No. 652,374. Patented June 26, 1900.

J. F. SANDERS.

INCANDESCENT LAMP FOR ELECTRIC LIGHTS.

(Application filed Oct. 12, 1899.)

(No Model.)

Fig. 2.

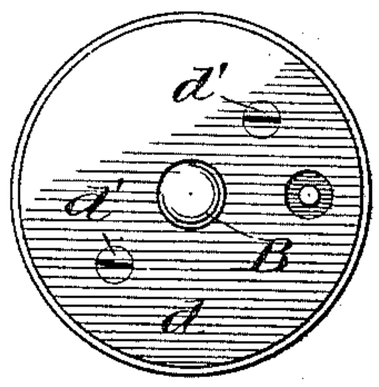


Fig. 3.

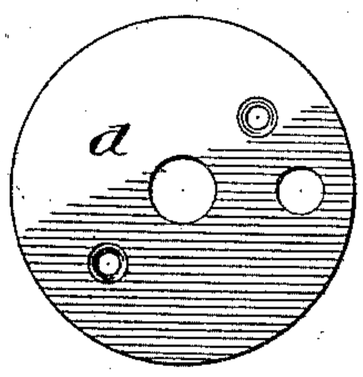


Fig. 1.

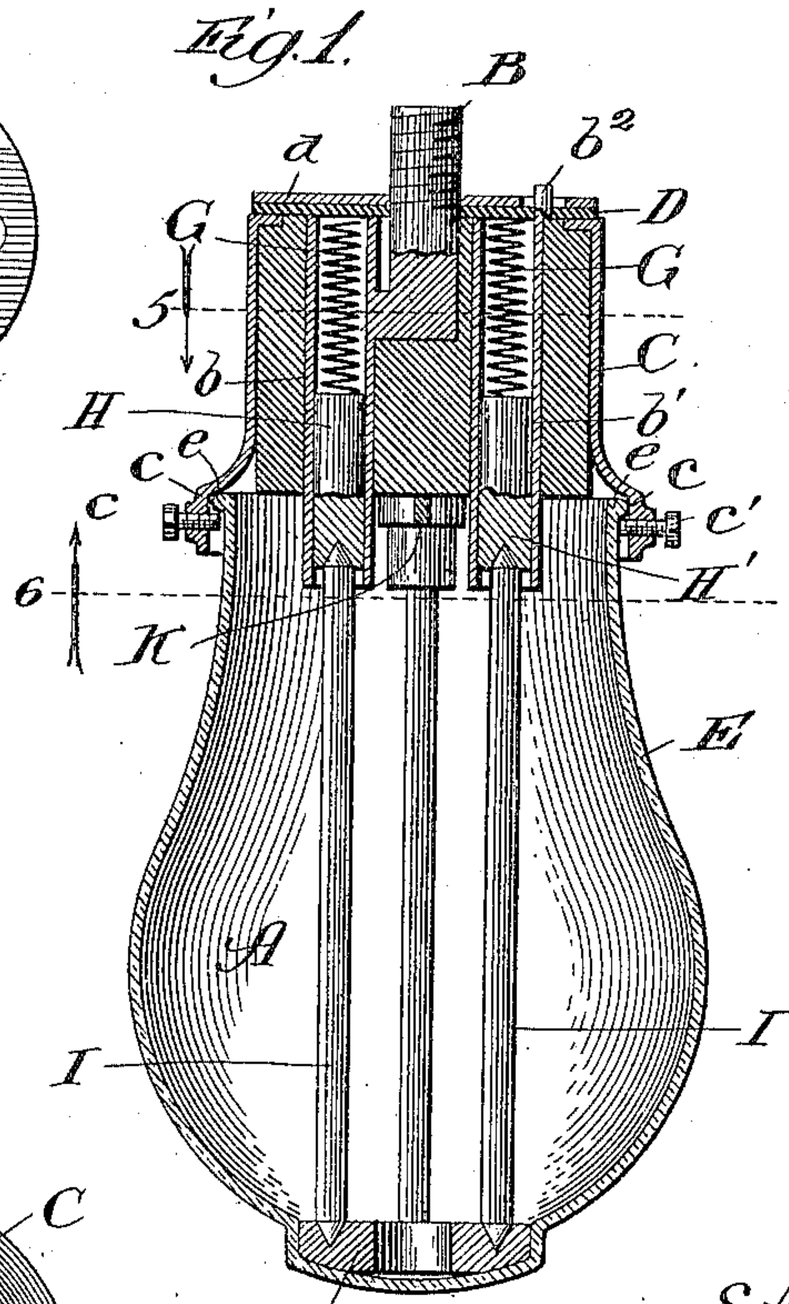


Fig. 4.

