

March 3, 1964

B. CHAUVIN ETAL

3,122,825

POSITIONING APPARATUS FOR SEALING LAMPS

Filed Sept. 27, 1960

2 Sheets-Sheet 1

FIG. 1.

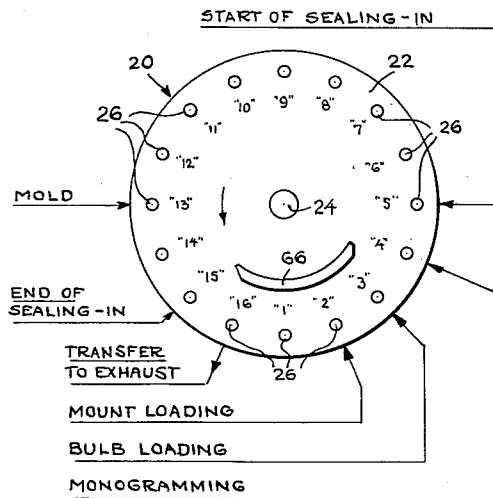


FIG. 2.

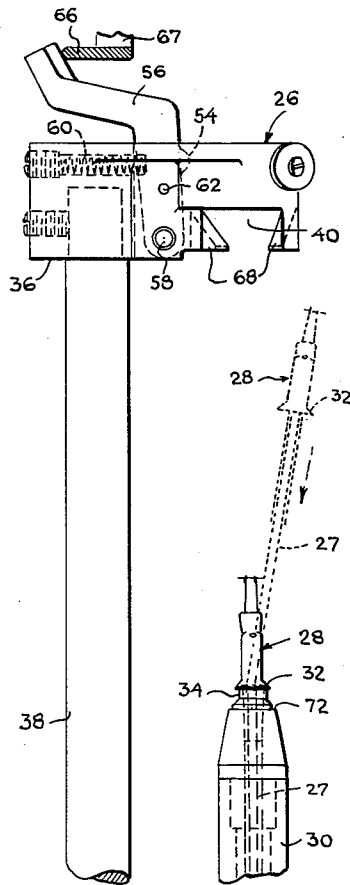


FIG. 4.

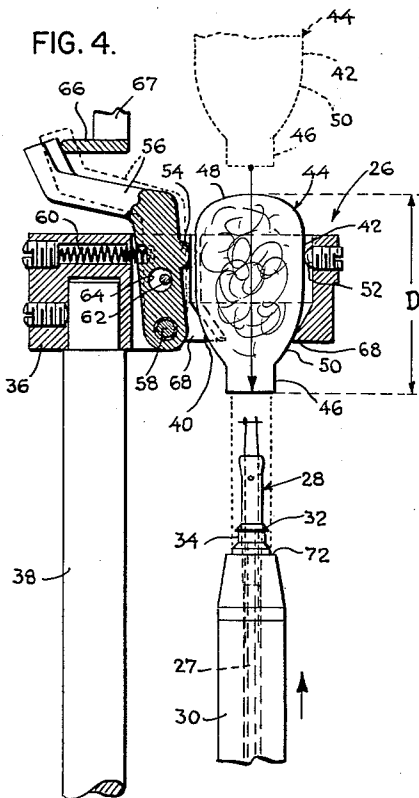
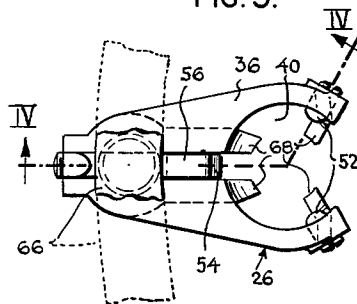


FIG. 3.



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2 Sheets-Sheet 2

FIG. 5.

