

No. 639,161.

Patented Dec. 12, 1899.

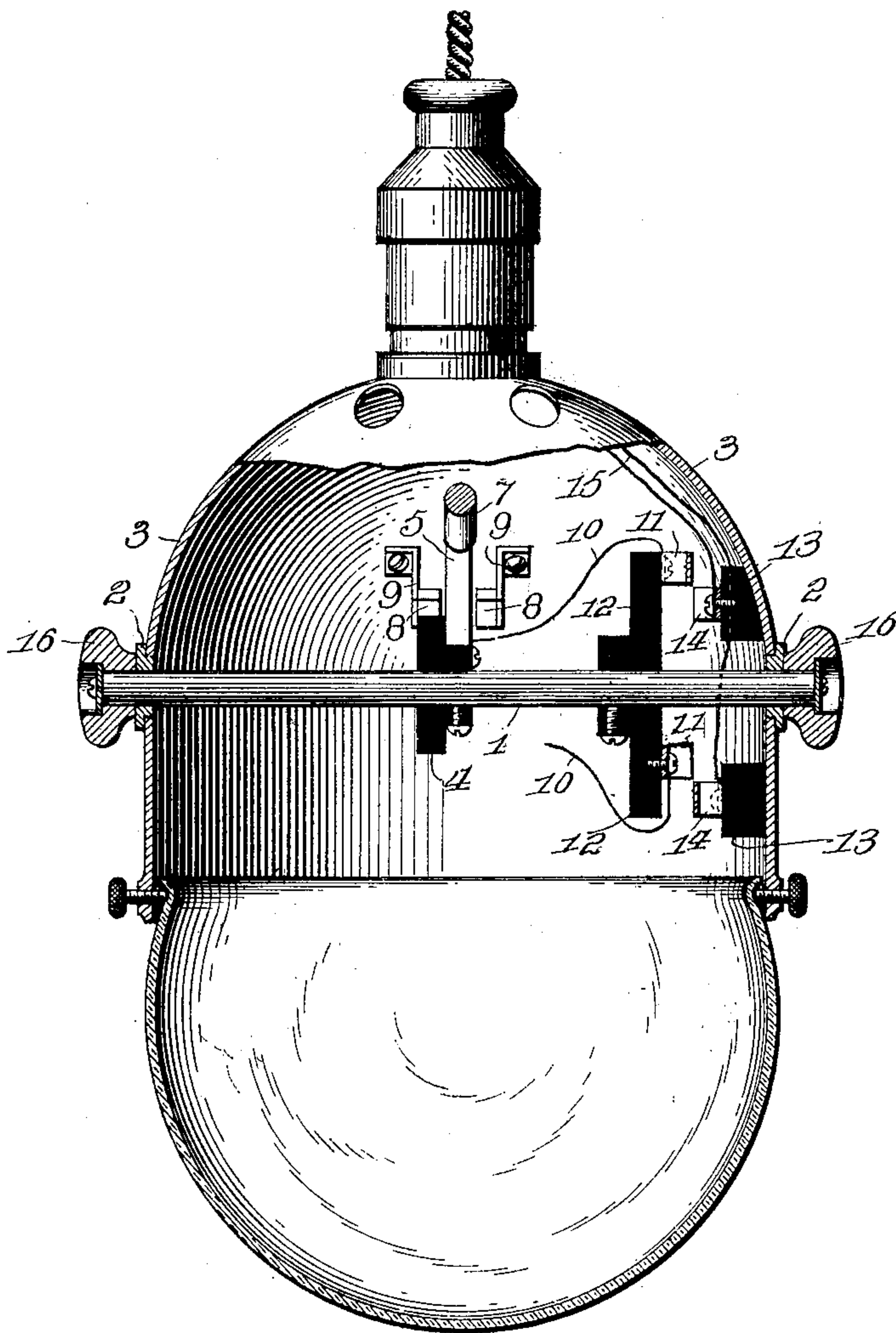
R. A. FESSENDEN.  
INCANDESCENT LAMP.

(Application filed Aug. 7, 1899.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.



WITNESSES:

*Herbert Bradley.*  
*E. Newell.*

INVENTOR,

*Reginald A. Fessenden*  
by *Darius S. Wolcott*  
Att'y.

No. 639,161.

Patented Dec. 12, 1899.

R. A. FESSENDEN.  
INCANDESCENT LAMP.

(Application filed Aug. 7, 1899.)

(No Model.)

