June 28, 1938. L. C. STRINGER 2,122,117

RECONDITIONING ELECTRONIC UNIT

Filed May 7, 1937 3 Sheets-Sheet 1

Fig. 1.

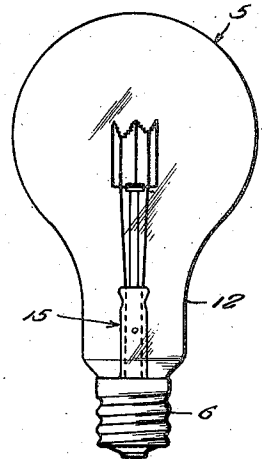


Fig. 1a.

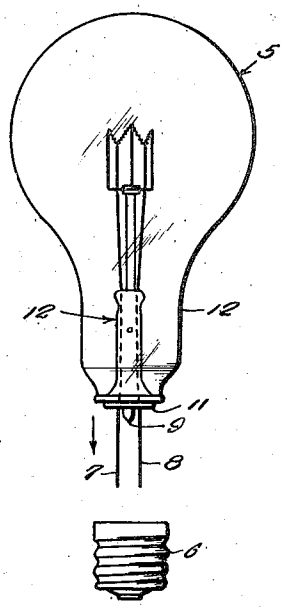


Fig. 2.

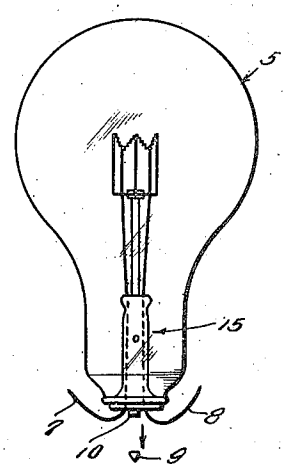
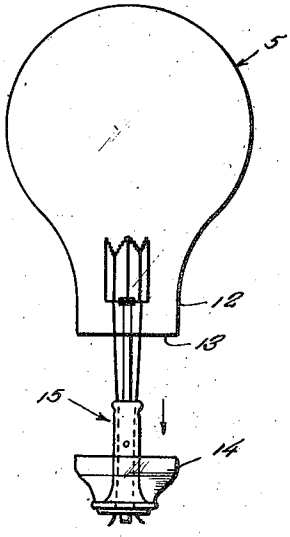


Fig. 3.



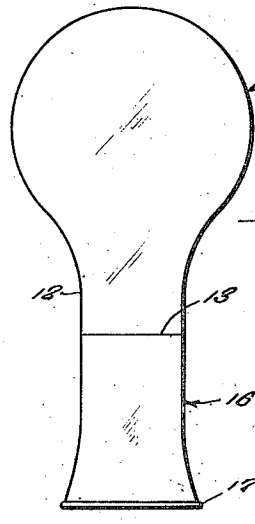


Fig. 4.

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Filed May 7, 1937 3 Sheets-Sheet 2

Fig. 5.

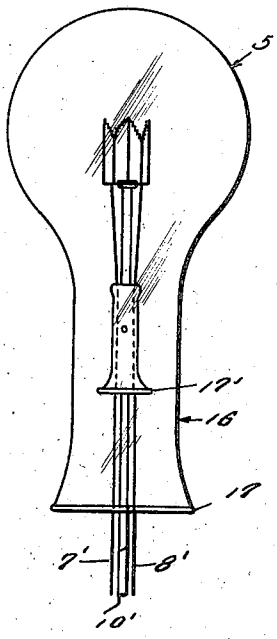


Fig. 5a.

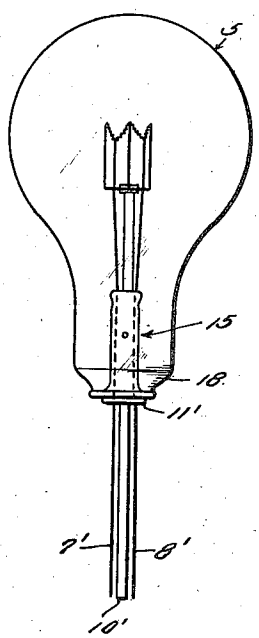
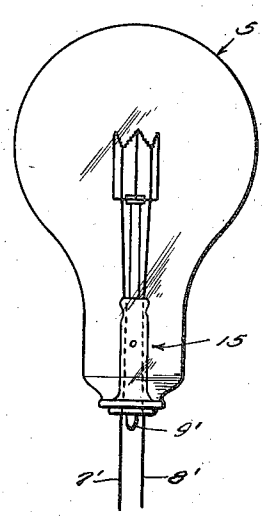


Fig. 6.