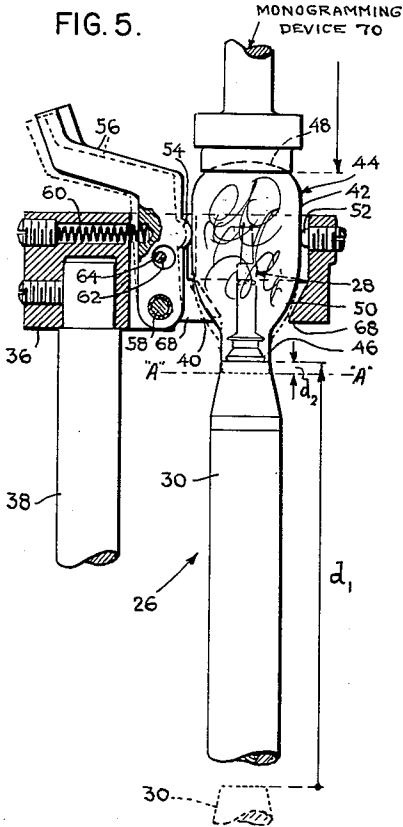


FIG. 6.

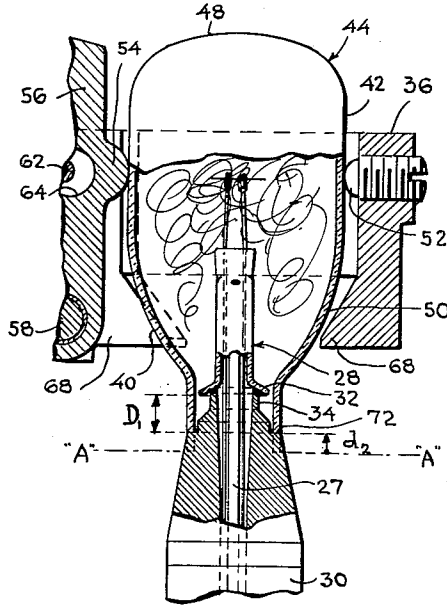


FIG. 7.

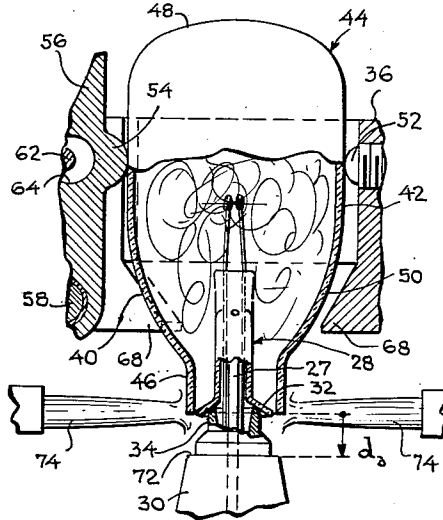
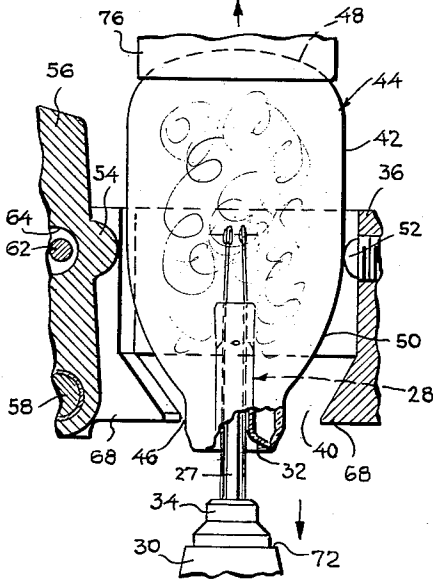


FIG. 8.



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POSITIONING APPARATUS FOR SEALING LAMPS
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 Filed Sept. 27, 1960, Ser. No. 58,716
 3 Claims. (Cl. 29—203)

The present invention relates to the sealing of lamps, and more particularly, to an improved apparatus for positioning a photoflash lamp bulb and mount with respect to each other for sealing.

Heretofore, conventional sealing apparatus for incandescent lamps (of the type shown in U.S. Patent No. 1,461,155 issued July 10, 1923, to H. D. Madden et al.) has been employed for sealing photoflash lamps.

The generally tubular envelope for present photoflash lamps has a cylindrical neck portion connected to the tubular body portion by a connecting or inwardly tapering portion. The bulb holder for such conventional sealing apparatus has a lower inverted frustoconical seat for centering the bulb in the bulb holder (by means of the tapering portion) and for positioning the bottom edge of the bulb neck with respect to a reference plane (namely the bottom of the bulb holder). The amount carried by the mount pin is then elevated into the fixed bulb a predetermined distance for the purpose of positioning the flare of the mount with respect to the bottom edge of the bulb neck for sealing.

