixteen hundred turns of No. 24 wire for the fine winding *t'* on cores *t<sup>2</sup>*, six by one and five-eighths inches, composed of fine iron wire connected at their ends by laminated iron yokes *t<sup>3</sup>* one and one-fourth by one and three-fourths by four and one-half inches, and as thus constructed the condenser of micanite sheets and tin-foil has a capacity of about one-fourth of a microfarad connected by heavy flexible conducting-wires *c c'* to the lamp A for carrying the rapidly-oscillating current.

This apparatus is not only relatively inexpensive, but can be used with any commercial alternating current, as stated. The apparatus is very readily portable and does not require a skilled operator, is rapid in its work—a treatment requiring only two to five minutes is capable of treating a large area satisfactorily—and is inexpensive to operate. It will run steadily without heating and does not require adjustment, except at long intervals, and the light is exceedingly rich in ultraviolet rays.

In the foregoing description I have stated the size and proportions which I have found the best for a convenient portable apparatus; but it will be understood that by increasing the condenser a larger arc may be produced, the transformer being modified within limits by using larger wire for carrying increased current; and it will be understood that I have set forth herein the said preferred proportions as an example to enable those skilled in the art to apprehend more clearly my invention.

For practical use it is necessary that the ultraviolet rays shall preponderate, and one object of my invention is to produce these rays in abundance without at the same time generating to an appreciable extent the other rays of the spectrum, or, in other words, I do not produce an intense light and then eliminate therefrom the superfluous and undesirable rays, (which is an expensive and cumbersome process;) but I have devised an apparatus which arrives at the desired result directly by producing the ultraviolet rays in great abundance by having a condenser operated by an alternating-current step-up transformer in time to deliver a high-tension high-frequency current directly to the arc-lamp. It is well known that a current of this character will produce an arc rich in ultraviolet rays. By my apparatus these rays are

produced in an inexpensive, simple, and easily-operated mechanism capable of long continuous use.

I have aimed to produce an apparatus safely operable by a person not specially skilled and at a low cost, portable, and capable of operation with current commonly available.

My apparatus requires practically no attention, excepting turning the switch and occasionally adjusting the electrodes.

While I prefer to use iron electrodes, I do not wish to limit myself thereto, except where specified in the claims. These electrodes are mounted at an angle of about ninety degrees, as shown, and are held rigidly at one end, being capable of being turned to bring new portions of the sharp corners into action at the arc, these electrodes being inexpensive, long-lived, readily mounted, highly actinic, not liable to injury, interchangeable, and economical.

When it is desired to renew the screen *a<sup>21</sup>*, the holder can be quickly removed from the tube and another put in place, or the screen material may be released by loosening the thumb-screws and a fresh supply substituted.

When it is desired to remove the electrodes or get at them, this may be done quickly simply by unscrewing the cap *a<sup>12</sup>* and slipping the whole connected apparatus out of the tube.

Without undertaking to set forth all the modifications in form and arrangement of my apparatus and the various further advantages thereof, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus of the kind described, comprising in series a source of alternating current, a step-up transformer and a condenser for producing a high-tension, high-frequency current, and an arc-lamp operated thereby for producing ultraviolet rays, substantially as described.

2. An apparatus of the kind described, comprising in series a source of alternating current, a step-up transformer and a condenser for producing a high-tension, high-frequency current, and an arc-lamp operated thereby for producing ultraviolet rays, said lamp being provided with iron electrodes, substantially as described.

3. An apparatus of the kind described, comprising in series a step-up transformer, a condenser, and an arc-lamp for producing ultraviolet rays, said lamp having square-ended iron electrodes arranged at an angle to each other for producing an arc between them, substantially as described.

4. In an apparatus of the kind described, a lamp comprising a case, a frame therein, electrode-supports carried thereby, and iron electrodes fixed rigidly on said supports, and means for adjusting said supports toward and from each other, substantially as described.

5. In an apparatus of the kind described, a lamp comprising a case, a frame therein, sup-



ports carried thereby, square-ended electrodes mounted in said supports, said electrodes being capable of being rotated in said supports, but immovable longitudinally therein, substantially as described.

5 6. In an apparatus of the kind described, a lamp, comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising toggle-links and an operating member therefor connected with said links and extending outside of the case, substantially as described.

15 7. In an apparatus of the kind described, a lamp comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising toggle-links, a nut connecting the same, and a threaded rod in engagement with said nut, said rod extending beyond the case, substantially as described.

25 8. In an apparatus of the kind described, a lamp comprising a case, opposite electrodes, separate supports therefor, and means for adjusting said supports toward and from each other, comprising a threaded rod for operat-

ing said links, said rod extending beyond the case, substantially as described.

9. In an apparatus of the kind described, a lamp comprising a case, a removable cap 30 therefor, a frame rigidly connected to said cap, supports carried by said frame, electrodes mounted on said supports, whereby the frame and all parts connected therewith can be bodily removed with said cap, substantially as described. 35

10. In an apparatus of the kind described, a lamp, comprising a case having at one end a cap and at the other end a removable screen-holder provided with means for detachably 40 holding a screen of ice, a frame, supports and electrodes, all carried by said cap, and means for maintaining the same out of contact with the case, substantially as described.

In testimony whereof I have signed my 45 name to this specification in the presence of two subscribing witnesses.

HOWARD JACKSON.

Witnesses:

GEO. H. MAXWELL,

WILHELMINA C. HEUSER.