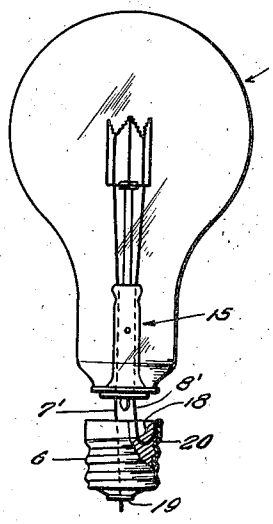


Fig. 7.

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RECONDITIONING ELECTRONIC UNIT

Filed May 7, 1937 3 Sheets-Sheet 3

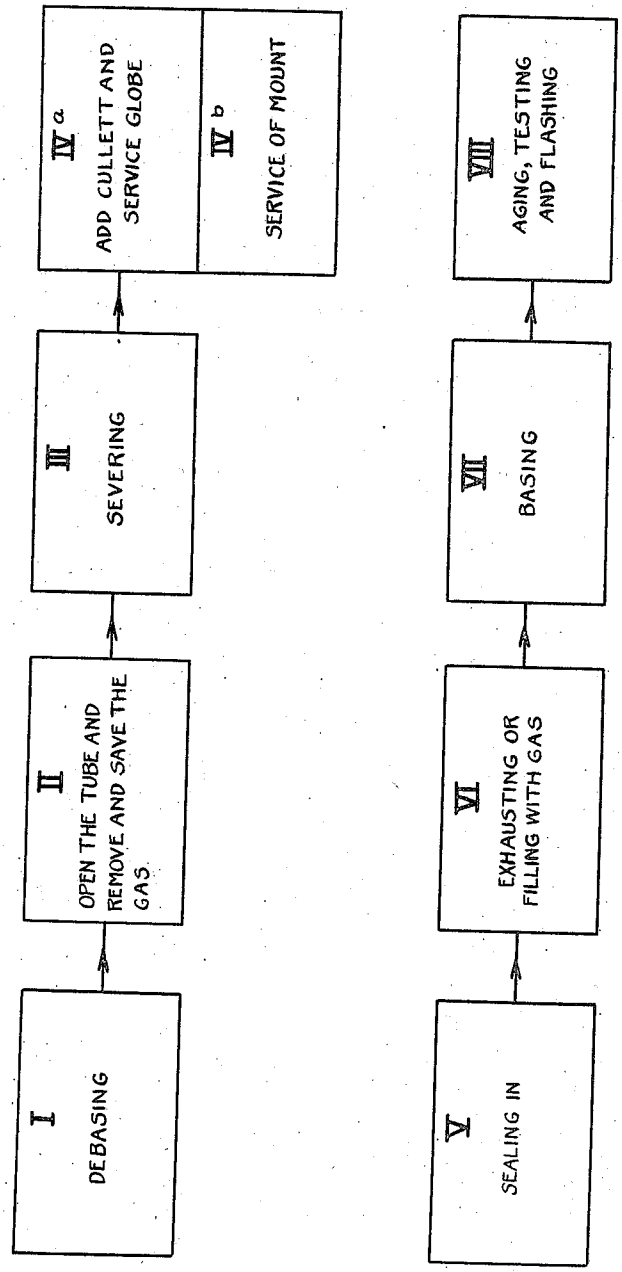


Fig. 8.

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UNITED STATES PATENT OFFICE

2,122,117

RECONDITIONING ELECTRONIC UNIT

Louis C. Stringer, Chicago, Ill., assignor to Electronics Supply Corp., a corporation of Delaware

Application May 7, 1937, Serial No. 141,373

6 Claims. (Cl. 176—7)

My invention relates generally to a process or method of rejuvenating, rebuilding, and reconditioning electronic units of the type which involve a glass envelope, globe or tube, and particularly to a process or method of this character which reconstructs the unit to original standards in every respect so that the same will meet all specifications and requirements imposed by commercial and governmental agencies such as are imposed on originally manufactured units of the same character, and an important object of my invention is to provide a simple, practical, and workable method or process of this character which can be performed with sufficient facility and at a sufficiently low cost to make the operation of such method or process commercially feasible on a large scale.

