E. A. KRÜGER.

METHOD OF REGENERATING CARBON FILAMENT ELECTRIC INCANDESCENT LAMPS.

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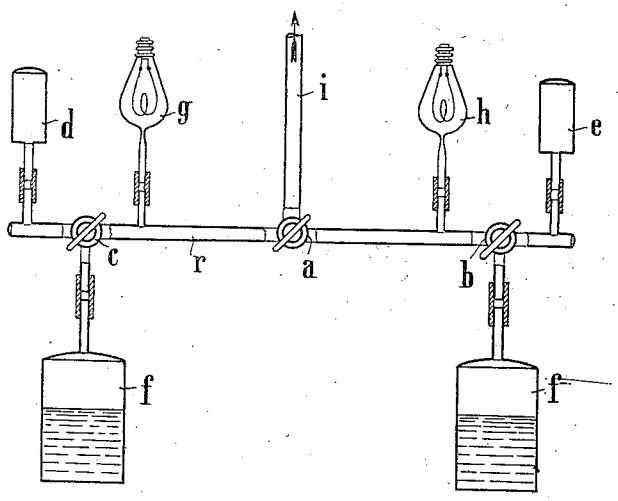
958,652. **Patented May 17, 1910.**



Witnesses:
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UNITED STATES PATENT OFFICE.

ERNST AUGUST KRÜGER, OF SEEHAUSEN, ALTMARK, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALFRED BLOCH, OF PARIS, FRANCE.

METHOD OF REGENERATING CARBON-FILAMENT ELECTRIC INCANDESCENT LAMPS.

958,652. Specification of Letters Patent. Patented May 17, 1910.

Application filed April 1, 1909. Serial No. 487,162.

To all whom it may concern:

Be it known that I, ERNST AUGUST KRÜGER, a subject of the German Emperor, and residing at Seehausen, Altmark, Germany, have invented a certain new and useful Improved Method of Regenerating Carbon-Filament Electric Incandescent Lamps, of which the following is a specification.

The subject-matter of my invention is an improved method of regenerating used carbon filament incandescent electric lamps.

The reason of carbon filament lamps becoming black is that in the course of their life very fine particles of carbon are thrown off from the carbon filament and are deposited on the inner wall of the glass bulb. Owing to the glass bulb being blackened the light radiated from the lamp is diminished, but simultaneously, owing to the particles of carbon being thrown off from the carbon filaments, the latter are weakened so that when the lamp is continued to be used the danger of the filament burning through at its weakest place always becomes greater.

As long as the carbon filament in a lamp is not broken, the lamp can be regenerated according to the present method. For this purpose the blackened lamp is first opened at its point so that air can enter into the bulb; simultaneously, for the purpose of subsequently evacuating the bulb, a tube is attached by fusion to the point of the bulb. The glass bulb is now or subsequently highly heated by means of an open flame so that the black coating of the glass wall burns away. The lamp is now prepared for the execution of the regenerating method proper. The glass receptacle is evacuated and a suitable hydrocarbon is introduced into the bulb. If an electric current of suitable strength is now sent through the carbon filament so that the latter is caused to glow, the hydrocarbon is decomposed and carbon is deposited, as is well-known from the preparation of the carbon filament, in a very dense form on the filament, namely the filament is flashed. The flashing is continued until the filament has acquired a uniform strength. When that is so, the lamp is evacuated again and sealed. It is then ready for use and is exactly as good as a lamp having a perfectly new carbon filament. The method can be repeated optionally frequently in the case of every lamp when the glass bulb has become blackened again.

For carrying my improved method into practice the apparatus represented diagrammatically by way of example on the accompanying drawing may be used.

A pipe *r* has a plurality of sockets, to which can be connected the lamps *g* and *h* which are to be regenerated, certain preliminary receivers *d* and *e* and storage receptacles *f*. The pipe *r* is connected by means of the pipe *i* with an air-pump not shown in the drawing. In addition the pipe *r* is provided at suitable places with three-way cocks *a*, *b*, *c*.

At the beginning of the method the three-way cock *a* is so turned that the lamp *g* and receiver *d* for example are evacuated. Then by turning the cock *a* the lamp *g* is separated from the pump and the lamp *h* is evacuated. By turning the cock *c* a definite quantity of a suitable heavy hydrocarbon is now sucked from the storage receptacle *f* into the receiver *d*. Hereupon the storage receptacle *f* is cut off again by turning the cock *c* and the receiver *d* is connected with the lamp *g*; the hydrocarbon necessary for flashing the filament consequently enters into the lamp bulb where it is decomposed when current traverses the carbon filament. A similar series of operations is performed for treating the lamp *h*. For removing the black coating from the inner wall of the lamp it is preferable to heat the bulb to a high temperature by means of an open flame after the filament has been flashed. The preliminary receivers *d* and *e* are arranged for the purpose of preventing the hydrocarbon flowing into the lamps too violently, since the carbon filaments might otherwise be destroyed. It is to be understood that the hydrocarbon may be placed in the receivers *d* and *e* from the very first.

Lamps with every optional form of filament can be regenerated according to my

improved method. It does not make the slightest difference whether the filament is bent freely or anchored.

I claim:

The herein-described method of regenerating used carbon filament electric incandescent lamps, consisting in opening the lamp, in burning off the carbon deposited on the interior surface of the same, in evacuating the lamp, in connecting the evacuated lamp with a vessel containing a measured quantity of a pure hydrocarbon, in flashing the filament in the lamp, in evacuating the lamp and in sealing up the lamp.

In testimony whereof, I affix my signature in the presence of two witnesses.

ERNST AUGUST KRÜGER.

Witnesses:

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