Feb. 5, 1929. 1,701,388

H. REMANÉ

METHOD OF AND APPARATUS FOR SEALING-IN INCANDESCENT LAMPS AND SIMILAR ARTICLES

Filed April 7, 1925

Fig.1.

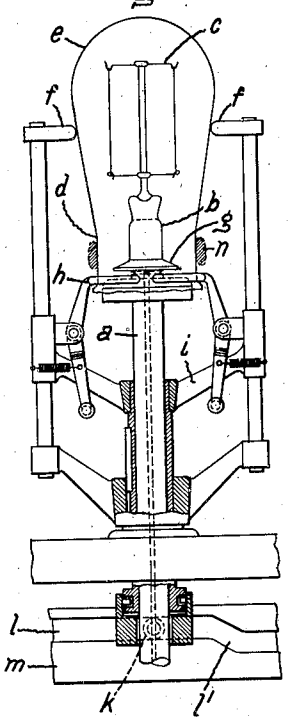


Fig.2.

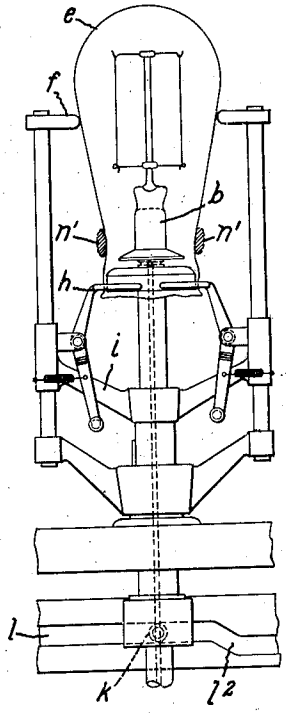


Fig.3.

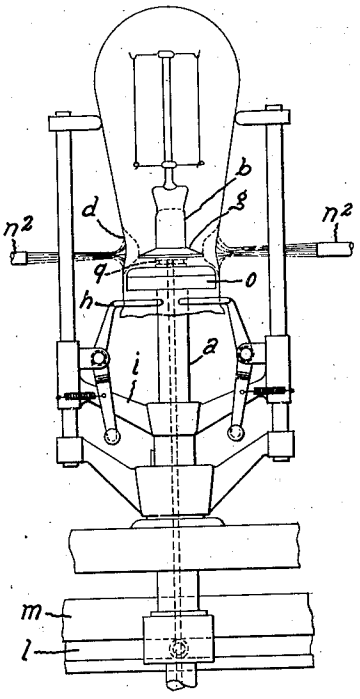
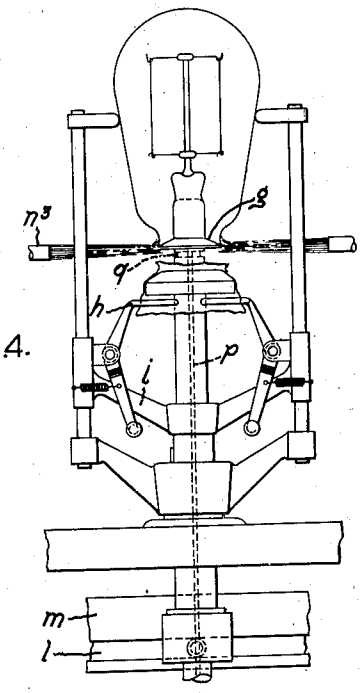


Fig. 4.



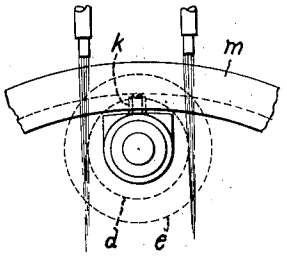


Fig. 5.

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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR SEALING-IN INCANDESCENT LAMPS AND SIMILAR ARTICLES.

Application filed April 7, 1925, Serial No. 21,312, and in Germany May 7, 1924.