Other important objects of my invention will be apparent from a reading of the following description taken in connection with the drawings, wherein for purposes of illustration I have shown a preferred embodiment of the invention.

In the drawings:—

Figure 1 shows an electric light bulb which is to be rejuvenated, rebuilt and reconditioned in accordance with the present invention.

Figure 1*a* illustrates the completion of the first step or operation in the process wherein the base of the bulb is removed.

Figure 2 illustrates the next succeeding step in the process or method, and shows the removal of the tip on the tube enabling removal of the gas within the globe of the bulb and the saving of the gas.

Figure 3 illustrates the third step in the process and shows the neck portion of the globe severed from the main portion of the globe, the severed portion carrying with it the mount.

Figure 4 illustrates the fourth step of the process which involves the adding of a cullet to the main portion of the globe, after which the globe is serviced for cleaning and other purposes, the mount removed in the preceding step being before, during or after this operation, serviced for reconditioning, restoration or rejuvenation.

Figure 5 illustrates the insertion of the repaired or substitute mount in the main portion of the globe equipped with the cullet, the excessively elongated wire conductors and tube of the mounting being shown depending therefrom.

Figure 5*a* illustrates the result of sealing the mount in the cullet portion of the globe, in which condition the mount is sealed in the globe but the conductor terminals and the tube remain exposed and unsealed and of excessive length.

Figure 6 illustrates the condition of the unit at the completion of the exhausting of the globe or the filling thereof with gas followed by sealing of the tube accompanied by foreshortening of the tube and of the conductors to the proper length for reception of the base.

Figure 7 shows the base in process of being applied to the resultant of the operation illustrated in Figure 6, one of the conductors being shown as soldered to the center contact of the base and the other conductor to the upper part of the side wall or ferrule of the base, and showing assembling cement, from which condition the unit is brought by application of the base to the globe, to the condition illustrated in Figure 1 of the drawings.

Figure 8 is a diagrammatic representation of the various steps and operations involved in the present process or method.

The present invention contemplates the opening of the glass globe or other envelope of any electronic unit, the replacement or reconditioning of the filament mount or other mount present in the globe and acting in conjunction with a gas therein or with a vacuum, and the subsequent restoration of the globe or other envelope to its original form and dimensions, in such a way that the restoration cannot be detected by ordinary inspection, and the restored unit will meet all specifications and requirements laid down by governmental and commercial agencies for originally manufactured units of this type. The invention further contemplates the dismantling of electronic units of the type indicated with a minimum of destruction of the units so as to require a minimum of rebuilding, thereby not only reducing the cost and difficulty of rebuilding and restoration, but making such rebuilding and restoration possible and practical on a commercial scale. Present attempted methods of rebuilding, rejuvenation, reconditioning and restoration of electronic units invcive the destruction of the units and a botching of the operation of restoration, so that the resultant of such processes will not meet all of the specifications and requirements laid down by governmental and commercial agencies for originally manufactured units of this type. Certain other processes of this general character known to the applicant closely approach although they do not reach such complete restoration as is necessary to meet original specifications and requirements, but these have proven to be impractical because of excessive cost and difficulty of performance of the operations involved.

The process or method of the present invention stated in specific terms involves:—

I. Debasing

which involves the removal of the base or bases from the globe, the term "base" including any form or arrangement whereby the globe is supported and electrical connection is made with the electrodes or filaments in the interior of the globe; and the term "globe" contemplating any form of glass envelope surrounding and enclosing the filaments or electrodes. The debasing operation is desirably and necessarily performed in such a way as to produce the least possible destruction, and a suitable way of doing this is to melt the cement which holds the base to the globe to such an extent as will render the same non-adhesive and permit ready and clean separation of the base from the globe. A suitable way of performing this is by arranging a simple reversal of the original process of originally applying the base to the globe, and standard machines are available on the market for such basing operations. Reference to Figure 1*a* of the drawings shows the removal of the base from the globe, in the performance of which the globe 5 and the base 6 are moved in opposite directions to achieve the necessary separation and detach the conductor 7 and the conductor 8 from their soldered or other connection with the ferrule of the base so as to expose the tip 9 of the tube 10 and at the same time expose the seal 11 at the bottom of the neck portion 12 of the globe 5, from which condition the next step in the process involving,