The bottom edge of each bulb neck is precut (prior to sealing) a predetermined distance from the top of the bulb dome. Due to variations in the slope of the tapering portion and in the length of the bulb neck (as measured from the junction between such tapering portion and the neck portion to the bottom edge of the neck portion), the disposition of the bottom edge of the neck portion from the reference plane varies from bulb to bulb. As a result when the mount reaches the end of its predetermined travel the flare is often undesirably disposed within the bulb neck more than about 1 mm. from the bottom edge of the neck portion. Over insertion of the flare in the bulb neck prevents the flare from reaching the sealing temperature with the resultant formation of a defective heavy seal. If however the flare is disposed outside the bottom edge of the bulb neck no seal results.

A further difficulty is encountered in maintaining the centerline of the bulb holder (which is mounted on a long rod above the mount pin) coincident with the centerline of the mount pin. Wear in the moving parts of the sealing head in addition to the angular magnification of variations in the bulb holder centerline cause misalignment of the bulb holder centerline with respect to the mount pin centerline, with resultant positioning of one edge of the flare against the misaligned bulb neck and the undesirable spacing of the opposite edge of such flare away from such bulb neck thereby causing the attendant formation of an open seal.

Since the taper of the inverted frustoconical seat of the conventional bulb holder closely approximates the taper of the tapering portion of the bulb, heating of the bulb during sealing causes the latter to expand and become wedged in the bulb holder seat with the result that the conventional suction type transfer device (which engages the dome of the sealed lamp) is unable to remove the sealed lamp from the bulb holder.

It is the general object of the present invention to avoid and overcome the foregoing and other difficulties of and objections to prior art practices by the provision of an improved apparatus for positioning a lamp bulb and mount for sealing, which apparatus eliminates the dimen-

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sional variables (in the bulb and mount) from the sealing operation.

Another object of the present invention is the provision of an improved positioning apparatus which automatically compensates for misalignment of the bulb and mount and juxtaposes said bulb and mount in the desired sealing position preparatory for the sealing operation.

A further object of the present invention is the provision of an improved positioning apparatus which eliminates heavy seals, no seals and open seals.

Yet another object of the present invention is the provision of an improved positioning apparatus which prevents wedging of the sealed lamp in the bulb holder and permits the facile removal of the sealed lamp therefrom.

The aforesaid objects of the present invention, and other objects which will become apparent as the description proceeds, are achieved by providing apparatus comprising a bulb holder having means for centering a body portion of a bulb in the bulb holder and seating means for supporting a tapering portion of the bulb by means of line contact and operable to center the tapering portion, mount supporting means movable toward a neck portion of the bulb to insert a mount in the neck portion, and engaging means carried by the mount supporting means for engaging the neck portion and for then moving the bulb with the mount thus fixing the distance which the mount is inserted into the neck portion. The engaging means is then operable to move the tapering portion away from the seating means to permit the engaging means to align a vertical axis of the bulb with a vertical axis of the mount, the mount supporting means being thereafter operable to retract the mount and position the latter with respect to the neck portion for sealing.

The improved apparatus performs the steps of supporting the bulb by means of its body portion and its connecting portion, inserting the mount into the neck portion of the bulb a predetermined distance, thereafter moving both the mount and the bulb while supporting the bulb by its body portion to leave the connecting portion unsupported, aligning a vertical axis of the bulb with a vertical axis of the mount by movement of the unsupported connecting portion, and retracting the mount to position the latter with respect to the neck portion for sealing.

