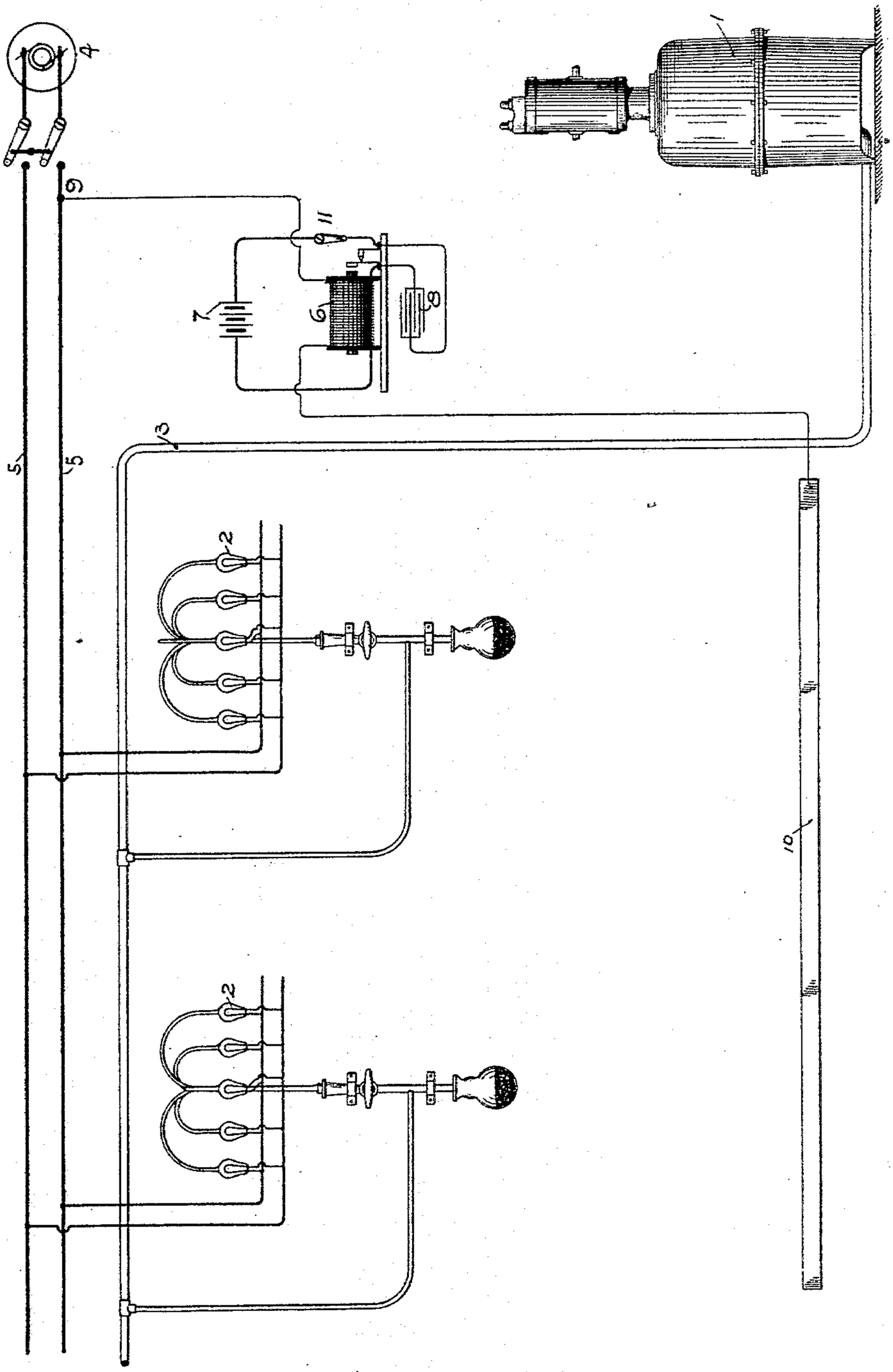
(No Model.)

F. S. SMITH & J. A. VANDEGRIFT.

METHOD OF AND MEANS FOR TESTING INCANDESCENT LAMPS.

No. 533,502. Patented Feb. 5, 1895.



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UNITED STATES PATENT OFFICE.

FRANK S. SMITH, OF PITTSBURG, AND JAMES A. VANDEGRIFT, OF ALLEGHENY, PENNSYLVANIA.

METHOD OF AND MEANS FOR TESTING INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 533,502, dated February 5, 1895.

Application filed July 9, 1894. Serial No. 516,895. (No model.)

