Dec. 18, 1934. H. EWEST 1,984,469

ELECTRIC CATHODE GLOW LAMP

Filed Sept. 10, 1929

Fig. 1

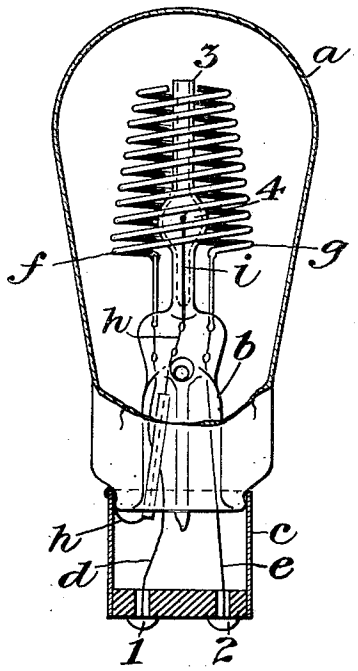
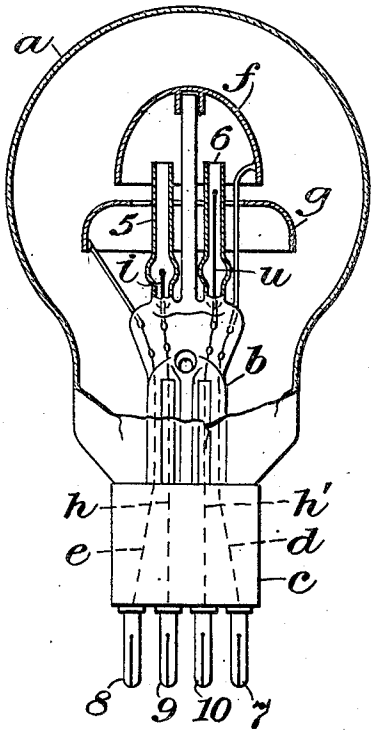


Fig. 2



INVENTOR
Hans Ewest
BY Charles E. Fuller
HIS ATTORNEY

Patented Dec. 18, 1934 1,984,469

UNITED STATES PATENT OFFICE

1,984,469

ELECTRIC CATHODE GLOW LAMP

Hans Ewest, Berlin, Germany, assignor to General Electric Company, a corporation of New York

Application September 10, 1929, Serial No. 391,679
In Germany November 1, 1928

1 Claim. (Cl. 250—27.5)

The present invention relates to gaseous electric discharge devices generally and particularly the invention relates to such devices of the cathode glow type.

Hitherto in devices of this type it has been found necessary to use a series connected resistance as a voltage regulator. It is the object of this invention to eliminate such resistance and to provide a cathode glow lamp of compact structure which can be used in connection with different operating voltages and for various special purposes, for example, for a signal means.

In accordance with the object of the invention the device comprises two or more discharge paths of different lengths and connected in parallel. In the interior of two hollow electrodes, arranged close to each other in the usual manner, are two or more tubes made of insulating material such as glass. These glass tubes enclose rod shaped electrodes of different lengths. When the device is used with comparatively low voltages such as 110 volts the shorter discharge section comes into operation, when used with higher voltages for example 220 volts or more the longer discharge sections come into operation in addition to the shorter discharge sections. Having these operating characteristics the device is very useful as a voltage indicator.

In the drawing accompanying and forming part of this specification two embodiments of the invention are shown in which

Fig. 1 is a side elevation partly in cross section of one embodiment of the new and novel cathode glow lamp and

Fig. 2 is a side elevation partly in cross section of an alternative embodiment of the new and novel cathode glow lamp.

Referring to Fig. 1 the glow lamp consists of the usual pear shaped glass container "*a*", stem "*b*", and cylindrical base "*c*". To the stem "*b*" are fastened two hollow electrodes "*f*" and "*g*" made of a wound wire screw connected by current leads "*d*" and "*e*" with main contacts 1 and 2 of the base "*c*". Centrally mounted in the interior of the hollow electrodes, and in the lamp chamber "*a*", is a third electrode "*i*" consisting of a wire rod connected to the head part of base "*c*" by current lead "*h*". The electrode "*i*" is sealed into the stem "*b*" and surrounded by the slightly longer glass tube 3, which, in the region of the electrode end has a ball shaped enlargement 4.

The third electrode "*i*" is in the same current circuit as the two hollow electrodes "*f*" and "*g*" so that by enclosing the electrode "*i*" in the insulation glass tube 3 the discharge is constrained to go through the length of the glass tube 3. A small positive column is formed which, because of the long path of the discharge, evokes a considerable potential drop. The ball shaped enlargement 4 of the glass tube 3 on one hand aids a sure establishment of the discharge and on the other hand prevents the glass tube 3 from becoming damaged during the operation of the established discharge.

The longer discharge section between the electrode "*i*" and one of the hollow electrodes "*f*" or "*g*" is connected in parallel to the very much shorter discharge section between the hollow electrodes "*f*" and "*g*". Thus, according to the voltage used, only one discharge is produced either between the hollow electrodes "*f*" and "*g*" or between the electrode "*i*" and one of the hollow electrodes "*f*" or "*g*". Likewise in the use of a higher voltage it is possible to produce both discharge sections simultaneously.

By varying the length of the insulated, surrounded electrode "*i*", or by varying the length and bore of the small glass tubes 3 the degree of potential drop and therewith the magnitude of the starting potential of the discharge path between the electrode "*i*" and one of the two hollow electrodes "*f*" or "*g*" is suitably regulated.

In the cathode glow lamp shown in Fig. 2 a cap shaped hollow electrode "*f*" and a ring shaped hollow electrode "*g*" are placed close to each other and fastened to the stem "*b*" of the sphere shaped glass chamber "*a*". In this embodiment of the invention two small glass tubes 5 and 6 are fused onto the stem "*b*" with two different length electrodes "*i*" and "*u*" inclosed therein. The current leads "*d*" and "*e*" of the hollow electrodes "*f*" and "*g*" and the current leads "*h*" and "*h'*" of the other two electrodes "*i*" and "*u*" are connected to four contact terminals 7, 8, 9 and 10 of the base "*c*". The discharge sections, of different length, the first between the hollow electrodes "*f*" and "*g*", the second between the electrode "*i*" and the hollow electrode "*f*", and the third between the electrode "*u*" and the hollow electrode "*f*", can be so arranged, as by being connected in parallel to each other, that in proportion to the potential at hand either the shorter discharge section or one of the longer discharge sections can be put in the circuit, in as much as with a sufficiently high potential simultaneous complete discharge of all sections in the circuit is not necessary. The electrodes "*i*" and "*u*" insulated and surrounded by the glass tubes, can be of any shape and can consist of a wire rod or a metal tube or a suitably supported

small metal plate or a small metallic star body, etc. As the surrounding tubes 3, 5, 6 of the electrodes "i" and "u" material such as glass or other desirable insulation material can be used.

What I claim as new and desire to secure by Letters Patent of the United States, is:

An electric discharge device comprising a container, a gas filling therein, a plurality of discharge electrodes therein, an insulation chamber for one of said electrodes, two of said electrodes being hollow electrodes, and another of said electrodes being mounted in the interior of said hollow electrodes and being enclosed in said insulating chamber, said insulating chamber extending beyond the end of said electrodes, the discharge paths between said electrodes being in electrically parallel relation and of different lengths.

HANS EWEST.