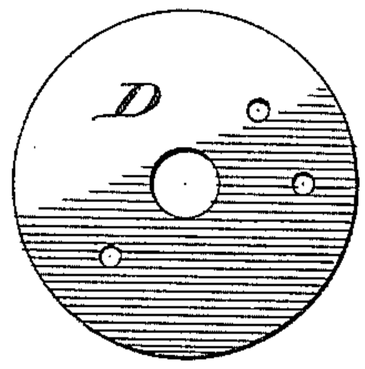


Fig. 5.

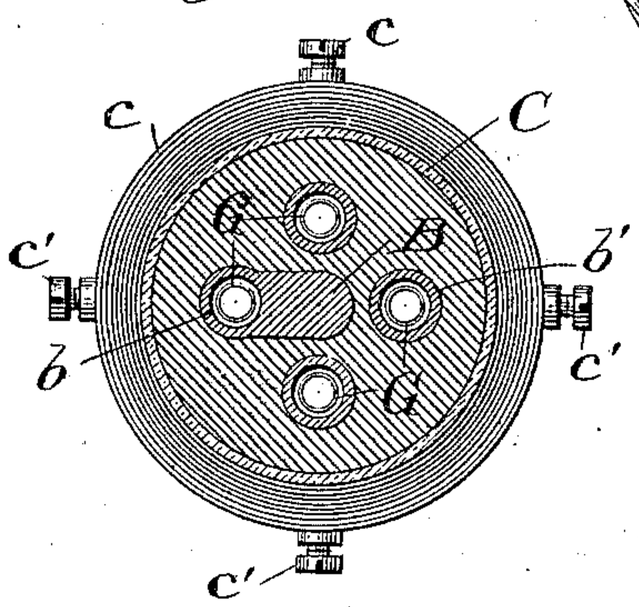


Fig. 6.

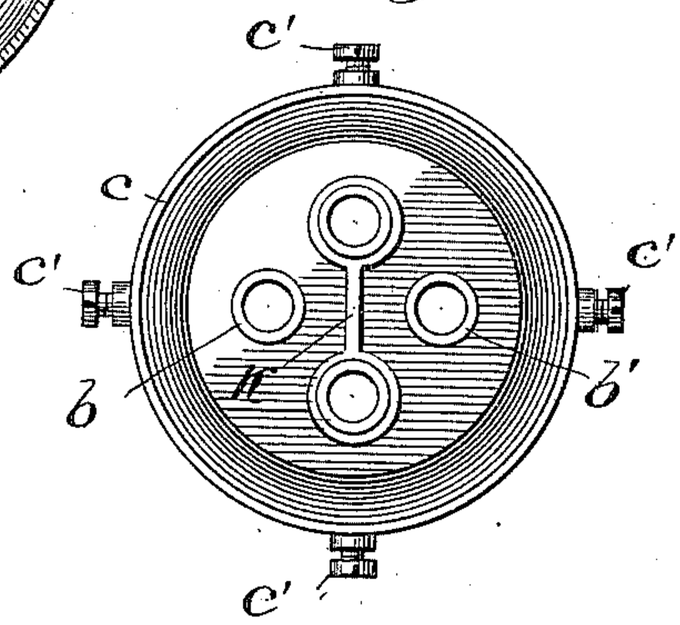
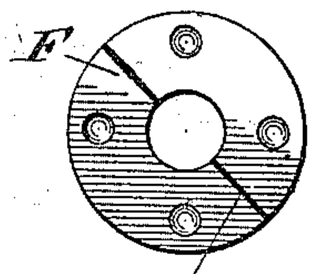


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN F. SANDERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO HARRY BROWN, OF SAME PLACE.

INCANDESCENT LAMP FOR ELECTRIC LIGHTS.

SPECIFICATION forming part of Letters Patent No. 652,374, dated June 26, 1900.

Application filed October 12, 1899. Serial No. 733,364. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. SANDERS, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Incandescent Lamps for Electric Lights, of which the following is a specification.

The object of my invention is to produce more light with a given current in a more economical and practical way than is now obtained in the use of the present incandescent electric lights and to make a lamp that is economical in construction, durable in use, and interchangeable as to its various parts, and capable of being applied to many of the existing electric currents; and my invention consists in the features, details of construction, and modes of operation hereinafter described and claimed.