2 Sheets—Sheet 2.

FIG. 2.

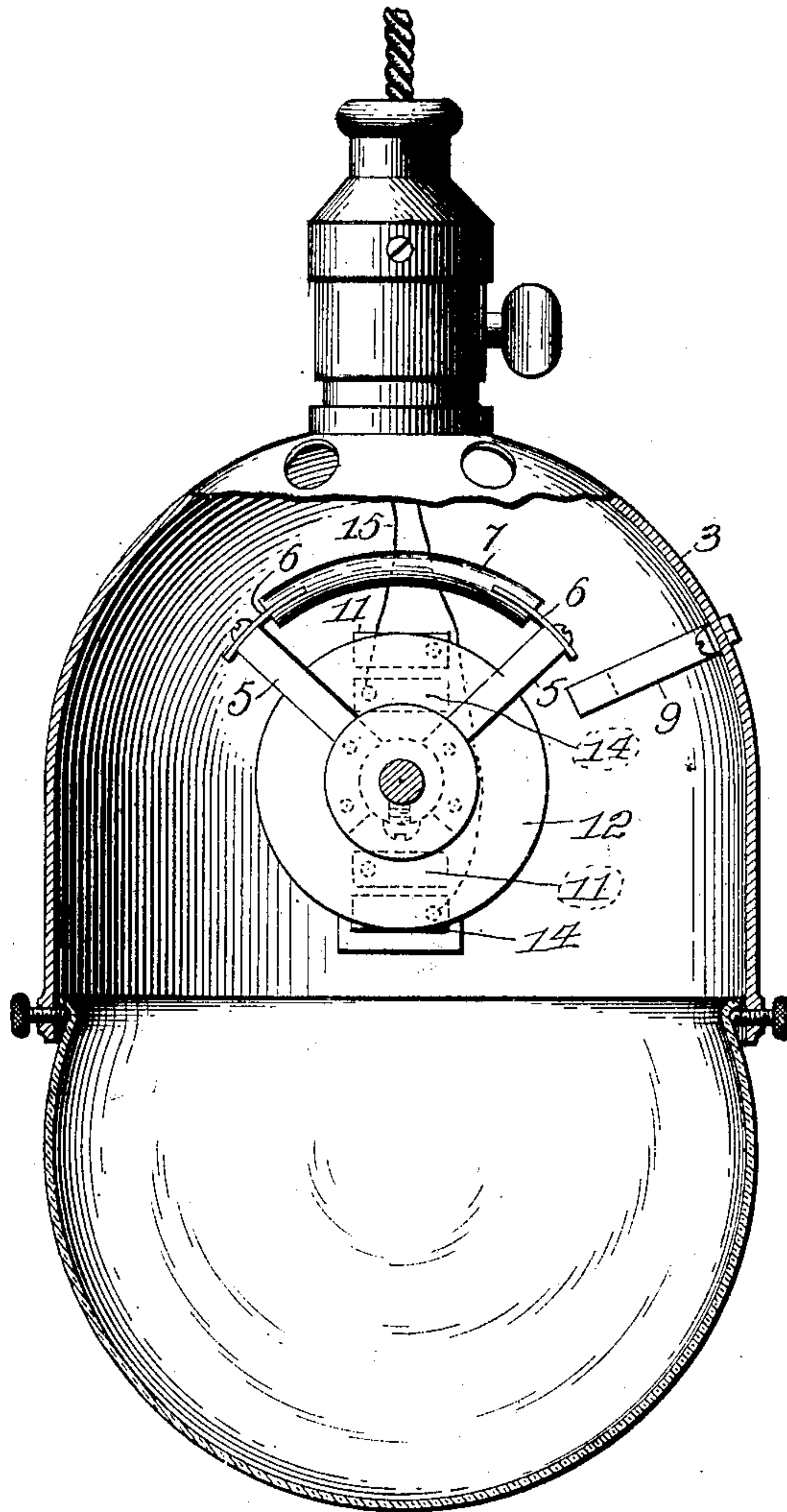
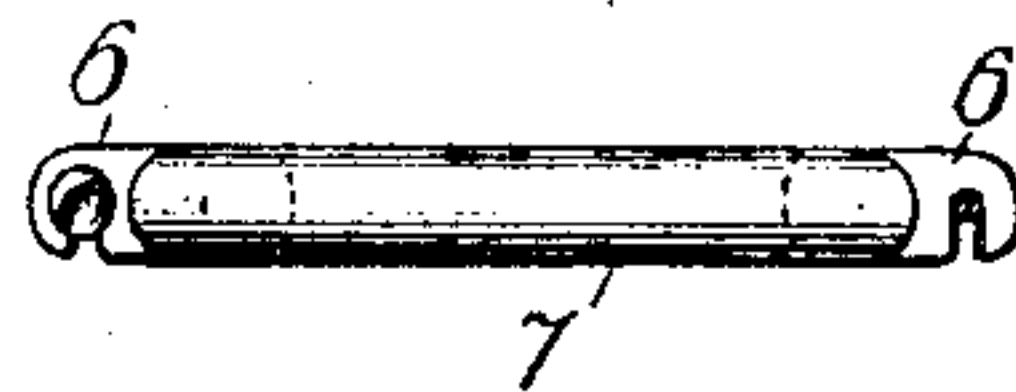


