

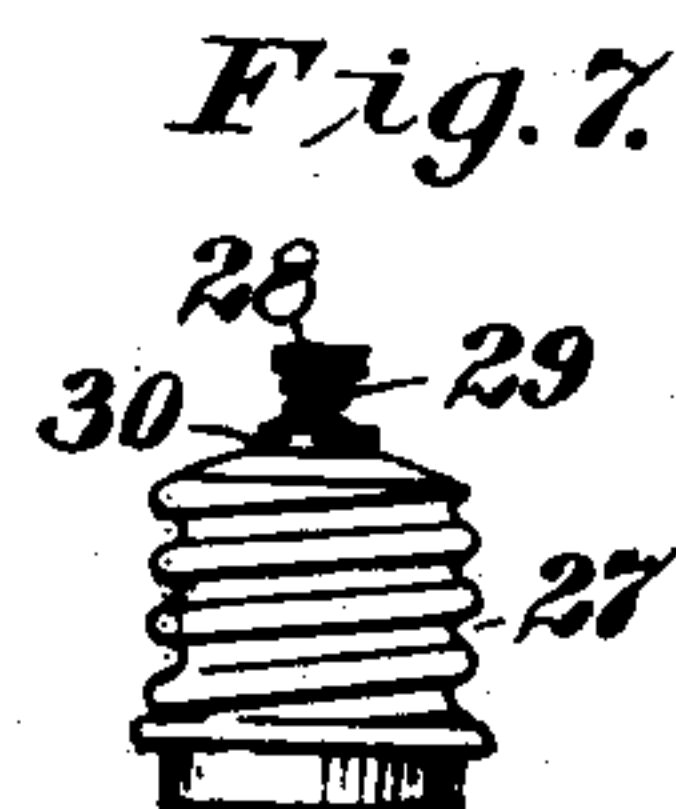