In the drawings, Figure 1 is a vertical longitudinal sectional elevation of my electric incandescent lamp. Fig. 2 is a plan or top view. Fig. 3 is a plan view of the top plate of the lamp. Fig. 4 is a plan view of a mica plate used under the top plate. Fig. 5 is a plan view of a horizontal section, taken in line 5 of Fig. 1. Fig. 6 is a bottom view taken in line 6 of Fig. 1, and Fig. 7 is a plan view of the ring of conducting material in the bottom of the lamp.

In making my improved electric-light incandescent lamp A, I make it with an external shape or configuration very nearly the same as that of the incandescent lamps now in general use and adapted to be inserted and used in the place of such lamps. It is therefore provided with the usual attachments to cause it to fit into the sockets now in general use for the ordinary incandescent lamps. It is provided with a screw B at its upper end of the proper diameter, thread, and length, so that after removing the present incandescent lamp one of mine can be screwed into its socket and used in its place. The screw is firmly secured to the lamp by embedding it in the material filling the cup or shell C forming the upper portion of the lamp. This filling may be any suitable non-conductive material. The screw is connected at its lower end with a metallic tube *b*, also embedded in the filling material. Other tubes *b'*, preferably three of them, are also embedded in the filling material, but with a layer of such material interposed between them and the screw B, so that they will be out of electrical connection with such screw until brought into such connection by other means. One of these tubes *b'* has a contact-point b^2 extending up above the top of the lamp a desired distance, so that when the lamp is screwed into the socket the circuit will be formed through the screw B and the contact-point b^2. Immediately above the filling material I arrange a plate of mica, asbestos, or other suitable non-conducting material D, and above this I arrange a metallic plate *d*, securely held in place by screws *d'* or other desired means, so as to make a firm and secure top for the lamp. Of course, however, a single plate of sufficient rigidity can be made to serve the purpose of the two. The lower end of the cup or shell C is preferably flared out and enlarged, as shown at *c*, to receive the top of a glass bulb or globe E, which may be provided with an outwardly-turned flange *e*, through which it may be held in place by means of the screws *c'*, which may be screwed in or out through the lower edge of the cup by hand to permit the insertion or removal of the globe or bulb. The glass forming the bulb or globe, as will presently appear, will be subjected to the heat of the incandescent carbons, and to prevent it from breaking from such heat or from uneven heat I would recommend that it be made from or contain a sufficient quantity of silicate of lead. In the lower end or bottom of the lamp is arranged where more than two carbons are used a sectional bottom ring F, of conducting material, preferably of two half-rings insulated from each other, as shown at *f*. Where only two carbons are used, however, this hollow ring need not be sectional, but may be formed of one integral piece of conducting material. Where a plurality of incandescent pencils or electrodes are used, they should be arranged in pairs and a section of the bottom ring should be provided for each pair. I arrange in the upper ends of the tubes *b* and *b'* light coiled springs G, as shown in Fig. 1, and beneath these I insert short carbons H and H', fitting snugly in the tubes, with their upper

ends contacting with the springs, by means of which they are constantly held down to their work. In the lower ends of these carbons and in the upper face of the bottom ring are arranged shallow holes, preferably conical, as shown in Fig. 1, in which are arranged incandescent pencils or electrodes I and I′, formed of resistance material, which should be refractory or substantially non-combustible. These incandescent carbons or electrodes, owing to the resistance which they furnish to the passage of the electric current, become incandescent or heated to a white heat, so as to furnish illumination of high candle-power.

The position and insulation of the carbon-tubes from each other and from the screw may be secured in various ways, as already intimated, though probably the simplest and easiest way is to place them and the cup or shell into a former made for the purpose, which holds them all in the exact required position, and then filling the intervening spaces with pipe or porcelain clay slightly moistened and pressed in with a die shaped and fitted for the purpose. The clay when dried forms a hard mass, which holds all the pieces firmly in place and forms, as already said, a non-conductor practically indestructible by heat. If preferred, however, plaster-of-paris, marble, or other suitable plastic non-conducting material may be employed to fill the cup or shell. The carbons H and H′ and the bottom ring F can be and preferably are made of graphite. The reason I prefer graphite is because it is a good conductor of the electric current and is not readily affected by high temperatures. The carbon pencils or electrodes are made in the manner described in my application, Serial No. 731,564, filed September 25, 1899, and I need not here describe the matter in detail.