FIG. 3.



WITNESSES:

*Herbert Bradley*  
*E. Newell*

INVENTOR,

*Reginald A. Fessenden*  
*by Saml. S. Wolcott*

Att'y.



# UNITED STATES PATENT OFFICE.

REGINALD A. FESSENDEN, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF TO GRANT MCCARGO, OF PITTSBURG, PENNSYLVANIA.

## INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 639,161, dated December 12, 1899.

Application filed August 7, 1899. Serial No. 726,395. (No model.)

*To all whom it may concern:*

Be it known that I, REGINALD A. FESSENDEN, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Incandescent Lamps, of which improvements the following is a specification.

The invention described herein relates to certain improvements in that class or kind of incandescent lamps known as the "Nernst" lamp, in which is used a rod or pencil formed of a material capable of serving as an electric conductor only when heated. This form of lamp has never come into practical commercial use on account of the difficulty experienced and the delay involved in the preliminary heating of the rod or pencil.

The object of the present invention is to provide for the practical instantaneous heating of the pencil, the heating and the closing of the controlling-switch being nearly simultaneous, as the heating is effected by the current employed for rendering the pencil incandescent.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of my improved lamp. Fig. 2 is a similar view taken on a plane at right angles to the plane of section of Fig. 1; and Fig. 3 is a detail view, on an enlarged scale, of the rod or pencil.

In the practice of my invention a shaft 1 is mounted in suitable bearings 2 in the sides of the supporting or protecting shell, which is preferably made approximately hemispherical and has its inner surface highly polished, so as to form a reflecting-surface. On the shaft 1 is secured a disk 4, formed of insulating material, and to the disk are attached arms 5, which project radially therefrom. To the outer ends of these arms are detachably secured contact-pieces 6, having one end embedded in or electrically connected to the pencil 7, formed of magnesia or kaolin or other material which is a non-conductor when cold, but will when heated become a good conductor for electricity. As shown by Fig. 3, the contact-pieces 6 are made, preferably, in

the form of flat strips, preferably of platinum or nickel and of a width approximately equal to the width or diameter of the pencil 7, which may be either round, square, or other shape in cross-section. These strips are embedded in the ends of the pencil, so that their edges will be flush with the surface of the pencil; but by the rotation of the shaft the pencil is caused to pass between blocks 8, formed of graphite or other conducting material, held in such relation to the path of movement of the pencil that the blocks will rub along the sides of the pencil and make a deposit from end to end thereof. These blocks 8 may be held by any suitable means in proper relation to the path of movement of the pencil, so that they will rub sufficiently hard thereon to deposit a film, as described. A convenient means for supporting these blocks in proper relation to the path of movement of the pencil consist of spring-plates 9, secured at one end to the shell or case 3 and having the blocks 8 attached to their outer ends. Care should be taken that the blocks 8 should be so arranged with relation to the path of movement of the pencil and the manner in which the contact-pieces are secured thereto that a deposit of graphite will be made on the exposed edges of the contact-plates and will be continuous therefrom along the pencil from one plate to the other, thereby forming a conductor along the sides of the pencil. The arms 5 are electrically connected by means of wires 10 or in any other suitable manner to the spring contact-plates 11, which are mounted upon disk 12, formed of insulating material and secured to the shaft 1. On blocks 13 of insulating material are attached spring-plates 14, to which are connected the feed-conductors 15. The blocks 13 are secured on the case or shell 3 in such position that the contact-plates 14 will lie in the path of movement of the plates 11 when shifted by the rotation of the shaft 1.