II. Opening of the tube and removal and saving of the gas, is performed

This step involves removing the tip 9 from the tube 10 in such a way that no destruction of the tube takes place. Figure 2 of the drawings illustrating this step shows the conductors 7 and 8 bent up out of the way of mechanical means applied to the tube 10 to remove the tip 9. Upon removal of the tip 9 the gas which may be in the globe 5 is removed, and where economy is a consideration, this gas is saved by utilizing for the evacuation of the gas a machine of which several types are available in the prior art. This operation or step prepares the unit for the next operation which is designated,

III. Severing

which involves cutting around the neck portion 12 of the globe 5 as close as practical to the lower end of the neck portion in a manner to prevent chipping of the neck portion or any other destruction or impairment thereof, in such a way as to produce separation of the lower portion 14 of the neck portion 12 from the upper portion thereof on the line 13 thereby enable removing the lower portion 14 from the globe 5, which removal is accompanied by the removal of the mount which is generally designated 15 and which is still attached to the portion 14. This prepares the unit for the next step or operation which has two aspects described as,

IVa. Adding the cullet to the globe and servicing the globe

This involves providing a cullet which is generally designated 16 and which is in the form of a tube of glass of the same diameter and gauge as the neck portion 12 of the globe and having a flaring lower end 17, and attaching the cullet by glass-welding of the upper end of the neck portion 12 of the globe so as to make an invisible joint on the line 13 as illustrated in Figure 4 of the drawings. The cullet 16 is of a sufficient length to make up for the removal of the lower portion 14 of the neck portion of the globe, and to provide sufficient glass for the operations required in the below described step V and entitled "Sealing in". The bulb 5 with its cullet adjunct now forming one piece is serviced for cleaning and other conditioning by the application thereto of suitable chemicals by suitable steps and operations known in the art, and either preceding or following this step IV*a*, there is performed step,

IVb. Service of mount

which involves either the replacement by a new mount of the mount removed from the globe or the repairing, reconditioning, rejuvenating or restoration of the original mount by the repair and replacement or reconditioning of the various electrodes, structural elements, vacuum or other containers or tubes, or whatever is involved in the particular type of mount of the particular electronic unit being worked upon, so that after the handling of the mount involved in step IV*b* and the preparation of the globe by the addition of the cullet in operation IV*a*, the mount is ready for placing in the globe, which operation is involved in the next following step, described as

V. Sealing in

which involves the holding of the cullet equipped globe and the mount with the excessive length tubulation 10*a* and the excessively long conductors 7' and 8' relative to each other, by any suitable mechanical means, as illustrated in Figure 5 of the drawings, followed by application of such heat and in such manner as will procure formation of the cullet 16 to a contracted diameter on a level with the flange 17 of the mount 15 and the joining of the glass of this portion of the cullet with the glass of the flange 17; which condition is followed by the application of suitable moulds and pressure to bring the glass into the rounded and tapered shape indicated by the numeral 18 duplicating the shape of the original globe at this point, and to provide the seal 11' duplicating the seal 11 in the original bulb. Having produced these conditions, the tubulation 10' and the conductors 7' and 8' depend below the seal 11' as indicated in Figure 5*a* of the drawings, and this makes the unit in process of restoration ready for the step of

VI. Exhausting or filling with gas

which involves the application to the tubulation 10' of suitable mechanical means for accomplishing the exhausting of the bulb to produce a vacuum therein or to introduce the desired gas into the bulb, and the sealing of the tube 10' to produce the tip 9' exactly corresponding to the tip 9 of the original bulb whereby the vacuum or the gas is sealed in the restored globe. At the same time or immediately after the completion of these operations the conductors 7' and 8' are cut to the proper length for attachment to the base which is subsequently applied in the next step of the process. It should be mentioned at this point that in either steps V or VI suitable electrical current may be applied to the conductors 7' and 8' to effect the drying of the interior of the globe in any manner or for any purpose prior to or subsequent to the production