As already said, the lamp may have two or more—say four—incandescent pencils or electrodes, although any desired additional number may be used, if preferred. Where two incandescent electrodes are used, the electric current passes into the lamp through the screw B, which, as already said, is used to secure the lamp in the socket. From the screw it passes into the tube *b* and from such tube into the carbon H, from which it passes into the incandescent electrode I, and from thence into the bottom ring, thence up through the incandescent electrode I′ to the carbon H′ and into the metallic tube *b*′ and through the contact b^2 into the return-circuit entering the socket. Where more than two incandescent electrodes are used—for instance, four—the electric current passes, as already described, into the bottom ring, which in this case, however, as already explained, is formed of sections insulated from each other. The current then passes up through the incandescent electrode, resting in the portion of the ring that supports the electrode through which it entered, and at the top passes through a metallic or conducting connector K, that leads it across to the metal tube holding a carbon resting on an incandescent electrode supported by another section of the bottom ring, which enables the current to pass down and up through the other electrode resting in the same section of the ring and out through the return-circuit, as already described. The same arrangement obtains where more than two pairs of incandescent pencils or electrodes are used. Each pair rests on a section of the bottom ring, and the transfer from one pair to another pair is made at the top, and the contact-point b^2 is arranged in the tube containing the last carbon traversed by the electric current in its course through the lamp.

In the above construction of lamp and arrangement of carbons and incandescent electrodes or pencils no vacuum is required, and the lamp can be readily opened to remove or insert new electrodes, so that the quantity of candle-power light can be increased or decreased at will by simply changing the character of the incandescent pencils or electrodes used. All parts of the lamp are readily accessible, so that they can be easily cleaned, and in case any part becomes broken or defective it can readily be changed or repaired. These advantages, to speak of no others, will be readily recognized and appreciated by users of incandescent electric lights.

What I regard as new, and desire to secure by Letters Patent, is—

1. In an incandescent electric lamp, the combination of a glass bulb or globe terminating in a prolongation at its bottom adapted to receive and hold a ring of conducting material, a bottom ring of conducting material arranged in the prolongation of the bulb or globe and provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, substantially as described.

2. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, metallic tubes embedded in the filling material adapted to receive carbons, a glass bulb or globe terminating in a prolongation at its bottom adapted to receive and hold a ring of conducting material, and a bottom ring of conducting material arranged in the prolongation of the bulb or globe and provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

3. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, metallic tubes embedded in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering

the lamp and the other provided with a contact-point for completing the circuit leaving the lamp, a glass bulb or globe terminating in a prolongation at its bottom adapted to receive and hold a ring of conducting material, and a bottom ring of conducting material arranged in the prolongation of the bulb or globe and provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

4. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, metallic tubes embedded in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp, and the other provided with a contact-point for completing the circuit leaving the lamp, and a bottom ring of conducting material provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

5. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, metallic tubes embedded in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp and the other provided with a contact-point for completing the circuit leaving the lamp, and a bottom ring of conducting material provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

6. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, metallic tubes embedded in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp, and the other provided with a contact-point for completing the circuit leaving the lamp, springs arranged in the metallic tubes above the carbons when inserted therein, a glass bulb or globe terminating in a prolongation at its bottom adapted to receive and hold a ring of conducting material arranged in the prolongation of the bulb or globe and provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

7. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, a plurality of metallic tubes arranged in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp, two of the others being connected together at the top by conducting material, and another being provided with a contact-point for completing the circuit leaving the lamp, a glass bulb or globe terminating in a prolongation at its bottom adapted to receive and hold a ring of conducting material, and a bottom ring of conducting material arranged in the prolongation of the bulb or globe and provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

8. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, a plurality of metallic tubes arranged in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp, two of the others being connected together at the top by conducting material, and another being provided with a contact-point for completing the circuit leaving the lamp, and a bottom ring of conducting material provided with recesses in its upper face adapted to receive and hold incandescent pencils or electrodes, whereby incandescent pencils or electrodes may be inserted connecting the carbons in the tubes with the bottom ring of conducting material, substantially as described.

9. In an incandescent electric lamp, the combination of a cup or shell, non-conducting filling material arranged therein, a plurality of metallic tubes arranged in the filling material adapted to receive and hold carbons, one of the tubes forming a part of the circuit entering the lamp, two of the others being connected together at the top by conducting material, and another being provided with a contact-point for completing the circuit leaving the lamp, and a sectional bottom ring of conducting material provided with recesses in its upper face and having its sections separated by insulating material, whereby incandescent pencils or electrodes may be inserted, a pair for each section of the bottom ring, connecting the carbons in the tubes with the bottom ring, substantially as described.

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