For a better understanding of the present invention reference should be had to the accompanying drawings, wherein like numerals of reference indicate similar parts throughout the several views and wherein:

FIG. 1 is a diagrammatic plan view of a sealing machine incorporating the improved positioning apparatus of the present invention, which apparatus is capable of practicing the improved positioning method of the present invention;

FIG. 2 is a fragmentary side-elevational view of the improved positioning apparatus at station "2," the mount loading station, and showing the mount loading operation;

FIG. 3 is a plan view of the positioning apparatus shown in FIG. 2;

FIG. 4 is a vertical-sectional view taken along the line IV—IV of FIG. 3 in the direction of the arrows;

FIG. 5 is a view similar to FIG. 4 of the improved positioning apparatus and bulb and mount carried thereby at station "4," the monogramming station, and showing the insertion of the mount within the bulb and the alignment of the bulb with such mount;

FIG. 6 is an enlarged fragmentary view, similar to FIG. 5, showing the alignment of the bulb with the mount;

FIG. 7 is a view similar to FIG. 6 taken at station "5," the first sealing station, and showing the final positioning of the mount with respect to the aligned bulb preparatory for the sealing operation;

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FIG. 8 is a view similar to FIGS. 6 and 7 taken at station "16," the sealed lamp transfer station, and showing the hollow spindle of the sealing head lowered and disengaged from the sealed lamp and the sealed lamp about to be transferred to the exhaust machine (not shown).

Although the improved positioning method and apparatus of the present invention are broadly applicable to the sealing of all lamps having a bulb provided with a cylindrical neck portion and a connecting portion, the positioning method and apparatus of the present invention are particularly adapted for use in conjunction with the sealing of photoflash lamps and hence they have been so illustrated and will be so described.

With specific reference to the form of the present invention illustrated in the drawings, and referring particularly to FIG. 1, a sealing machine is indicated generally by the reference numeral 20.

The sealing machine 20 has a turret 22 (FIG. 1) rotatably mounted on a center post 24 and provided with sixteen sealing heads 26 (FIGS. 2, 3 and 5) each of which comprises the improved positioning apparatus of the present invention. These sixteen sealing heads 26 are indexable through a like number of work stations by a conventional indexing mechanism (not shown, but of the type disclosed in U.S. Patent No. 2,439,884, issued April 20, 1948, to J. M. Campbell).

At station "2" (FIG. 1), the mount loading station, a tubulation 27 of a mount 28 (FIG. 2) is inserted into a hollow spindle 30 of the sealing head 26 and a flare 32 of such mount 28 is positioned on a mount pin 34 by moving such mount 28 from the dotted-line position shown in FIG. 2 to the solid-line position shown in such figure, preparatory for the bulb loading operation at station "3" (FIG. 1). The mount pin 34 and hollow spindle 30 (FIGS. 2, 4 and 6-8) form the mount supporting means.

In order to provide bulb supporting and aligning means for the sealing head 26, a bulb holder 36 (FIGS. 2-8) is mounted on a relatively long mount rod 38 and is provided with a bulb receiving cavity 40. The vertical axis of such bulb receiving cavity 40 should desirably coincide with the vertical axis of the mount pin 34 and hollow spindle 30. The upper portion of the bulb receiving cavity 40 is cylindrical and of larger diameter than a corresponding cylindrical body portion 42 of a foil filled bulb 44 which is to be loaded into the bulb receiving cavity 40. As shown in FIGS. 4-8, this bulb 44 has a cylindrical neck portion 46 precut a predetermined distance "D" (FIG. 4) from a dome 48 of the bulb 44, which neck portion 46 is connected to the body portion 42 by a connection portion, such as an inwardly converging frustoconical tapering portion 50.

So that the vertical axis of the bulb 44 will be centered on the vertical axis of the bulb receiving cavity 40, a pair of fixed but adjustable positioning fingers 52 (FIG. 3, spaced 120° apart) project into the bulb receiving cavity 40 from the bulb holder 36 and a movable positioning finger 54 is mounted on a lever 56 (FIGS. 2, 4-8) pivoted at 58 in a suitable slot in the bulb holder 36. The fingers 52 and 54 (FIGS. 2-8) constitute the centering means. The means utilized to bias the lever 56 and movable positioning finger 54 carried thereby into the bulb receiving cavity 40 comprises a spring 60 (FIGS. 2, 4-5). As shown particularly in FIGS. 4 and 5, the lever 56 is limitedly oscillatable between the dotted-line and solid-line positions shown in such figures by a pin 62 which projects from the bulb holder 36 through a clearance hole 64 in the lever 56.