of the vacuum or the filling of the globe with gas. The next step is

VII. Basing

which involves the application of the original base 6 or of a new base, if desired, to the restored globe by the usual operation of basing such as is reversed in the step I of the present process, and which involves the use and application of a quantity of cement 18 in the base and the soldering or other attaching of the conductor 7' to the center contact 19 of the base and the soldering or other suitable attaching of the conductor 8' to the upper part of the ferrule 20 of the base as illustrated in Figure 7. This figure shows the approach of the base to connection with the lower part of the globe, and the cement in place, and the conductors attached as mentioned. The basing or the application of the base to the globe or permanent attachment thereto is accomplished in any suitable manner or by the use of a standard basing machine, so that the final product is exactly like the original bulb shown in Figure 1 of the drawings, and as stated meets all specifications and requirements commercial and governmental for electronic units of the type worked upon. This is followed by step,

VIII. Aging, testing and flashing—

which involves aging by the application of suitable electrical current by connection of suitable conductors to the base 6, the said current being of a lower intensity than that for which the electronic unit is designed to carry ordinarily. The testing involves all of those tests which are required to be applied to ascertain whether the unit meets the specifications and requirements mentioned herein. The flashing involves the application to the unit of a greater current than that for which it is adapted ordinarily, all of the operations of aging, testing and flashing being well known in the art.

Although I have shown and described herein a preferred embodiment of my invention, it is to be definitely understood that I do not desire to limit the application of the invention thereto, and any change or changes may be made in the structure and arrangement of the parts, and in the manner of forming and manipulating the same in the various steps and operations involved, within the spirit of the invention and the scope of the subjoined claims.

What is claimed is:—

1. In a method of rejuvenating, reconditioning and restoring an electronic unit involving a glass envelope having a base connected to one end thereof and carrying a mount, the steps of removing said base, then severing the base equipped end of the globe from the main body of the globe so as to remove the mount from the globe, then providing a cullet and glass-welding the same to the opened end of said globe.

2. In a method of rejuvenating, reconditioning and restoring an electronic unit involving a glass envelope having a base connected to one end thereof and carrying a mount, the steps of removing said base, then severing the base equipped end of the globe from the main body of the globe so as to remove the mount from the globe, then providing a cullet and glass-welding the same to the opened end of said globe, and forming the cullet so as to contract the same on the mount after replacing the mount in the cullet-equipped globe and restore the base equipped end of the globe and the position of the mount to the specification of the original unit.

3. A method of conditioning an electronic unit for restoration and rejuvenation purposes wherein said unit comprises a glass bulb having a base connected thereto through the instrumentality of a neck carrying a filament-equipped mount, the steps consisting in first removing the base, secondly, severing the mount-equipped neck from the reduced neck jointing portion of the main body of the bulb to remove the mount from the bulb, and replacing said discarded neck with a preformed glass cullet, the cullet being of uniform thickness corresponding to the original neck thickness, being open at opposite ends, flared at its outer end, the inner end of the cullet being glass welded to the open edge end of said bulb.

4. A method of reconditioning and restoring to original specifications an electronic unit, said electronic unit embodying a glass globe, a mount and a base, said method consisting in disconnecting the base, tapping the mount-equipped neck of the globe to salvage gas therein, severing the mount-equipped neck, substituting therefor a cullet glass welded to the main body of the globe, replacing the mount in the globe by way of said cullet, subjecting the outer end of the cullet to a sealing-in operation by conventional means, and replacing the base on the thus completed cullet.

5. A method of preparing a used glass globe for rejuvenation, reconditioning and restoration purposes wherein said globe includes a base and mount-equipped neck, said method consisting in removing the neck by severing and detaching the same to allow the mount to be extracted, and replacing the discarded portion of the neck with a cullet of predetermined dimensions, said cullet being open ended, of prescribed thickness and of a length to allow the inner end thereof to be glass welded to the opened end of the globe.

6. The method of repairing and salvaging the bulbous body and associated neck portion of a used incandescent lamp globe and reclaiming the latter for re-use either for original bulb manufacturing or for reconditioning and restoration assembling, wherein said globe includes a base and a mount-equipped neck, said method consisting in removing the neck by severing and thereafter detaching the same to allow the mount to be extracted for inspection and repair, and then replacing the discarded portion of the neck with a substitute cullet to restore said globe and its neck to predetermined original specifications and dimensions.

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