The pencil having been properly attached to the arms 5, shaft 1 is rotated by the knobs 16 on the ends of the shaft, so as to cause the pencil to pass between the rubbing-blocks 8, and thereby form one or more continuous conducting strips or films along the sides of the pencil. As the rotation of the shaft continues the contact-plates 11 are brought into



electrical contact with the plates 14, thereby closing the electric circuit, so that a current will pass to the arms 5 and contact-plates 6 and thence along the conducting strips or  
5 films on the pencil. By the action of this current the pencil will be brought to a sufficiently high heat to render it conducting, so that the current passing through the pencil will heat the same to a sufficiently high temperature to  
10 render it incandescent.

In order that the whole of the current may be utilized for rendering the pencil incandescent and maintaining it in such condition, the film or path of conducting material along  
15 the pencil should be rendered practically neutral or ineffective as a conductor so soon as the pencil has become sufficiently heated to become conductive. To this end the film or path may be formed of a material, such as  
20 graphite, which will be burned or destroyed by the heat of the pencil, or of a material, such as manganese peroxid, which is rendered non-conductive at high temperatures. Under the term "conductor neutralizable at  
25 high temperatures" as herein employed is included any form or construction of conductor connecting the terminals of the pencil and arranged in such relation to the pencil as to be effective to heat the latter to a conduct-  
30 ing temperature, but capable of being rendered neutral or ineffective as regards its conducting qualities so soon as the pencil has attained a conductive condition. This neutrality or ineffective condition may be pro-  
35 duced by a diversion of the current, a rupture or destruction of the conductor, or the conducting quality of the conductor may be destroyed.

While I have shown and described with a  
40 considerable degree of particularity devices for supporting the pencil, for applying a neutralizable strip or film of conducting material along the pencil, and for controlling the electric circuit, the invention as regards the broad  
45 terms of the claims is not limited to such construction, as I consider within the scope of the invention any means which would suggest themselves to those skilled in the art for applying a conductor to the pencil in such  
50 manner as to form a continuous neutralizable path for the electric current from one terminal thereof to the other as within the scope of this invention.

I claim herein as my invention—

55 1. In an incandescent lamp, the combination of a pencil or rod formed of a material non-conductive at low temperatures but conductive at high temperatures, terminals formed of conducting material, a conductor  
60 neutralizable at high temperatures for connecting the terminals and arranged in such relation to the pencil or rod as to heat the rod on the passage of a current to a conduct-

ing temperature and mechanism for renewing said conductor from time to time, substantially as set forth. 65

2. In an incandescent lamp, the combination of a pencil or rod formed of a material non-conductive at low temperatures but  
70 conductive at high temperatures, terminals formed of conducting materials and mechanism for connecting the terminals of the pencil by a conductor neutralizable at high temperatures, the conductor being arranged in  
75 such relation to the pencil or rod as to heat the same on the passage of a current to a conductive temperature, substantially as set forth.

3. In an incandescent lamp the combination of a pencil or rod formed of a material non-conductive at low temperatures but conduct-  
80 ive at high temperatures, terminals formed of conducting material, a switch controlling the circuit of the pencil and means operated by such switch, for connecting the terminals of the pencil by a conductor neutralized at high  
85 temperatures, the conductor being arranged in such relation to the pencil or rod as to heat the same on a passage of a current to a conducting temperature, substantially as set forth. 90

4. In an incandescent lamp, the combination of a pencil or rod formed of a material non-conductive at low temperatures, but conductive at high temperatures, terminals for  
95 said rod or pencil formed of conducting material and mechanism for applying to the rod or pencil a strip or film of conducting material extending from terminal to terminal, said strip or film being neutralizable at high temperatures, substantially as set forth. 100

5. In an incandescent lamp, the combination of a pencil or rod formed of a material non-conductive at low temperatures, but conductive at high temperatures, a holder for  
105 a conducting material neutralizable at high temperatures, and means for effecting such a movement of one of said parts on the other as to form a strip or film of conducting material on the pencil, substantially as set forth.

6. In an incandescent lamp, the combination of a rotatable shaft provided with radi-  
110 ally-projecting arms, a rod or pencil formed of a material non-conductive at low temperature but conductive at high temperature, a holder for a conducting material neutralizable  
115 at high temperatures, and means for rotating the shaft, thereby causing the pencil or rod to rub along the conducting material, substantially as set forth.

In testimony whereof I have hereunto set  
my hand. 120

REGINALD A. FESSENDEN.

Witnesses:

DARWIN S. WOLCOTT,  
F. E. GAITHER.