In order to permit unloading of the bulb receiving cavity 40 at station "16" (FIG. 1) and the loading of a foil filled bulb 44 into such bulb receiving cavity 40 at station "3," an arcuate stationary cam 66 extends from station "16" to station "3" and is mounted on a frame 67 (FIGS. 2 and 4) of the sealing machine 20 so as to be engaged by the lever 56 during index of the sealing head

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26 through such stations "16"—"3." The cam 66 moves the lever 56 from the dotted-line position shown in FIG. 4 to the solid-line position shown in such figure with resultant retraction of the movable positioning finger 54 from the bulb receiving cavity 40.

At station "3," the bulb loading station, a bulb 44 is moved (from the dotted-line position, FIG. 4) downwardly into the bulb receiving cavity 40 until the tapering portion 50 is engaged by a seating means, such as a segmented frustoconical seat 68 provided in the bulb holder 36. It will be noted from FIG. 4 that the taper on the seat 68 is less than the minimum taper on the tapering portion 50 of the bulb 44 so that the contact therebetween is limited to substantially line contact thus resultantly eliminating wedging of the bulb 44 in the bulb holder 36.

During index of the sealing head 26 to station "4," the monogramming station, the lever 56 rides off the cam 66 (moving from the dotted-line position, FIG. 5, to the solid-line position) thus permitting the spring 60 to move the movable positioning finger 54 into engagement with the bulb 44 and resultantly aligning the vertical axis of the bulb 44 with the vertical axis of the bulb receiving cavity 40 (FIG. 5).

The spring 60 has, of course, sufficient force to position the body portion 42 of the bulb 44 against the fixed positioning fingers 52 and to support the weight of the bulb 44 but such spring 60 is sufficiently resilient to permit the bulb 44 to be moved upwardly while the movable positioning finger 54 is still in contact with the body portion 42 of the bulb 44.

Thereafter at station "4," a monogramming device 70 (FIG. 5) provides the dome 48 of the bulb 44 with a suitable indicia. Subsequently, the hollow spindle 30 (and the mount pin 34 and mount 28 carried thereby) are moved upwardly from the dotted-line position (FIG. 5) a distance " d_1 " to the solid-line position (FIG. 5) by a conventional reciprocating mechanism (not shown, but of the type disclosed in the above-mentioned U.S. Patent No. 1,461,155). During this upward movement the mount 28 is inserted into the neck portion 46 of the bulb 44. When an engaging means, such as an annular shoulder 72 on the hollow spindle 30, reaches elevation "A—A" in its upward travel (a distance " d_2 ", FIGS. 5 and 6, from the end), the flare 32 of the mount 28 has been inserted into the neck portion 46 of the bulb 44 a predetermined distance " D_1 " (FIG. 6), and the shoulder 72 (FIGS. 4, 6-8) on the hollow spindle 30 engages the neck portion 46 of the bulb 44. Such shoulder 72 then lifts the bulb 44 upwardly (against the action of the spring 60) away from the seat 68 so that the bulb 44 is held solely by the fingers 52 and 54 and the tapering portion 50 is unsupported. If the vertical axis of the bulb 44 does not coincide with the vertical axis of the mount pin 34, the shoulder 72 then cocks the bulb 44 in the cavity 40 (during this upward movement through the distance " d_2 ") to achieve exact coincidence of the vertical axis of the bulb 44 with the vertical axis of the mount pin 34 and the flare 32 of the mount 28.

When the sealing head 26 (and the bulb 44 and mount 28 carried thereby) arrive at station "5," the first sealing station, the hollow spindle 30 (and mount pin 34 and mount 28 carried thereby) are retracted downwardly a distance " d_3 " (FIG. 7) to position the flare 32 of the mount 28 at the mouth of the neck portion 46 of the bulb 44 preparatory for the heating and ultimate sealing of the flare 32 to the neck portion 26 (by burners 74, FIG. 7) at stations "5"—"15". At station "13" (FIG. 1) the seal is molded. Adjacent station "16" (FIG. 1) the cam 66 causes the retraction of the movable positioning finger 54 thus releasing the sealed lamp and permitting, as shown in FIG. 8, a vacuum-type transfer device 76 to remove the sealed lamp from the sealing head 26.

