

No. 652,639.

Patented June 26, 1900.

H. N. POTTER.

HEATER CUT-OUT DEVICE FOR ELECTRIC LAMPS.

(Application filed Sept. 11, 1899.)

(No Model.)

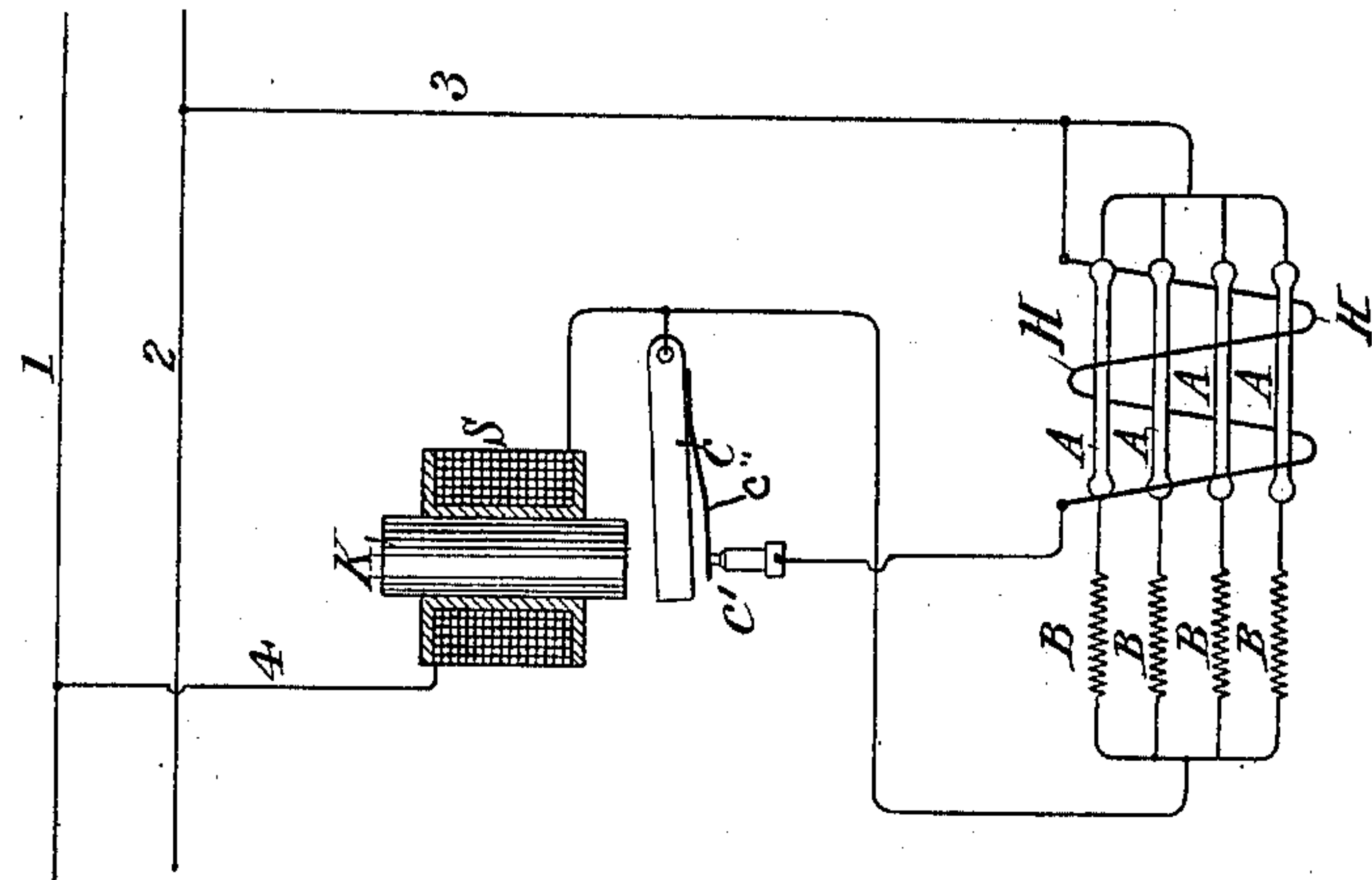


Fig. 3

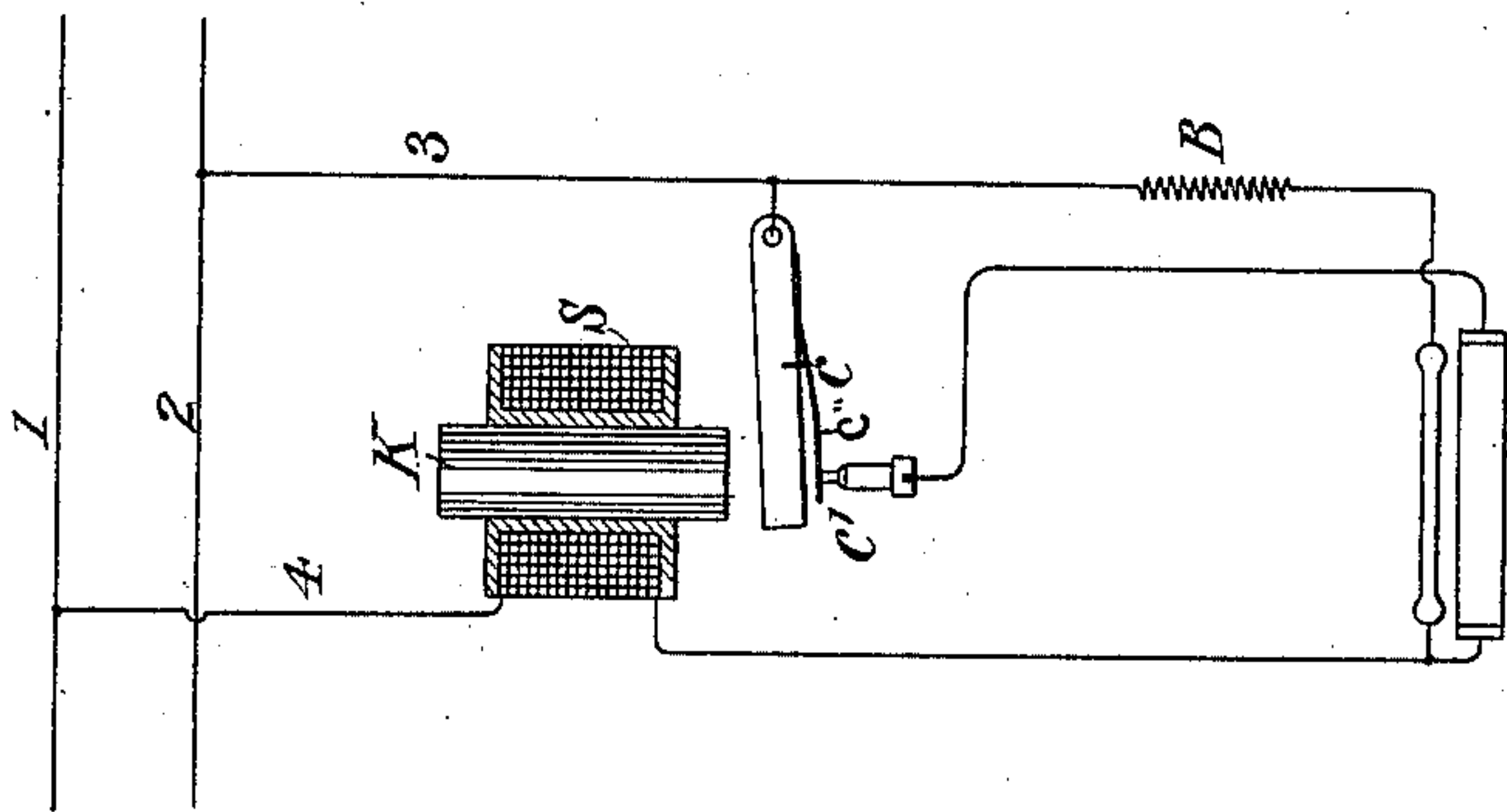


Fig. 2

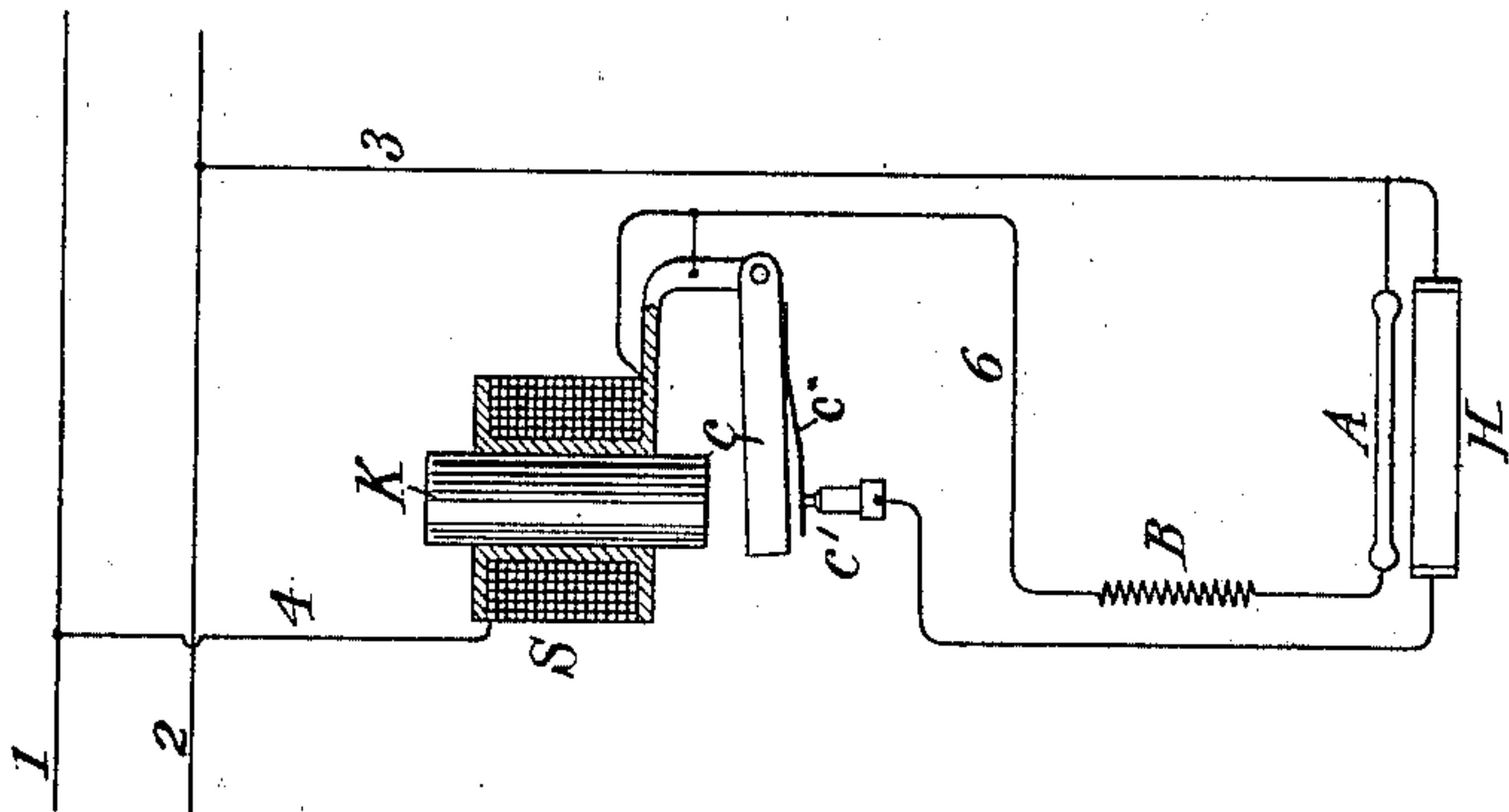


Fig. 1

Witnesses:  
J. H. Jones  
M. H. Capel.

Inventor  
Henry N. Potter  
by Charles A. Perry, Atty.

# UNITED STATES PATENT OFFICE.

HENRY NOEL POTTER, OF GÖTTINGEN, GERMANY, ASSIGNOR TO GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

## HEATER CUT-OUT DEVICE FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 652,639, dated June 26, 1900.

Application filed September 11, 1899. Serial No. 730,053. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY NOEL POTTER, a citizen of the United States of America, residing at Göttingen, Germany, have made certain new and useful Improvements in Heater Cut-Out Devices for Electric Lamps, of which the following is a specification.

My invention relates to that class of electric lamps in which a preliminary electrical heating of the light-giving element or "glower" by means of a suitable heating device or "heater" is required to render the said glower sufficiently conducting to take up and carry on its function.

My invention relates particularly to the means employed for automatically interrupting the operation of the heater when its further activity is unnecessary. Various devices have been proposed to this end; but all have one characteristic feature in common in that they derive the energy necessary to operate them entirely from that portion of the circuits in the lamp which is peculiar to the glower.

My invention is distinct from the proposed methods in that the operative energy is derived in large part from the heater-circuit, a portion only of the energy being required of the glower-circuit.

In order to distinguish my system from those heretofore employed, I term it a "compound" cut-out system.

In the drawings I show diagrammatically the electrical connections and working arrangement of my device.

Figure 1 shows one arrangement; Figs. 2 and 3, modifications thereof.

Referring to Fig. 1 of the drawings, A is the glower, H the heater, and B the steadying resistance. These parts may be of well-known construction.

