

(No Model.)

2 Sheets—Sheet 1.

C. H. RUDD.
ELECTRICAL TESTING APPARATUS.

No. 504,751.

Patented Sept. 12, 1893

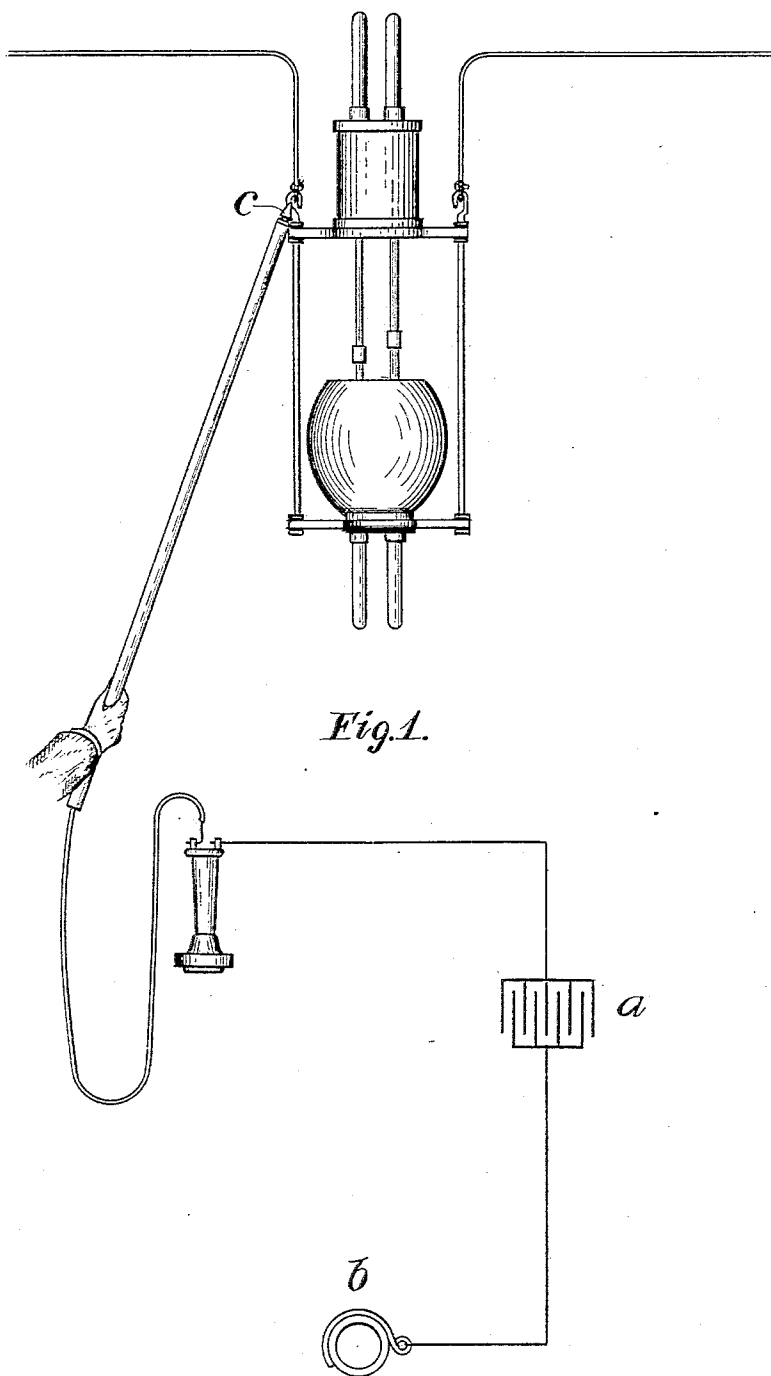


Fig. 1.

Witnesses:
Sam^l B. Dover.
Cha^l G. Hawley.

Inventor.
Charles H. Rudd.
By George P. Barton
attorney.