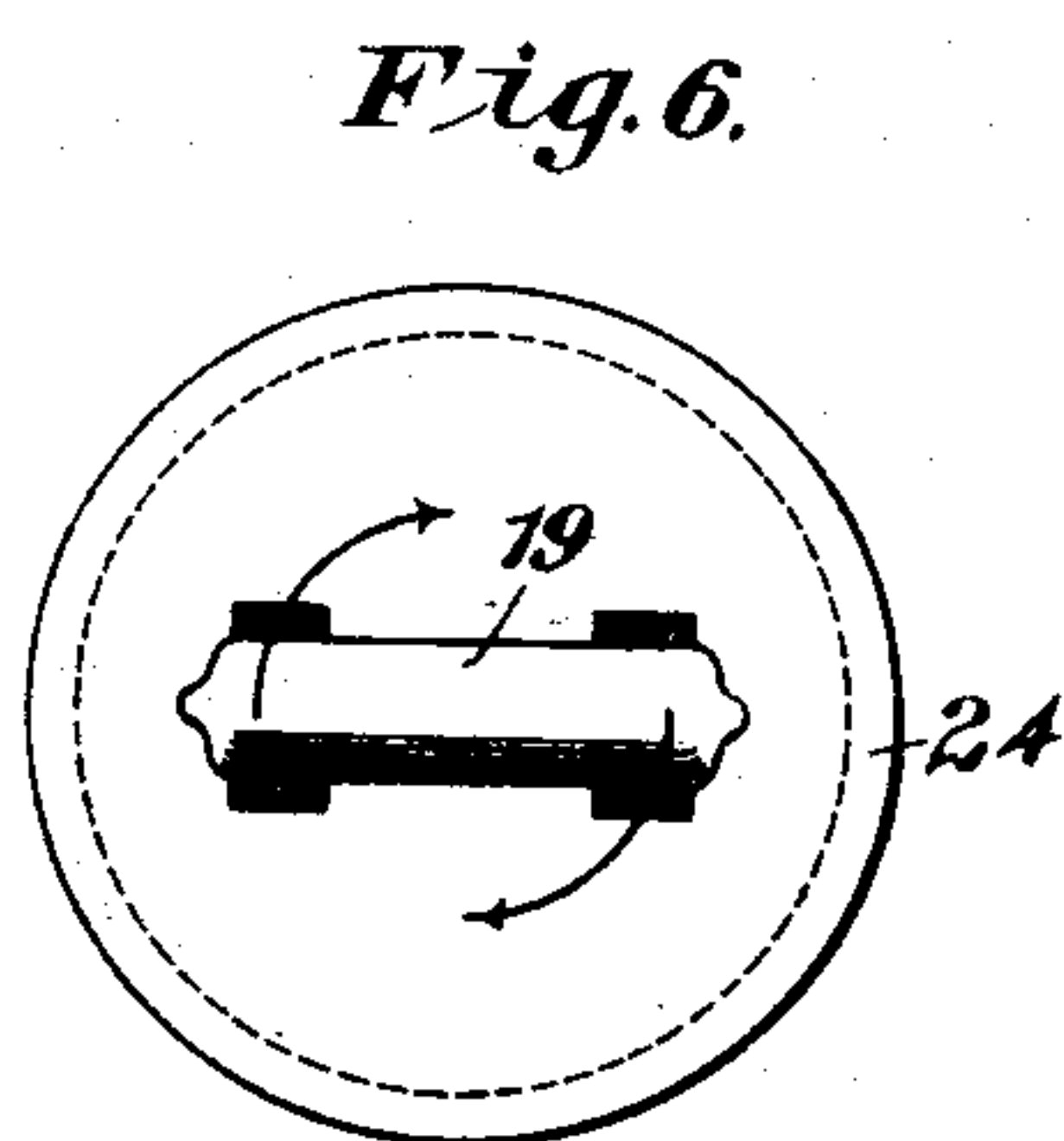
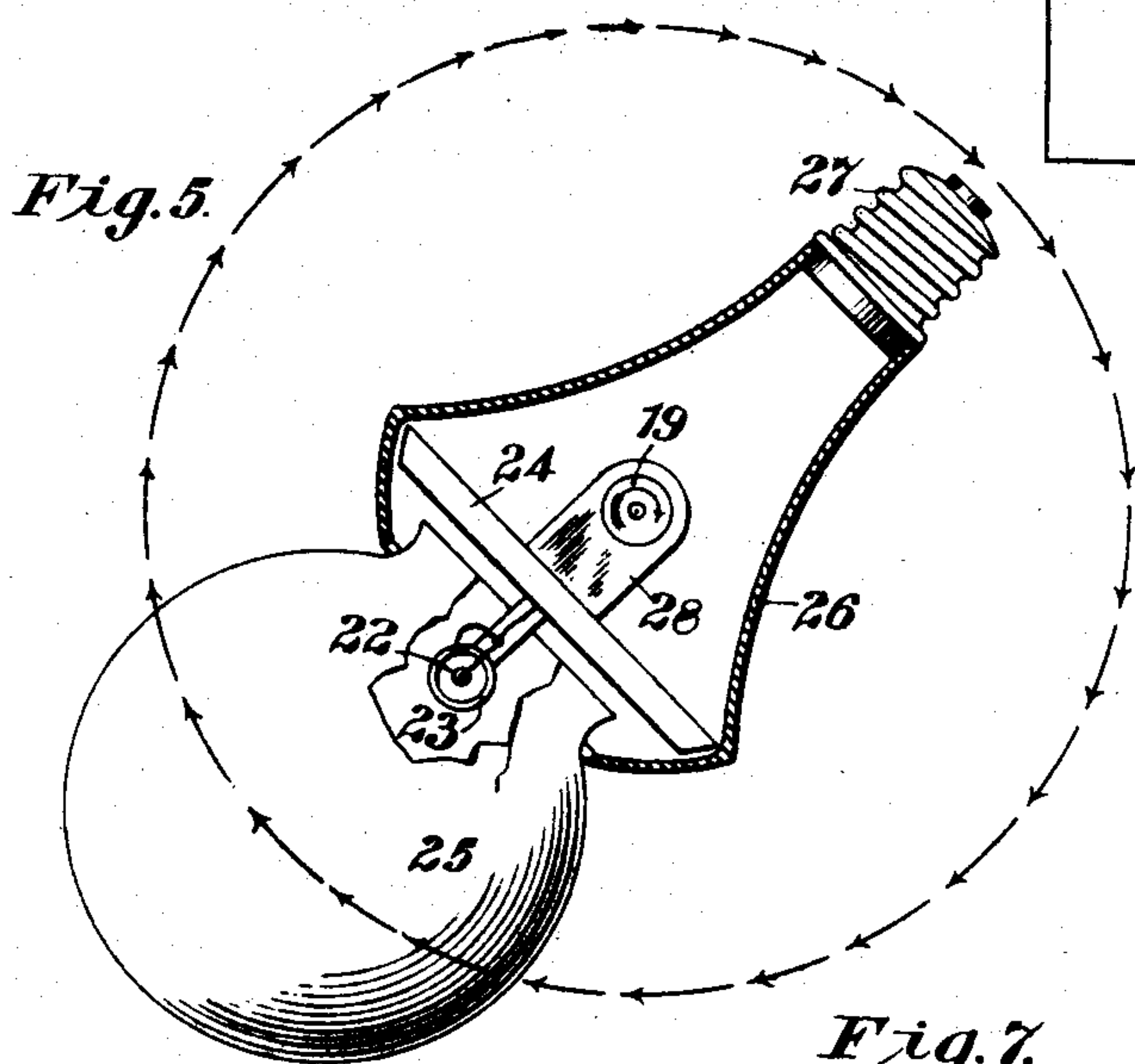