The cut-out mechanism consists of a magnet-core K, surrounded by a coil S and provided with an armature *c*, which is at the same time a part of the electric circuit to the heater, in that it is in electrical connection with one terminal of the coil S and has a contact-spring *c'*, that makes contact (when not attracted by the magnetism induced in core K) with the contact-terminal *c'*, which is con-

nected to one end of the heater H, as shown. The conductor 6, leading to one end of the glower, is also connected to the same terminal of the coil S, as shown. The winding of the coil is such that the armature is not moved by the attraction caused by the passage of the current to the heater alone, which current I will term *h*, but is moved by the sum of the current *h* plus some portion of the glower-current. The total amount of the glower-current I will term *g* and the portion necessary to cause the armature to be lifted I will express as  $g/a$ . The conditions for successful operation are then that the armature *c* must not be lifted by current *h*, but must be lifted by current *h* plus  $g/a$ , and must remain lifted by the action of current  $g/a$ . To this I may add that it is in most cases advantageous to have current  $g/a$  as small as practical considerations allow. In the case of a glower having the same current *g*, but any of the forms of heater cut-out operated entirely by energy from the glower-circuit, the heater-current necessary to operate the cut-out is some fraction of the whole current *g*, and I will express it as  $g/b$ . It is at once apparent that current  $g/a$  can in any case be made smaller than current  $g/b$ , because current  $g/a$  has the assistance of current *h* in performing its functions, and herein lies one of the chief advantages of the compound system.

By the arrangement shown in Fig. 1 it is apparent that the break made by the cut-out, which occurs at *c'' c'*, is shunted by the glower-circuit containing only the glower A and ballast device B. The weight of the armature *c* serves to deflect the spring *c'* when the coil S is deenergized, so that when the armature is attracted the spring will remain in engagement with the contact *c'* long enough to permit both glower and heater currents to effect the lifting of the armature nearly or quite into engagement with the core K. At the moment of breaking the heater-circuit the glower is already conductive, and the shunt to the break serves to diminish the size of the spark which occurs when the heater-circuit is opened. In Fig. 2 I show the actuating-coil in the opposite leg of the circuit, the action being the same.



In Fig. 3 I show the arrangement of Fig. 1 in connection with a plurality of glowers. In this device the cut-out is designed to operate on a current to the common heater plus the  
 5 current to a single glower or a fraction thereof. In this way I accomplish the certain interruption of the heater, provided a single glower remains operative. This is very desirable, since the glowers have various lengths  
 10 of life, and the continued operation of the heater near an operating glower is not only wasteful of electrical energy, but damages the heater as well.

Other compound arrangements embodying  
 15 a plurality of magnets or a plurality of coils upon a single core may obviously be employed, if desired; but inasmuch as such arrangements involve merely duplication of parts, further illustration is believed to be un-  
 20 necessary.

I claim as my invention—

1. An electric lamp of the type described, comprising a glower, a heater therefor and a heater cut-out having its actuating element  
 25 operated by the joint action of the heater and glower currents.

2. An electric lamp of the type described, comprising a glower, a heater and a heater cut-out having its actuating-coil in a portion  
 30 of the lamp-circuit traversed by both heater and glower currents.

3. An electric lamp of the type described, comprising a glower, a heater therefor and a heater cut-out consisting of an electromagnet  
 35 excited by both heater and glower currents,

and an armature therefor and an interrupter in series with the heater.

4. An electric lamp of the type described, comprising a glower, a heater and a heater cut-out in which the heater-current is inter-  
 40 rupted by the combined action of the heater and glower currents and in which the said interruption is maintained by the action of the glower-current only.

5. In an electric lamp of the type described, 45 the combination with a glower and a ballast in series therewith, of a heater in parallel to said glower and ballast and a heater-controlling mechanism comprising interrupter-con-  
 50 tacts in series with the heater and an actuating-electromagnet having its exciting-coil in series with both heater and glower circuits.

6. An electric lamp of the type described comprising a heater, a glower and a cut-out for the heater-circuit having interrupter-con-  
 55 tacts and an actuating-coil therefor traversed by both heater and glower currents.

7. In an electric lamp of the type described, the combination with a plurality of glowers each provided with a ballast, of a heater or  
 60 heaters and a heater-controlling device operated by the joint action of both heater and glower currents.

In witness whereof I have hereunto signed my name, this 9th day of August, 1899, in the  
 65 presence of two subscribing witnesses.

HENRY NOEL POTTER.

Witnesses:

WOLDEMAR HAUPT,  
 MAX SIMON.