As an alternative embodiment of the present invention a reciprocating mechanism (not shown but similar to that

disclosed in the above-mentioned U.S. Patent No. 1,461,155) is connected to a reciprocating mount rod similar to the mount rod 30. The bulb holder 36 is then moved toward the mount 28 on the mount pin 34 to insert the flare 32 the distance "D₁" (FIG. 6) into the neck portion 46. Thereafter, either the bulb holder 36, or the mount 28 and mount pin 34 are retracted to position the flare 32 at the mouth of the neck portion for the sealing operation.

Method

From the above description of the improved positioning apparatus of the present invention it will be understood that an improved positioning method is also provided, which method comprises the steps of supporting the body portion 42 and the tapering portion 50, inserting the mount 28 into the neck portion 46 a predetermined distance "D₁" (FIG. 6), thereafter moving both the mount 28 and the bulb 44 while supporting the bulb 44 by its body portion 42 to leave the tapering portion 50 unsupported, aligning a vertical axis of the bulb 44 with a vertical axis of the mount 28 by movement of the unsupported tapering portion 50, and retracting the mount 28 to position the latter with respect to the neck portion 46 for sealing. This improved positioning method can be practiced by hand or by apparatus other than the positioning apparatus herein described.

It will be recognized by those skilled in the art that the objects of the present invention have been achieved by the provision of an improved positioning apparatus for sealing lamps, which apparatus positions the flare of the mount and the neck portion of the bulb in the same relative position for sealing regardless of the dimensional variables in the bulb and mount. Such improved apparatus automatically compensates for misalignment of the bulb and mount with respect to each other during the positioning operation. As a result the improved positioning apparatus eliminates open seals, no seals and heavy seals. Additionally, such improved apparatus prevents the bulb from wedging in the bulb holder during the sealing operation and readily permit removal of the sealed lamp from the bulb holder at the completion of the sealing operation.

While in accordance with the patent statutes a preferred embodiment of the present invention has been illustrated and described in detail, it is to be particularly understood that the invention is not limited thereto or thereby.

We claim:

1. Apparatus for positioning the neck of a lamp bulb with respect to the sealing portion of a lamp mount preparatory to mount-to-bulb sealing, said bulb having a substantially straight-sided body portion, an open neck portion, and a connecting portion joining the body portion and the neck portion thereof, said apparatus comprising:

- (a) a bulb-retaining head having a vertically disposed bulb-receiving cavity provided therein;
- (b) bulb-engaging means projecting into an intermediate portion of the cavity of said bulb-retaining head, and a portion of said first bulb-engaging means movable and resiliently biased to project into the cavity of said bulb-retaining head;
- (c) bulb-loading means for loading a bulb into the cavity of said bulb-retaining head;
- (d) mount-supporting means for retaining in predetermined disposition a mount to be sealed to the bulb as loaded into said bulb-retaining head;
- (e) reciprocating means for moving said mount-supporting means a predetermined distance first toward and then away from said bulb-retaining head;
- (f) bulb-neck-engaging means carried on said mount-supporting means for engaging and seating the neck portion of a bulb retained in said bulb-retaining head after said mount-supporting means has been moved by said reciprocating means a predetermined distance

toward said bulb-retaining head, and further movement of said mount-supporting means by said reciprocating means toward said bulb-retaining means causing the retained bulb to slide upwardly with respect to said bulb-engaging means;

(g) said mount-supporting means thereafter moved by said reciprocating means a predetermined distance away from said bulb-retaining head to position the sealing portion of said mount in predetermined position with respect to the neck portion of the retained bulb and to leave said bulb supported by said first bulb-engaging means and in proper position for mount-to-bulb sealing; and

(h) timing means for controlling the operation of said bulb-loading means and said reciprocating means in the foregoing work sequence.