To all whom it may concern:

Be it known that we, FRANK S. SMITH, residing at Pittsburg, and JAMES A. VANDEGRIFT, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented a new and useful Improvement in Methods of and Means for Testing Incandescent Electric Lamps, (Case No. 602,) of which the following is a specification.

Our invention relates to a method and means for testing incandescent electric lamps in process of construction, and particularly for ascertaining the proper time for applying the electric current from the generator, which current is employed before sealing of the lamps for the purpose of driving off occluded gases, in a well known manner.

The object of our invention is the provision of a quick and easy method for ascertaining, without removing the lamps from the pumps, the moment when the proper degree of vacuum is reached, with such certainty as to practically preclude the possibility of the current being turned on too soon.

Our invention also applies to a method and means for making a like test for the purpose of determining when a lamp is defective or leaky, so that it may be at once removed from the vacuum tubes, and not admit air into other lamps connected to the same pump.

Our invention is illustrated in the accompanying drawing, which shows the various parts necessary to the practice of our invention.

The pumping apparatus proper is in itself no part of our invention, and is indicated in the drawing at 1.

The lamps to be exhausted are as usual, arranged in a number of groups, as shown at 2, which are properly connected in any well known manner to the pumping apparatus, as shown, by means of the tubing, 3.

It is customary before removing the exhausted lamps from the vacuum tubes, to connect them in circuit with a proper generator, 4, so that the gases which may have been occluded by the filaments may be driven off before the sealing is done, and may be carried off by the pumps. If this is done too soon the filaments will be injured and destroyed, and it has been the custom hitherto to allow a certain time for the production of the proper degree of vacuum. In allowing this time, it was of course necessary to employ a considerable factor of safety, so that different conditions might be allowed for, and thus much time has been lost. It is one object of our invention to save this extra time by providing a method and means whereby the moment when the lamps may be safely connected in circuit may be ascertained by test. The current can thus be turned on as soon as the lamps are ready, and no factor of safety will be necessary and no lamps injured.

In the accompanying drawing the generator and circuit, shown at 4 and 5, supply current to the lamps 2.

The testing means are composed of the following elements, arranged substantially as shown in the drawing, for the purpose of permitting the testing to be accomplished in position, and without taking the lamps from their places on the exhausting tubes.

At 6 is shown an inductor, or Ruhmkorff coil, excited by the battery 7 or any other source, and preferably provided with the usual condenser in shunt with the interrupter, as shown at 8.

As shown in the drawing, one end of the secondary is connected to either of the leads of the generator 4, as at 9. The other end of the secondary is connected to a conductor 10 extending along the whole line of lamps to be exhausted and tested, said conductor usually as constructed by us consisting of a flat strip of metal, supported upon a board or otherwise, and placed in a convenient position to be touched by the foot of the operator. This strip is usually laid along the row of lamps under the bench, and out of casual reach.

The operation of this device is as follows:—When the process of exhaustion has continued for a definite length of time the operator proceeds to test each of the groups of lamps by touching the strip 10 with one portion of his body, usually his foot, while more or less surrounding the lamps one by one, with his hand

placed against the globe or bulb. The electrical undulations which are set up through the vacuum between the hand of the operator and the filament of the lamp will ordinarily produce a faint glow or discharge of uncertain character, much resembling the phenomena visible in the familiar experiments with Crookes's tubes. As long as these effects are visible the operator knows that the vacuum is not sufficiently high; but when, upon making contact in the manner above described, no discharge appears within the bulb, the operator knows that it is safe to turn on the current.

Of course it is not necessary to establish the electrical undulations within the bulb by means of the hand, as any means whereby the terminals of the secondary of the Ruhmkorff coil are brought electrically near together will suffice to produce the desired results. The means above described we have however found to be very desirable.

The details of our above described invention may be varied in many ways and we do not wish to be understood as limiting ourselves in any way to such details. It is clear for instance that a Ruhmkorff coil is merely an illustrative instance of many means for producing high tension oscillatory currents, which might be used.

What we claim is—

1. The method of definitely ascertaining the proper moment for putting lamps, under process of exhaustion, into circuit for the purpose of expelling occluded gases, which consists in causing electrical oscillations of high frequency and potential to pass from the circuit aforesaid through the space within the lamp bulb, substantially as described.

2. As a means for testing lamp bulbs while in process of exhaustion, leads in circuit with the filaments of said lamps, a conductor in proximity to said lamps, and means for producing high tension oscillatory or alternating currents, one end of the high tension producer being connected to either of the said leads and the other to said conductor, substantially as described.

In testimony whereof we have hereunto subscribed our names this 2d day of July, A. D. 1894.

FRANK S. SMITH.
JAMES A. VANDEGRIFT.

Witnesses:
JAS. W. SMITH,
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