The sealing-in of the stem into the glass bulb of electric incandescent lamps and similar glass containers or vessels by the application of flame and continuous rotation of the parts to be sealed together was, according to previous practice, accomplished by sealing the stem to the neck of the bulb, either at the edge of the neck as in the short neck method, or else at a point about half way up the neck as in the long neck method. In the latter kind of sealing-in, as shown for example in U. S. patent to Mitchell and White, 1,453,594, May 1, 1923, it is customary to use bulbs with a rather elongated neck. Although the excess length of neck caused a considerable loss of glass, this mode of sealing the parts together was preferred in practice because the sealing-in could be done with greater safety and reliability, and the burned gases from the burner flames did not enter the lamp and thus were prevented from injuring the sensitive metallic parts inside the lamp.

In accordance with this invention, the advantages of the long neck method of sealing the parts together inside the neck instead of at the edge is preserved, in spite of the use of a bulb with a short neck. With this end in view, according to the invention and before the sealing-in takes place, the short neck of the bulb is gripped at its lowermost edge in a novel manner by the fingers of a gripping device, and the neck is elongated by subjecting it to the action of a pulling member joined to said gripping device, which, after the neck of the bulb has been sufficiently softened by burner flames playing on it, preferably tangentially, moves to elongate the neck, the pulling member being limited in its movement. This pulling movement is discontinued as soon as the neck has been sufficiently lengthened, and the pulling member then holds the neck by means of the gripping device, without exerting further tension on it. The slight constriction of the neck produced by capillarity and flame pressure, in spite of the action of the pulling member, is not objectionable, and after the pulling stops, the neck can be safely sealed to the stem, the excess length of bulb neck being afterwards cut off in well-known manner by mechanical action, air pressure, or narrow and pointed flames.

In order to facilitate the lengthening of the short bulb neck, and to obtain more safely a uniform thickness of the wall, a preferable plan is to elongate the bulb neck by stages by passing it consecutively through a number of working positions.

The possibility afforded by the means provided in this invention of sealing-in the stem at a point in the interior of the neck, even in bulbs with a particularly short neck, offers great economies, making not only for simplification and cheapening of the bulb, but also allowing realization of great savings in glass and cost of transportation of bulbs from the glass works to the lamp factory where they are to be used. Another substantial advantage of the new sealing-in method is that, on the one hand, crooked sealing-in of the stem is avoided, since the edge of the neck during the sealing of the neck to the edge of the stem is immovably locked in position, while on the other hand, absolute uniformity of wall thickness at the sealing-in points is always insured by virtue of the positive and limited elongation of the neck of all bulbs worked consecutively at a number of positions.

The drawing herewith illustrates the rotatable holder head of a sealing-in machine (see Figs. 1 to 4), while Fig. 5 is a horizontal section through Fig. 1.

The sealing-in machine, which is in general of the type shown in said Mitchell and White U. S. Patent 1,453,594, is provided in the customary manner with an intermittently rotating table on which a plurality of holder heads for receiving the glass bulb and the stem to be sealed together are disposed in a circle. Upon the stem spindle or holder *a* of each holder head the stem *b* is set by the operator at the loading position, the stem having been previously provided with a filament and the filament supports *c*. The bulb is placed with its neck *d* downwards, over the filament supports *c* and the stem *b*, the bulb *e* resting on and being rotated by the rotatable bulb holders *f*. The neck *d* of the bulb is so short that in the first working position of the machine, the edge of the neck preferably somewhat flared protrudes, as shown in Figure 1, only slightly beyond the flare *g* of the said stem, and insufficiently for the sealing-in of the stem, the edge of the flare being substantially at the edge of the bulb neck, as was customary in the short neck method of sealing-in used for many years, but now superseded by the long neck method of seal-

ing-in disclosed in Figures 7 to 9 of U. S. patent to Kremenezky No. 941,996, November 30, 1909. The edge of the neck of the bulb is gripped peripherally by a gripper, which may conveniently comprise yielding fingers *h* carried by a pulling member, such as the vertically guided forked frame *i* which is automatically pulled down during the sealing-in operation. The pulling member is for this purpose supplied, for example, with a roller *k* guided by the slot *l* formed in the edge of the stationary cam *m*, which is concentric with the rotary table of the machine and also with the axis about which all of the holder heads are disposed. By means of the said guided frame *i* and the fingers *h*, the bulb *e* is held in position, and its neck is subjected to tension by the stationary cam *m*.