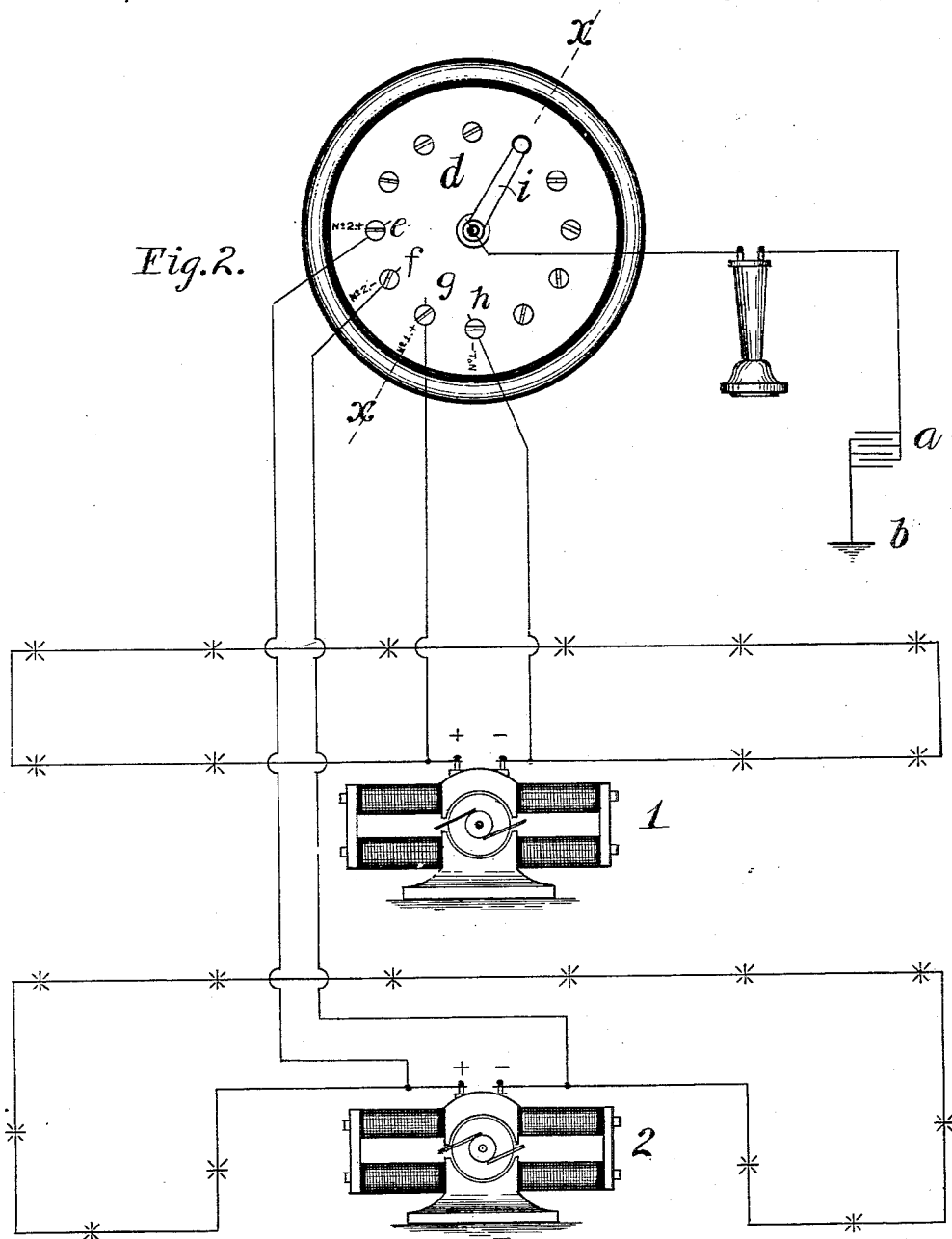
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2 Sheets—Sheet 2.

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Witnesses.

Chas. G. Hawley.
Albert H. Parker

Inventor.

Charles H. Rudd.
By George P. Barton
Attorney

UNITED STATES PATENT OFFICE.

CHARLES H. RUDD, OF EVANSTON, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

ELECTRICAL TESTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 504,751, dated September 12, 1893.

Application filed January 14, 1888. Serial No. 260,944. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. RUDD, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric-Light-Testing Apparatus, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to apparatus for testing to determine whether there is any ground or leak upon an electric arc light circuit.

My invention consists in a telephone on one side of which is a condenser and on the other side a connecting device for closing the telephone circuit to any portion of the electric light circuit. This connecting device may be a rod or pole to be held in the hand and reached up to the lamp hooks, or a dial device may be used provided with normally open branch connections to different sides of the dynamo machine, so branched that the telephone may be readily connected to either branch at will. The inspector listening at the telephone and noting the effect in the telephone, is able to determine whether or not there is any leak or ground throughout the circuit. The tests are made while the lamps are burning and the location of the leak or ground is determined by listening at the telephone and noting the loudness of the sound due to the currents drawn off from the circuit at points of different potential. It is well known that if a ground is established between two lamps, little or no current would be sent through a branch connected to ground between the same lamps, but if a connection were made to ground at some other point in the circuit so that there should be intervening lamps between the two ground connections, a strong current would be established through the new ground connection. A condenser included in a ground branch, permits the vibratory currents or waves to pass through the telephone so as to cause sounds in the telephone practically the same as if the circuit were direct to ground. This function of a condenser in a telephone circuit is well known. The experienced inspector will soon learn by the difference in the loudness

of sound in the telephone as he makes connection at different points of an electric light circuit, the direction or location of the leak or ground, if any.