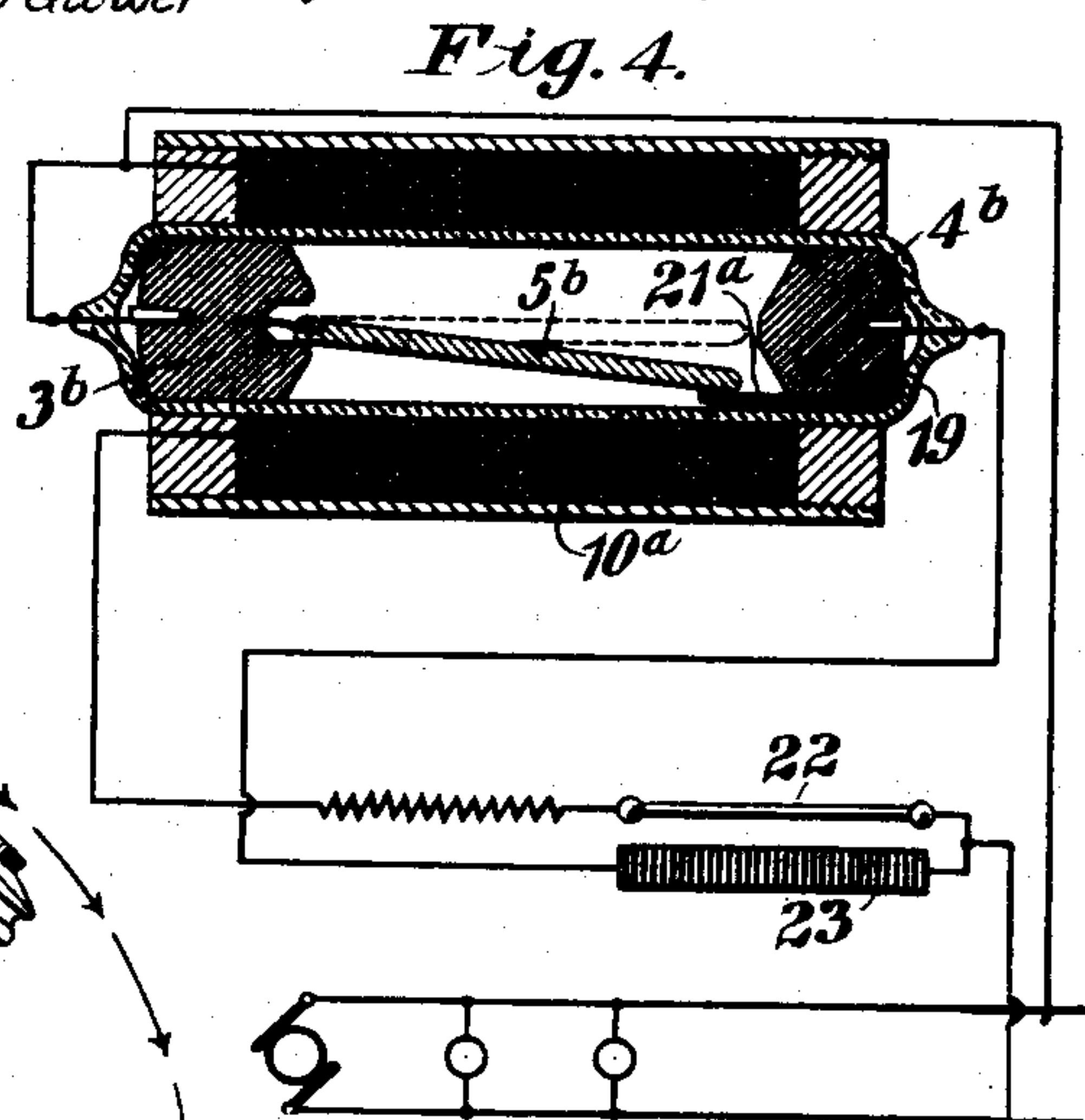