2. Apparatus for positioning the neck of a lamp bulb with respect to the sealing portion of a lamp mount preparatory to mount-to-bulb sealing, said bulb having a substantially straight-sided body portion, an open neck portion, and a connecting portion joining the body portion and the neck portion thereof, said apparatus comprising:

(a) a bulb-retaining head having a vertically disposed bulb-receiving cavity provided therein;

(b) first bulb-engaging means projecting into an intermediate portion of the cavity of said bulb-retaining head, and a portion of said first bulb-engaging means movable and resiliently biased to project into the cavity of said bulb-retaining head;

(c) second bulb-engaging means positioned proximate to the bottom portion of the cavity of said bulb-retaining head and adapted to contact the connecting portion of a bulb loaded into said bulb-retaining head;

(d) bulb-loading means for loading a bulb into the cavity of said bulb-retaining head to cause the connecting portion of such loaded bulb to seat against said second bulb-engaging means;

(e) mount-supporting means for retaining in predetermined disposition a mount to be sealed to the bulb as loaded into said bulb-retaining head;

(f) reciprocating means for moving said mount-supporting means a predetermined distance first toward and then away from said bulb-retaining head;

(g) bulb-neck-engaging means carried on said mount-supporting means for engaging and seating the neck portion of a bulb retained in said bulb-retaining head after said mount-supporting means has been moved by said reciprocating means a predetermined distance toward said bulb-retaining head, and further movement of said mount-supporting means by said reciprocating means toward said bulb-retaining means causing the retained bulb to slide upwardly with respect to said first bulb-engaging means and to move from contact with said second bulb-engaging means;

(h) said mount-supporting means thereafter moved by said reciprocating means a predetermined distance away from said bulb-retaining head to position the sealing portion of said mount in predetermined position with respect to the neck portion of the retained bulb and to leave said bulb supported by said first bulb-engaging means and in proper position for mount-to-bulb sealing; and

(i) timing means for controlling the operation of said bulb-loading means and said reciprocating means in the foregoing work sequence.

3. Apparatus for positioning the neck of a lamp bulb with respect to the sealing portion of a lamp mount preparatory to mount-to-bulb sealing, said bulb having a substantially straight-sided body portion, an open neck portion, and a connecting portion joining the body por-

tion and the neck portion thereof, said apparatus comprising:

- (a) a bulb-retaining head having a vertically disposed bulb-receiving cavity provided therein;
- (b) first bulb-engaging means projecting into an intermediate portion of the cavity of said bulb-retaining head, a portion of said first bulb-engaging means movable and resiliently biased to project into the cavity of said bulb-retaining head, another portion of said first bulb-engaging means being fixed and projecting into the cavity; 5 10
- (c) second bulb-engaging means positioned proximate to the bottom portion of the cavity of said bulb-retaining head and adapted to contact the connecting portion of a bulb loaded into said bulb-retaining head; 15
- (d) actuating means for moving the movable portion of said first bulb-engaging means from projection within the cavity of said bulb-retaining head to permit a bulb to be freely loaded into the cavity; 20
- (e) bulb-loading means for loading a bulb into the cavity of said bulb-retaining head to cause the connecting portion of such loaded bulb to seat against said second bulb-engaging means, and said actuating means thereafter permitting the movable portion of said first bulb-engaging means to be resiliently biased against the bulb as loaded into the cavity; 25
- (f) mount-supporting means for retaining in predetermined disposition a mount to be sealed to the bulb as loaded into said bulb-retaining head; 30
- (g) reciprocating means for moving said mount-supporting means a predetermined distance first toward and then away from said bulb-retaining head;

- (h) bulb-neck-engaging means carried on said mount-supporting means for engaging and seating the neck portion of a bulb retained in said bulb-retaining head after said mount-supporting means has been moved by said reciprocating means a predetermined distance toward said bulb-retaining head, and further movement of said mount-supporting means by said reciprocating means toward said bulb-retaining means causing the retained bulb to slide upward with respect to said first bulb-engaging means and to move from contact with said second bulb-engaging means;
- (i) said mount-supporting means thereafter moved by said reciprocating means a predetermined distance away from said bulb-retaining head to position the sealing portion of said mount in predetermined position with respect to the neck portion of the retained bulb and to leave said bulb supported by said first bulb-engaging means and in proper position for mount-to-bulb sealing; and
- (j) timing means for controlling the operation of said actuating means, said bulb-loading means and said reciprocating means in the foregoing work sequence.

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