After part of the bulb neck has been adequately heated in the first working position as depicted in Figure 1, by means of burner flames *n* preferably arranged to strike the bulb neck tangentially, the holder head is caused to move into the next or second working position. During its movement into this second working positon, a strong mechanical pull is exerted upon the softened neck portion by the gripper through the fingers *h*, since the forked frame *i* and the fingers mounted on it are compelled by the roller *k* to move slightly downward by the curvature *l'* of the slot *l* in the cam *m*. The consequence of this action, as shown in Fig 2, is that the neck of the bulb is somewhat lengthened, so that the lower edge of the neck now projects somewhat farther beyond the edge of flare *g* of the stem *b*. While in this second working position, the bulb neck is subjected to additional heating by tangentially placed burner flames *n'*, and also while moving out of this second working positon toward the third positon the neck is further positively lengthened by the further pull of the fingers *h* as the roller *k* of the forked frame *i* passes into the curvature l^2 of the slot *l*. The bulb neck after leaving the second working position is lengthened so much that in the following or third working positon sufficient length has been provided to permit the safe sealing-in of the stem into the bulb. For this purpose, in the working position depicted in Figure 3, with the neck *d* of the bulb being, as before, firmly gripped by the fingers *h*, the bulb neck in the usual way is subjected to the action of radially disposed sealing-in fires or flames n^2 which seal the bulb neck to the edge of the flare.

The softened portion of the neck located below the flare of the stem may incidentally for instance, as here shown, be placed firmly and snugly against the circumference of a cone-shaped bushing *o* of the stem spindle *a*. There is then formed a chamber between the edge of the flare and the conical bushing, and in the next working stage, as shown in Figure 4, the surplus neck may be cut off in the well known way by softening a narrow zone by flames n^3, and also by a current of air supplied through a vertical bore *p* of the stem spindle *a* and directed outwardly by radial holes *q* provided immediately below the sealing-in points, blowing out the softened glass of the neck directly below the sealing-in point until it is thin and is easily severed by the flames.

After having passed through the unloading positions for removal of the sealed lamp, and a position where the surplus portion of the neck is removed from the stem spindle, the forked frame *i* with fingers *h* is again raised by the curved slot *l* of the cam into the position shown in Fig. 1, and the head is ready to receive a new bulb and stem.

Instead of severing the surplus neck by blowing out the softened glass by an air current the zone on the neck heated to a high temperature can be severed in the well known ways as by a tool thrust into the softened material of the neck immediately below the sealing zone, by tearing off the surplus, or merely by means of pointed flames directed upon the neck.

The elongation of the bulb neck produced during the first stage of the working process, when the bulb neck is down, can also be obtained by loading the pulling device with sufficient weight, but in this case, it is necessary to lock the pulling device after the desired elongation of the neck has been obtained, in order that the sealing-in may be done in all cases with the pull down device stationary.

The elongation of the bulb neck produced prior to the sealing-in proper can, if desired, be produced by one single mechanical pull on changing from one working position to the other. However, when sealing in large bulbs, the elongation of the bulb neck may also be effected in more than two working stages. The conical bushing *o* can be made adjustable in height on the stem spindle *a*; but, if desired, it may also be dispensed with, if the surplus neck is cut off mechanically or by the aid of pointed flames.