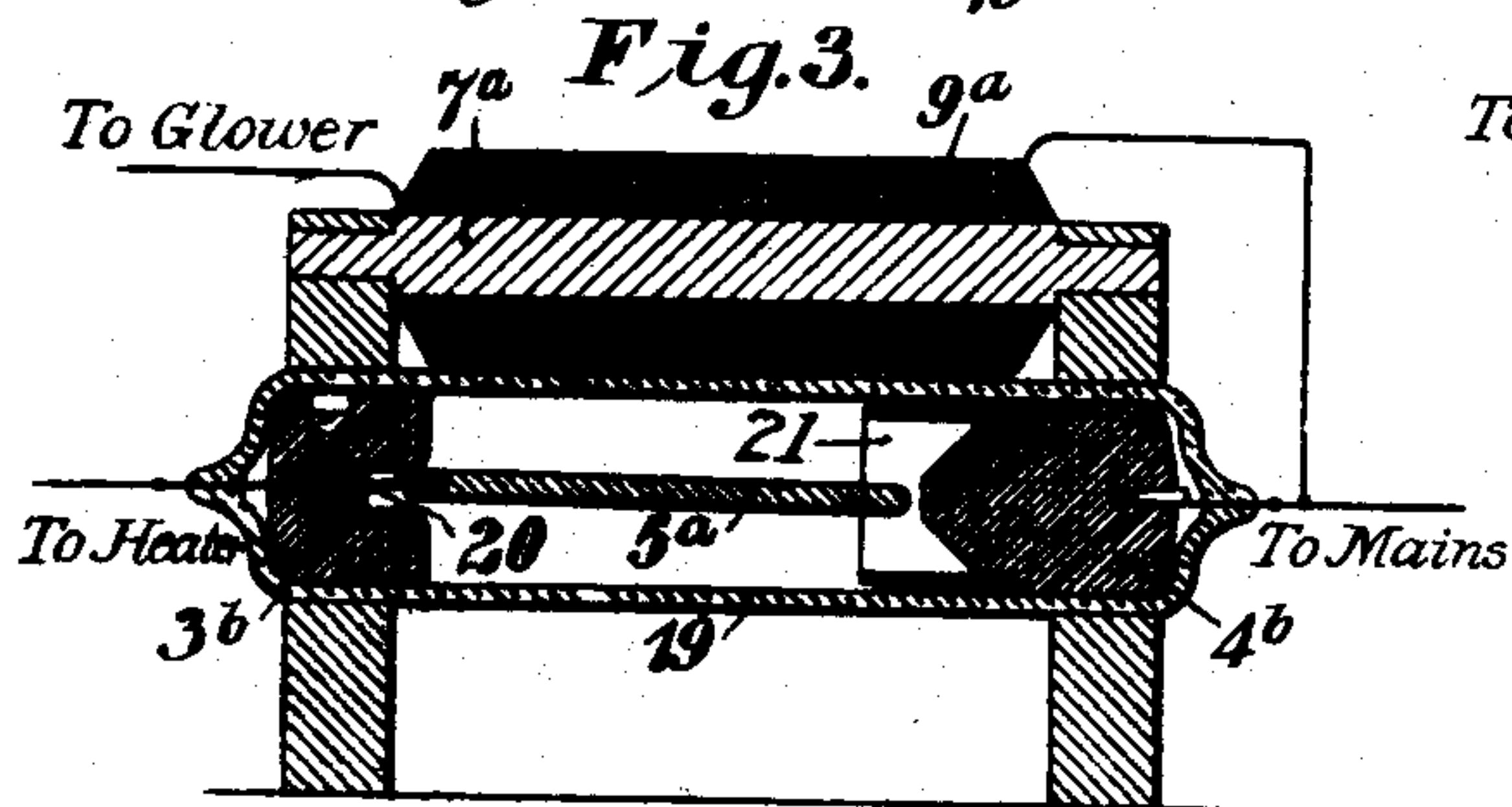
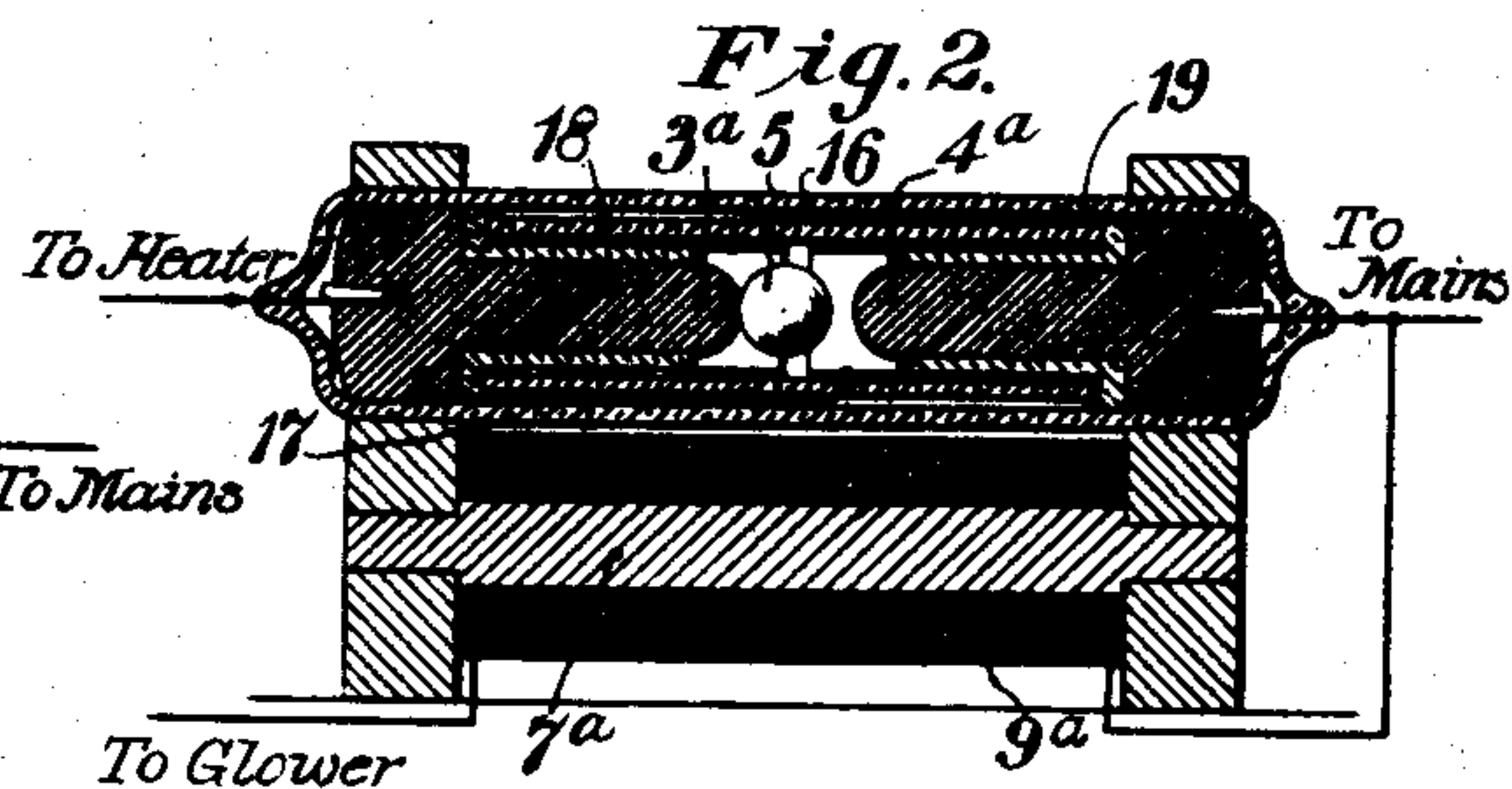
