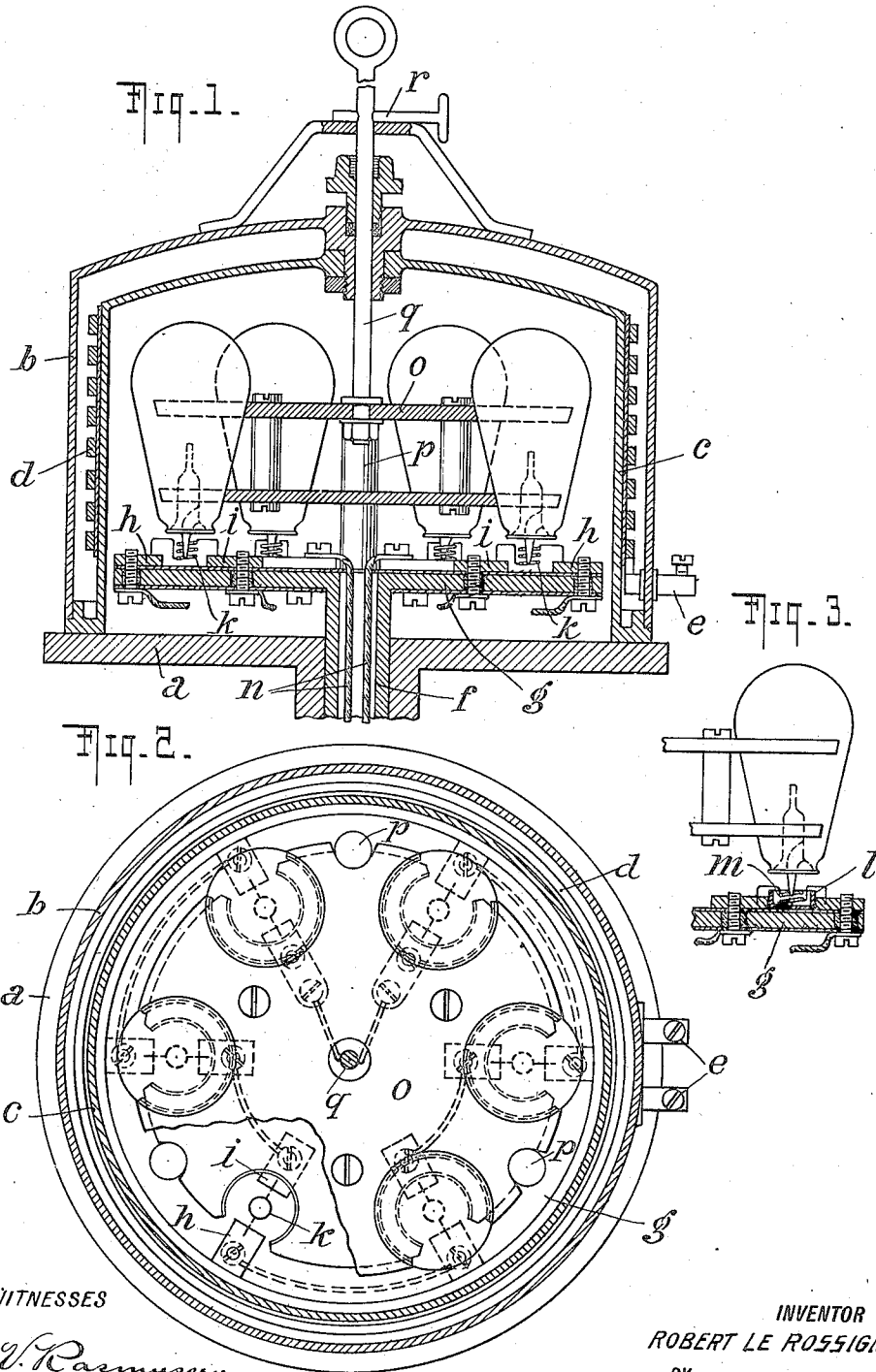


R. LE ROSSIGNOL.
PROCESS AND APPARATUS FOR SEALING LAMPS.
APPLICATION FILED JULY 9, 1920.

1,430,118.

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WITNESSES

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ROBERT LE ROSSIGNOL, OF HARROW, ENGLAND, ASSIGNOR TO PATENT-TREUHAND-GESELLSCHAFT FÜR ELEKTRISCHE GLÜHLAMPEN MIT BESCHRÄNKTER HAFTUNG, OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

PROCESS AND APPARATUS FOR SEALING LAMPS.