My invention involves not only the apparatus, but the method of using the same to determine the location of accidental leaks or grounds upon electric light circuits.

The claims upon the apparatus I have inserted in a division of this case, Serial No. 289,088, filed October 25, 1888, for testing apparatus for electric light circuits.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows an electric lamp, electric lamp circuit and my testing apparatus applied to one side of the lamp as in the act of making a test. Fig. 2 is a diagram illustrative of my dial device provided with terminals connected with different sides of dynamo electric machines at an electric light station. Fig. 3 is a sectional view of the dial upon line *x x* of Fig. 2.

As shown in Fig. 1 it will be seen that the telephone is included in a circuit branched through a condenser *a* to the ground *b*. The pole is held in the hand and attached to the hook of the lamp. I have made the ground connection *b* in the form of a hook, so that it may be conveniently thrown over a gas pipe for making the ground connection readily. The circuit is connected through the pole to the point *c* so that when the point *c* is touched to the hook or other portion of the lamp circuit, the circuit will be closed through the pole to the telephone and condenser to ground. Any convenient form of apparatus may be used.

As shown in Figs. 2 and 3, the dial *d* is provided with terminals *e f g h*, which terminals are connected with different sides of the dynamo machines 1 and 2, as shown. The lever *i* corresponds, in function, to the pole. It may be moved over any one of the terminals *e f g h* and closed thereon as desired. This dial is designed especially to be placed at an electric light station. Each separate lamp circuit is provided with two terminals upon the dial, one terminal leading to one side of the dynamo electric machine or machines, and the other to the other side of the dynamo

electric machine or machines. If the lever *i* be closed upon point *e*, no sound will be heard in the telephone unless there be a leak or ground at some point of the circuit, and if the
 5 leak or ground should be between the dynamo and the first lamp, there would still be no current sent through the telephone, or other current indicating apparatus, included in the circuit with the condenser. I therefore
 10 find it necessary to provide for testing on opposite sides of the machine, and therefore after a test has been made upon the point *e*, I move the lever *i* over to point *f* connected with the opposite side of the machine. In
 15 this manner a leak or ground will be surely detected, if any exist at any point throughout the circuit. The engineer or inspector in order to test a circuit, therefore, will preferably test first at the station connecting with
 20 opposite sides of the generator. If the telephone or other current indicating apparatus does not show appreciable current when connection is made with either side, it will be considered that the circuit is perfect. If, how-
 25 ever, current should be indicated when connection is made with either side or with both sides, the inspector will go out along the line with apparatus similar to the apparatus shown in Fig. 1, and will touch the point *c* of
 30 his testing apparatus to the lamps on different sides at different points along the route until he arrives at a point where no current is indicated when said point *c* touches a hook on one side of a lamp. This will indicate that
 35 the ground is upon that particular side of the lamp which he is testing and between that lamp and the next. Thus the ground or leak may be readily traced upon any electric light circuit.

I do not limit myself to the construction 40 shown, since the construction may be varied in various ways without departing from my invention.

Having thus described my invention, I claim as new and desire to secure by Letters 45 Patent—

1. The method of testing an electric lamp circuit, which consists in successively connecting or tapping a telephone with said circuit at different points while the lamps are 50 burning, and listening at the telephone and comparing the sounds produced in the telephone at the different points with respect to loudness, substantially as described.

2. The method of testing electric light circuits while the lamps are burning, which consists in successively closing different points of the circuit to ground through a telephone and condenser, and listening at the telephone as the connections are made and comparing 60 the loudness of sounds in the telephone to determine the relative potentials of the current at the different points.

3. The method of detecting grounds upon an electric circuit supplied with a non-uniform current, which consists in applying successively at various points along the line, an indicating device adapted to be actuated by a non-uniform current to give an indication, said indication adapted to vary as the strength 70 of the current varies, and noting the character of the indication, substantially as described.

In witness whereof I hereunto subscribe my name this 11th day of January, A. D. 1888.

CHARLES H. RUDD.

Witnesses:

GEORGE P. BARTON,
 C. C. WOODWORTH.