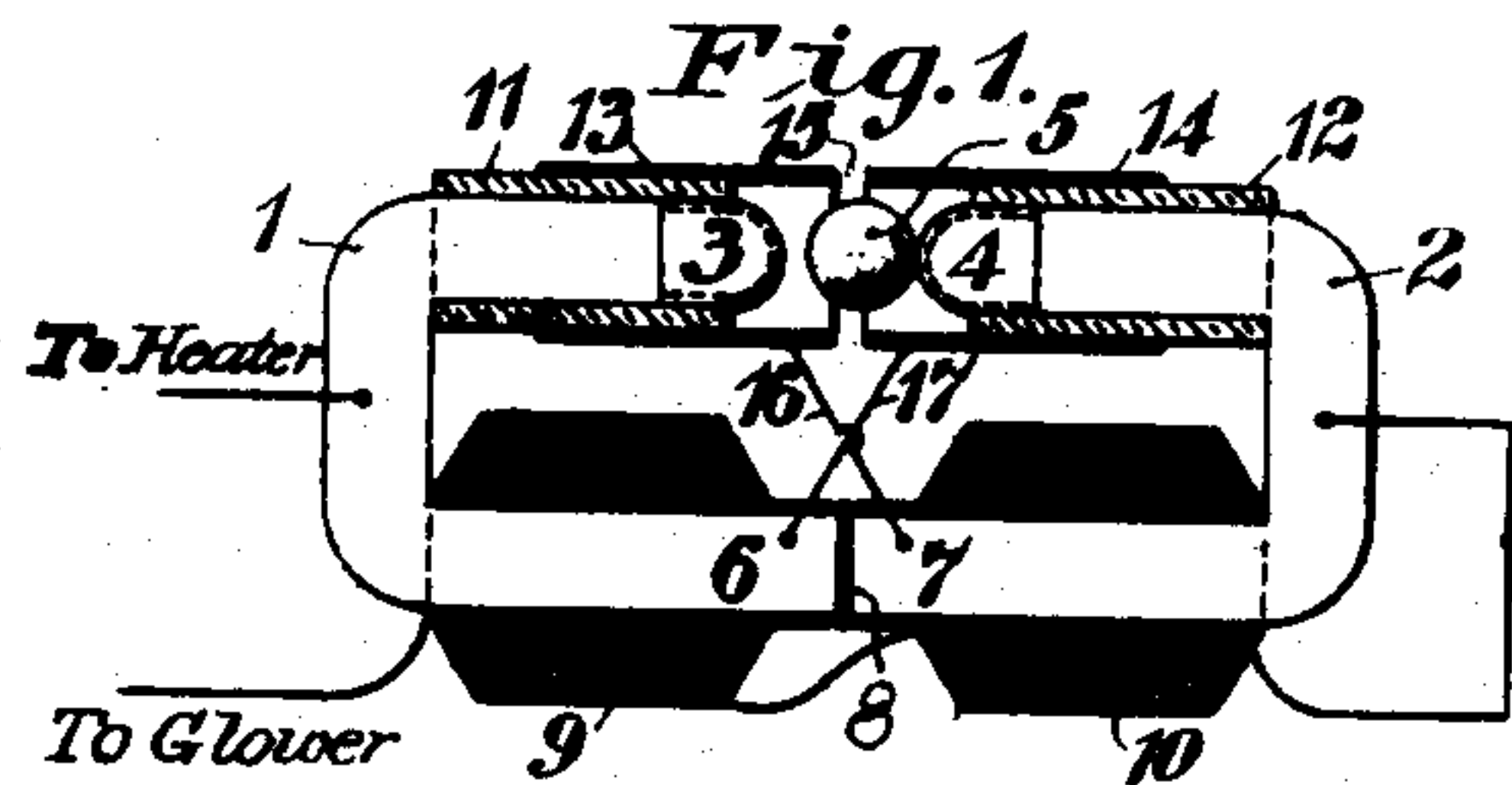
No. 684,378.