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

1. The method of sealing a flared stem into a bulb which consists in holding the stem with its edge substantially at the edge of the neck of the bulb, heating a zone on the neck of the bulb immediately adjacent its edge, pulling the edge of the neck away from the bulb to a predetermined extent to elongate the plastic neck and thereby draw its edge considerably beyond the edge of the stem, holding the edge of said neck immovable with reference to the bulb in the position into which it has been drawn and heating to a higher temperature the hot elongated neck at a zone adjoining the edge of the stem while the edge

of said neck is in said position and thereby sealing-in the stem.

2. The method of sealing a flared stem into a bulb which comprises holding the stem inside the bulb neck with its edge substantially at the edge of the bulb neck, heating the bulb neck along a zone immediately adjacent its edge, gripping the edge of the bulb neck and pulling it away from the bulb a predetermined distance to stretch the hot plastic neck over the stem, holding the edge of said neck immovable with reference to the bulb in the position into which it has been drawn, further heating the hot elongated neck along a zone adjoining the edge of the stem while the edge of said neck is in said position to seal the stem and the wall of the bulb neck together, and removing the surplus neck by severing the bulb neck immediately below the stem.

3. The method of sealing a stem into a bulb which comprises positioning the stem in the bulb neck with its edge substantially at the edge of the bulb, heating the bulb neck immediately adjacent its edge until it is plastic and stretching it to a predetermined extent while plastic over the stem by successive steps until the edge of the neck is considerably beyond the edge of the stem, holding the edge of said neck immovable with reference to the bulb in the position into which it has been drawn and then, while the elongated neck is still hot, and while the edge of said neck is in said position heating a zone of the neck immediately adjacent the edge of the stem to seal the walls of the elongated bulb neck to the edge of the stem.

4. The method of sealing a stem into a bulb which consists in positioning the stem in the bulb neck with its edge substantially at the edge of the bulb neck, heating the bulb neck along a zone immediately adjacent its edge to render it plastic, seizing the edge and pulling longitudinally of the neck a predetermined distance to stretch the neck over the stem and thin its walls, holding the edge of said neck immovable with reference to the bulb in the position into which it has been drawn and then while said walls are still hot and while the edge of said neck is in said position sealing the edge of the stem to the hot thinned walls of the neck.

5. In a device of the character described, the combination of a bulb holder, a stem holder for holding a stem in the neck of the bulb with its edge substantially at the edge of the neck of the bulb in said bulb holder, burners for heating the neck of the bulb in said holder along a zone immediately adjacent its edge, a bulb neck gripper for gripping the edge of the bulb neck and movable with reference to the bulb holder to a predetermined extent sufficient only to stretch the neck of the bulb over the stem on said holder until said stem is well within but out of contact with the bulb neck and actuating means for moving said bulb neck gripper away from the bulb holder to said predetermined extent only and then holding it stationary with reference to said holder while said burners seal the walls of the elongated bulb neck to the edge of said stem.

6. In a device of the character described, the combination of a head mounted to travel through several positions in succession and comprising a bulb holder, a stem holder, and a gripper for seizing the neck of a bulb in said holder, said gripper being movable away from said holder to carry the edge of the neck of said bulb well beyond the stem on said stem holder, burners mounted at some of said positions to heat the neck of a bulb in said holder, and actuating means responsive to movement of said head from one position to the next for moving said gripper relative to said holder.

7. In a device of the character described, the combination with a bodily movable head mounted to move into two positions in succession and comprising a bulb holder, a stem holder in registry with said bulb holder and a bulb neck gripper mounted to move out of its normal position and away from said bulb holder into a remote position to pull the edge of the neck of a bulb in said bulb holder beyond the edge of a stem on said stem holder, of burners mounted at the first position to heat the neck of a bulb in said bulb holder adjacent the stem, sealing-in burners mounted at the second position to direct a flame at and below the edge of the stem, a stationary cam mounted adjacent the path of said head, and connections between said cam and said gripper, said cam being shaped to move said gripper from its normal position to its remote position during travel of said head from the first position to the second and to hold it in remote position during the sealing-in of the stem.

In witness whereof, I have hereunto set my hand this 18th day of March, 1925.

HERMANN REMANÉ.