Application filed July 9, 1920. Serial No. 395,028.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, ROBERT LE ROSSIGNOL, chemist, a subject of the King of Great Britain, residing at Harrow, Middlesex, England, have invented certain new and useful Improvements in Processes and Apparatus for Sealing Lamps (for which I have filed applications in Germany, May 18, 1918; Austria, April 30, 1919; Hungary, May 22, 1919; Holland, May 16, 1919; Great Britain, February 4, 1920; France, May 13, 1919; Italy, June 12, 1919; Norway, May 10, 1919; Sweden, May 8, 1919; Switzerland, May 3, 1919; Denmark, July 19, 1920; Bohemia, March 1, 1920), of which the following is a specification.

My invention relates to a process and apparatus for exhausting electrical glow lamps and glass receptacles of like character as more fully described in my Patent No. 1,298,569. According to this patent the glow-lamps, provided with very short open exhaust stems are placed within a container which is connected with an air pump. After exhaustion the open ends of said short stems are sealed within the container, preferably by electrical means which brought the glass to a plastic condition. When thus sealed the stems were fragile and the seal or stem easily ruptured by even slight mechanical contusions.

According to the present invention the process is improved by providing a drop of fluid glass at the ends of said exhaust stems during the time that the vacuum is established whereupon after exhaustion is completed the ends of the stems are removed from the heating zone and the soft glass hardening, closes the orifice in the stem of the bulbs. By these means the lamps are sealed off in a very reliable manner forming round, not easily frangible closed ends of the exhaust stems. The hardening of the drop of glass from the liquid state results in a protective closure which by reason of its shape, dimensions, form and the manner of its creation produces a strong and impact-resisting seal or terminal for the stem. In the device for carrying out this process heating elements or small vessels containing a fusible mass are provided underneath or around the

open ends of the exhaust stems while means are provided to allow of movement between the exhaust stems and said heating element or said fusible mass after the liquefaction of the ends of the stems. The heating elements consist preferably of heating spirals or of flat strips, plates or other suitable electrical devices.

In the drawings Fig. 1 is a sectional elevation and Fig. 2 a plan view partly in section of a device embodying my invention, and Fig. 3 illustrates a detail of the modification.

Referring to the drawing and particularly to Figs. 1 and 2 the container *b* is supported upon the base plate *a*, the connection being airtight. Within the container and fastened thereto at the top is the bell *c* which is surrounded by an electrical heating coil *d* which receives current from terminals *e* passing through the wall of the container *b*. An exhaust pipe *f* opens into the container through the base plate *a* and terminates in a flange-like plate *g* supporting contact pieces *h* and *i* between which extend the heating units *k*. Current is supplied to the contact pieces *h*, *i* by means of the two conductors *n* and as the current passes through the heating spirals *k*, sufficient heat is generated in the immediate vicinity of said spirals to partially melt or soften the material of which the ends of the lamp stems is composed. The construction and operation of such heating coils is well understood in the electrical art and consequently requires no enlarged description. The lamps are carried by a frame-like device *o* which may be raised and lowered and which is guided by three bolts *p* (Fig. 2). The device *o* is suspended by means of a rod *q* fixed in its proper position by a locking pin *r* the rod passing into the bell *c* through an air-tight connection. The container *b* may be dispensed with, a bell such as *c* being alone used, but in that case operations will have to be conducted with far greater care. Instead of employing heating spirals *k* for the purpose of softening or melting the ends of the lamp stems, small vessels *l* (see Fig. 3) may be provided. These vessels are provided with heating spirals *m* otherwise ar-

ranged and functioning like the heating spirals *k* heretofore described. The vessels *l* contain a fusible mass such, for example, as glass of low melting point which, when the electric current is turned on, is brought to a melted condition as the result of the heat developed by the spirals *m*.

The operation of the device is as follows:

The locking pin *r* being withdrawn the rod *q* when raised will lift the container *b* and the bell *c* so that the frame-like device *o* becomes free and the lamps can be inserted therein. The container *b* and the bell *c* being then placed upon the baseplate *a* the device *o* is fixed by putting the locking pin *r* into the rod *q* in such a position that the ends of the exhaust stems touch or rest closely adjacent to the heating units *k* (Fig. 1) or the fusible mass in the vessel *l* (Fig. 3). Exhaustion of the bell *c* and of the glow-lamps now takes place the air being withdrawn through the pipe *f*, the bell *c* being simultaneously heated by current supplied to the heating coil *d* from terminals *e*. As soon as the proper vacuum is established current is supplied to the heating units *k* (Fig. 1) or *m*, (Fig. 2) until the ends of the exhaust stems have become liquefied or partially liquefied so that on cooling the opening through said stems will remain closed. To facilitate this operation the device *o* may be lowered if necessary and raised after the stems have become partially liquid. Upon cooling of the lamp stems they remain sealed, the sealing being in the shape of a pear-like terminal. After the heating currents have been interrupted and the vacuum destroyed the container *b* and the bell *c* are lifted along the rod *q*, so that the finished lamps can be removed. If a great number of lamps are to be exhausted and sealed off simultaneously in each operation, it is advisable to provide additional heating units in the bell *c* or on the frame-like device *o* so that the temperature of the lamps can quickly be raised to the desired degree. Instead of moving the lamps with respect to the heating units, the latter may be arranged so as to be movable, the important consideration being in any case that the stem, as soon as the glass has become fluid, shall be as speedily as possible thereafter completely encompassed with a cooling atmosphere, i. e. an atmosphere materially lower in temperature than that which prevails in the vicinity of the heating units even after their current is shut off.

While I have described a preferred construction embodying the apparatus of my invention for practicing my improved process, I do not restrict myself thereto as changes of detail may be made within the spirit of the invention and the scope of the following claims:—

1. The process of sealing electrical glow

lamps provided with a short open exhaust stem which comprises heating the end of the stem of the lamp thus supported, in an exhausted environment whereby the bulb is maintained as a vessel exhausted through its stem to such a temperature that the stem end becomes liquid, and then removing said end from the heating zone to cause the same to solidify as a seal.

2. The process of sealing electrical glow lamps provided with a short open exhaust stem which comprises heating such a lamp and then, while the lamp is hot, additionally heating the end of the stem of the lamp in an exhausted environment whereby the bulb is maintained as a vessel exhausted through its stem, to such a temperature that the stem end becomes liquid, and then removing said end from the heating zone to cause the same to solidify as a seal.

3. The process of sealing electric lamp bulbs provided with short open exhaust stems which comprises supporting the lamp in such a manner that its stem while closely adjacent to the heat generator is at all times out of contact therewith, then actuating the heat generators and causing them to become operative upon the stem of the lamp while the same is encompassed by an exhausted environment whereby the bulb is maintained as a vessel exhausted through its stem until the end of the stem is in liquid form and then causing said stem end to be completely encompassed with a cooling medium of greater and speedier cooling efficiency than that represented by the mere shutting off of the heat generators and thereby causing the said end to solidify as a seal in a freely suspended position.

4. The process of sealing electrical glow lamps provided with a short open exhaust stem which comprises maintaining the lamp while heated in an exhausted container the exhaust stem of the lamp being open, its end supported adjacent to an electrical heating unit and then passing current through said unit so as to raise its temperature and thereby to liquefy the end of the exhaust stem, and then removing said end from the heating zone.

5. An apparatus for sealing electrical glow lamps having short exhaust stems comprising in combination a container for the lamps, an exhaust duct communicating therewith, heating units within said container adapted to have electrical current passed therethrough, and a holder, also in the container, adapted to hold the lamps with the free ends of the exhaust stems adjacent to said heating units, said holder being movable within the container so as to enable the ends of the lamp stems to be brought out of the heating zone.

6. An apparatus for sealing electrical glow lamps having short exhaust stems

comprising in combination an inner bell, an exhaust duct communicating therewith, heating units within the bell adapted to have electrical current passed therethrough, a holder, also in the container adapted to hold the free ends of the exhaust stems in said heating units, said holder being movable within the container so as to enable the ends of the lamp stems to be brought out of the heating zone, and an outer container surrounding but spaced from the bell.

7. An apparatus for sealing electrical glow lamps having short exhaust stems comprising in combination an outer container, an inner bell, an exhaust duct communicating therewith, heating spirals within the bell adapted to have electrical current passed therethrough and a holder, also in the container, adapted to hold the lamps with the free ends of the exhaust stems reaching into said heating units, said holder being movable within the container so as to enable the ends

of the lamp stems to be brought out of said heating spirals.

8. An apparatus for sealing electrical glow lamps having short exhaust stems comprising in combination an outer container, an inner bell, an exhaust duct communicating therewith, small vessels containing a fusible mass, electrically heated spirals within the said vessels adapted to have electrical current passed therethrough, and a holder, also in the container adapted to hold the lamps with the free ends of the exhaust stems reaching into said heating spirals, said holder being movable within the container so as to enable the ends of the lamp stems to be brought out of said heating spirals.

In testimony whereof I have hereunto set my hand this 31st day of May 1920.

ROBERT LE ROSSIGNOL.

Witnesses:

BERNARD P. DUDDING.

SEWARD W. JOLLEY.