Patented Oct. 8, 1901.

H. N. POTTER.
ELECTRIC LAMP.

(Application filed Feb. 14, 1901.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY NOEL POTTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO
GEORGE WESTINGHOUSE, OF SAME PLACE.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 684,378, dated October 8, 1901.

Application filed February 14, 1901. Serial No. 47,355. (No model.)

To all whom it may concern:

Be it known that I, HENRY NOEL POTTER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Lamps, of which the following is a specification.

My application relates to electric lamps of the type in which the light-emitting body is a non-conductor when cold and is raised to conducting temperature by means of an electric heater located in proximity thereto.

My invention relates more particularly to means for automatically interrupting the circuits of electric heaters of the character above indicated when the light-emitting body or glower becomes conducting.

The object of my invention is to provide a cut-out device for the purpose above indicated which shall be comparatively simple in construction and effective and durable in use.

It has heretofore been proposed to utilize gravity for automatically closing the heater-circuits in lamps which operate in one position only and to utilize springs for the same purpose both in such lamps and also in those which are intended to be susceptible of use with their axes in different positions.

It is well known that incandescent electric lamps of the type in which a carbon filament is inclosed in a bulb from which the air is exhausted are adapted for use and are actually used in a great variety of positions—that is, so that the bulb projects vertically either upward or downward or at any angle between these two positions. It is therefore desirable that lamps of the type to which my present invention belongs should be so designed as to be substituted for those heretofore employed without modification of the sockets or other parts of the permanent fixtures.

The problem of designing a satisfactory heater cut-out for lamps intended to operate in different positions is rendered difficult, because of the tendency of springs to lose their temper when subjected for any considerable period of time to such temperatures as are practically unavoidable in lamps of the type

to which my present invention belongs, provided it be of practically reasonable size and shape. Springs formed of a great variety of materials have been tried without marked success. In every case, so far as I am aware, a spring formed of any metal or combination of metals gradually takes a permanent set when bent out of its normal shape and held in that condition for several hours in such temperatures as obtain in lamps of this class.

The utilization of gravity for restoring the movable member of the cut-out to its circuit-closing position has never been considered feasible and never attempted, as far as I am aware, in connection with lamps intended for operation in more than one position.

In order to utilize gravity instead of springs in what I will for convenience term "universal lamps," the term "universal" being employed to indicate that the lamp may be operated in any position, I have devised the means shown in the accompanying drawings, in which—

Figure 1 is a sectional view of one form of cut-out embodying my invention. Figs. 2 and 3 are similar views of two modifications. Fig. 4 is a sectional view of another modification in which the supply-circuit and the other parts of the lamp are shown diagrammatically. Fig. 5 is a view, partially in elevation and partially in section, of a lamp, illustrating the use of the cut-out shown in Fig. 4 when the lamp is operated in different positions. Fig. 6 is a detail view of one of the features shown in Fig. 5. Fig. 7 is a detail view of a lamp-base constructed to adapt the lamp for use in accordance with one of the modifications of my invention.

Referring now particularly to Fig. 1 of the drawings, 1 and 2 are approximately U-shaped parts of magnetizable metal, such as iron or steel, the adjacent ends 3 and 4 at one side being rounded and separated by a space somewhat greater than that of the movable member of the cut-out, which in this instance is shown as a ball 5 of magnetizable metal, such as iron or steel. The other adjacent ends 6 and 7 of the parts 1 and 2 are separated by a plate of non-conducting material. The winding of the cut-out is here shown in the

form of two coils 9 and 10, connected together in series so as to electrically constitute a single coil, this coil being connected in series with the glower or glowers of the lamp, as is usual in this class of devices. The ends 3 and 4 of the parts 1 and 2 are surrounded by sleeves 11 and 12, of suitable insulating material, and upon these sleeves are respectively mounted tubes 13 and 14, of conduction but non-magnetic material—such, for example, as copper or brass. The tubes 12 project beyond the ends of the parts 3 and 4, but are separated by an air-gap 15. The part 2 is connected to the tube 13 by a suitable conductor 16, and the part 1 is in a similar manner connected to the tube 14 by a suitable conductor 17.

The operation of the device above described is as follows: When the coils 9 and 10 are demagnetized, the ball 5 will fall away from the position in which it is shown and will either close the heater-circuit through the tubes 13 and 14, the pole 4 and tube 14, or the pole 3 and tube 13, according to the position of the lamp in which the cut-out is located. One of these three positions must be taken by the ball 5 no matter what the position of the lamp may be. It follows, therefore, by reason of the cross connections 16 and 17 that the heater-circuit will invariably be established when the coils 9 and 10 are deenergized and that when the coils are energized the ball will be attracted into the path of the lines of force, as indicated in the drawings, and thus interrupt the heater-circuit.

In order to prevent oxidation of the parts, they may be coated with silver or other substantially non-oxidizable metal, and to better quench any arcs that may be formed when the circuit is broken the device as a whole or the contacts may be inclosed in an atmosphere of inert gas, such as hydrogen.

A construction suitable for employing an inert gas is illustrated in Fig. 2 of the drawings, in which a glass tube 18 is employed to properly space the parts 3^a and 4^a, which correspond to parts 3 and 4 in Fig. 1, and also to insulate the cross connections 16 and 17. The outer glass tube 19 constitutes a receptacle or chamber for the inert gas and also performs the function of the spacing-piece 8 of Fig. 1. In this form of device a single actuating-coil 9^a and a single core 7^a are employed. The essential features of the device are, however, substantially the same as those shown in Fig. 1, and the operation is the same, except in so far as the use of an inert gas involves a difference in operation.

The foregoing construction is operative for any position of the lamp without manual manipulation of any of the parts. It is possible to secure substantially the same result by a different construction provided the lamp is susceptible of being turned upon its axis through one hundred and eighty degrees or any part thereof, so as to bring any perpendicular to the lamp-axis into a horizontal po-

sition—that is to say, a cut-out which will operate satisfactorily when in a horizontal position may be utilized in a universal lamp, provided the lamp or its operating parts may be turned upon the axis of the lamp.

In Fig. 3 I have shown a form of device which will operate satisfactorily, provided its axis is always maintained substantially horizontal. In this figure parts 3^b and 4^b are formed of magnetizable material, such as iron or steel, preferably soft iron, and the movable member 5^a is of like material. These three parts are shown as inclosed within a glass tube 19, it being understood that this tube may be filled with some inert gas for the purpose already described. The coil 9^a, its core 7^a, and the coöperating portions of the frame may be substantially the same as the corresponding parts shown in Fig. 2. The member 5^a is shown as attached by a flexible conductor 20 to the terminal piece 3^b, the end of the said member fitting loosely in a hole in the end of said terminal piece. The opposite end of the member 5^a is located adjacent to but out of contact with the inner end of the terminal piece 4^b and is in such position as to engage with the inner wall of a tube 21, which is mounted upon the piece 4^b and is formed of non-magnetic conducting material. The operation of this device when in the position indicated in the drawings will be readily understood, the device, as shown, being in a position to open-circuit the heater and serving to close the circuit by engagement with the tube 21 when the coil 9^a is deenergized. If this device be mounted in a lamp with its axis perpendicular to the axis of the lamp, it will be understood that it may be always brought into such position that its axis will be horizontal by rotating the lamp on its axis, no matter what may be the position of the lamp-axis with reference to the horizontal. By locating the cut-out device with its axis parallel to the glower-axis it will always be feasible to properly adjust the cut-out with certainty, since rotation of the lamp on its axis to bring the glower into horizontal position will also bring the cut-out into proper operative position. The horizontal position of the glower is not merely of value in determining the proper position of the cut-out, since a heater that always operates in a horizontal position is more easily constructed than one that has to be operated in different positions. The end shadows cast by the heater can be very nearly eliminated, the lamps will be uniform in appearance when in use, the ballast may be more easily located in a satisfactory position, and the blackening of the globes in case of inclined lamps may be more easily obviated.

Another form of cut-out similar to that just described is illustrated in Fig. 4, in which the movable member 5^b is a flat strip, and consequently has but one plane of movement, and the magnet is of the iron-clad type, the member 5^b being inside the coil 10^a and the return-

path for the lines of force being outside the coil. The terminal pieces 3^b and 4^b and the tube 19 do not differ materially from the corresponding parts shown in Fig. 3. This form of cut-out is also intended to be mounted with its axis at substantially right angles to the axis of the lamp, and when the lamp is inserted into its socket the axis of the cut-out is first placed horizontally and then the tube 19 may be turned upon its own axis until the member 5^b is in position to drop into engagement with the plate 21^a, and thus close the heater-circuit. The parts may obviously be provided with suitable marks to indicate when they have been turned to proper position.

The glower 22 and the heater 23 are shown in Fig. 5 as mounted upon a plate or disk 24, that supports a globe 25 and is in turn supported in a housing 26, at the other end of which is located a lamp-base 27 of the well-known Edison type. Plate 24 also supports on the side opposite the glower and heater the cut-out 28. This figure is intended to illustrate the relations of the parts where a cut-out similar to that shown in Fig. 4 is employed, the plate 24 and the parts supported thereby being turned until the tube 19 is horizontal and this tube being then turned upon its axis, as indicated by the arrow, until brought into such a position that the member 5^b of the cut-out will operate properly. The tube 19 and its supports are also shown in Fig. 6, the arrows shown in said figure indicating the movement of the parts to bring the cut-out into a horizontal position.

In Fig. 7 is shown an Edison lamp-base 27, provided with a supplemental contact-piece 28, mounted upon one end of a spring 29, the other end of the spring being attached to the ordinary terminal pin 30 of the lamp-base. With this construction of lamp-base the lamp may obviously be turned upon its axis any desired or necessary degree to bring the axis of the cut-out into horizontal position without interrupting the circuit of the lamp. In the case of other standard forms of lamp bases and sockets the turning of the lamp upon its axis may obviously be effected without the employment of any special device for maintaining the circuit.

While I have illustrated and described specific means for practicing my invention, I desire it to be understood that changes may be made in the form, dimensions, and relative location of parts and, in general, in details of construction without departing from the spirit and scope of the invention.

I claim as my invention—

1. A heater cut-out for electric lamps comprising an electromagnet and a freely-movable armature which serves to close the heater-circuit by the action of gravity thereon,

whatever may be the angular position of the axis of the lamp.

2. A heater cut-out for electric lamps comprising an electromagnet, stationary contact-terminals and an armature freely movable under the action of gravity and magnetism and operating to make and break connections between the stationary terminals, whatever may be the angular position of the axis of the lamp.

3. A heater cut-out for electric lamps comprising an electromagnet provided with heater-circuit terminals and a gravity and magnetically actuated armature which operates to make and break the heater-circuit irrespective of the angular position of the axis of the lamp.

4. A heater cut-out for electric lamps comprising an electromagnet having heater-circuit terminals and an armature freely movable under the action of gravity and magnetism to respectively make and break the heater-circuit, whatever may be the angular position of the lamp-axis and means for preventing oxidation of the contact-terminals.

5. A heater cut-out for electric lamps comprising an electromagnet the poles of which constitute heater-circuit terminals, a supplemental terminal adjacent to one of said poles and an armature freely movable under the action of gravity and magnetism to respectively make and break the heater-circuit.

6. A heater cut-out for electric lamps comprising an electromagnet having pole-pieces which constitute heater-circuit terminals, an armature of magnetizable material located between said pole-pieces and freely movable by gravity and magnetism to respectively open and close the heater-circuit.

7. A heater cut-out for electric lamps comprising an electromagnet and an armature movable under the action of gravity and magnetism to make and break the heater-circuit when its axis is horizontal, whatever may be the angular position of the axis of the lamp.

8. A heater cut-out for electric lamps comprising an electromagnet having an armature that is freely movable under the action of gravity and magnetism to respectively make and break the heater-circuit, the cut-out terminals and armature being movable to bring the armature into a horizontal plane, whatever may be the angular position of the axis of the lamp.

In testimony whereof I have hereunto subscribed my name this 11th day of February, 1901.

HENRY NOEL POTTER.

Witnesses:

WM. H. CAPEL,
G. E. CHAPIN.