

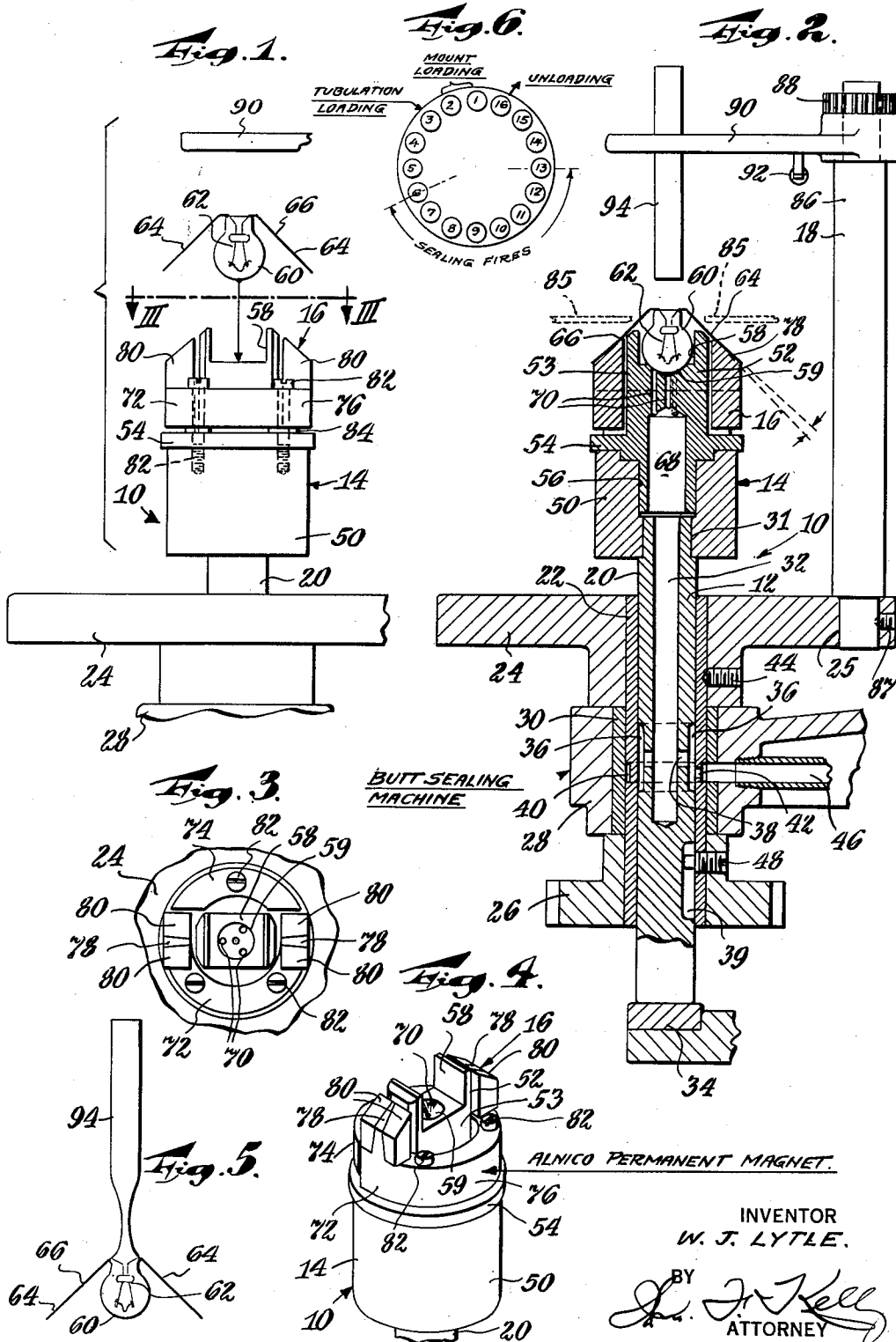
June 1, 1954

W J. LYTLE

2,679,713

MAGNETIC CENTERING DEVICE FOR BUTT SEALING MACHINES

Filed Sept. 22, 1951



INVENTOR
W. J. LYTLE.

BY *J. Kelly*
ATTORNEY

UNITED STATES PATENT OFFICE

2,679,713

MAGNETIC CENTERING DEVICE FOR BUTT SEALING MACHINES

Walter James Lytle, Madison County, Ky., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application September 22, 1951, Serial No. 247,863

3 Claims. (Cl. 49—2)

1

This invention relates to sealing machines and, more particularly, to a magnetic centering device for a sealing machine spindle or head.

In the manufacture of incandescent lamps, particularly the miniature type, one of the major items of production shrinkage is improper or off-center sealing of the mount with respect to the bulb or envelope. Under the present method of sealing, the bulb is secured in an inverted vertical position in the bulb adapter or cup by vacuum. The mount is loaded into the bulb and positioned thereon by the force of gravity and the engagement of the pre-formed external portions of the "Dumet" leading-in conductor in centering slots provided in the bulb adapter. "Dumet" is the trade name for wire having a nickel-iron core enclosed in a copper sheath which has a total thickness approximately 25% of the finished wire diameter.

A defect in the present method is the lateral movement, during sealing of the external portions of the leads, in centering slots wherein sufficient clearance is required. Further, due to the flexible nature of the leading-in conductors the external portions thereof do not fall into the centering slots properly during insertion of the mounts into the bulbs. Again, since the mount is light, the force of gravity is not sufficient to maintain the mount's position in the bulb on the sealing head, which may vibrate as it rotates. Also, at the butt sealing position of the sealing machine where the exhaust tubulation, bulb, and the leading-in conductors of the mount are pressed together, gravitational force is not enough to prevent lateral displacement of the mount.

Hence it has been found advantageous, according to my invention, to employ the force of magnetism in addition to the force of gravity to position the mount centrally with respect to the bulb during sealing. Permanent magnets located symmetrically at the sides of the bulb adapter or holder, attract the nickel-iron core of the "Dumet" leading-in conductors of the mount, thus positioning the mount, as desired, in relation to the bulb.

In its general aspect, the present invention has the object of overcoming the aforementioned disadvantages of the prior art gravitational centering devices for butt sealing incandescent lamps and the like.

A specific object of the present invention is the elimination of the centering slots in the bulb adapter.

Another object is the elimination of the sealing of improperly centered amounts in the bulbs.

2

A further object is a mount centering device employing the force of magnetism in addition to the force of gravity to center the mount relative to the bulb during the butt sealing operation.

A still further object is a mount centering device having permanent magnets symmetrically at the sides of the bulb adapter.

Other objects and advantages of the invention will appear to those skilled in the art to which it appertains as the description proceeds, both by direct recitation thereof and by implication from the context.

Referring to the accompanying drawing, in which like numerals of reference indicate similar parts throughout the several views:

Fig. 1 is a side view of the centering device of my invention symmetrically affixed about a bulb adapter of a conventional miniature lamp sealing head assembly and showing the miniature lamp bulb and mount being loaded into the bulb adapter;

Fig. 2 is a side view, partially in section, of the sealing head assembly of Fig. 1 and showing the mount and bulb of Fig. 1 loaded in the bulb adapter and an exhaust tube in a holder mechanism ready for sealing;

Fig. 3 is a view of the sealing head of Fig. 1, along line III—III, in the direction of the arrows;

Fig. 4 is a perspective view of the bulb adapter and the centering device of my invention;

Fig. 5 is a side view of the sealed lamp; and

Fig. 6 is a schematic diagram of a 16 head butt sealing machine.

Referring to the drawing and, more particularly, to Figs. 1 and 2, a rotatable sealing head assembly is designated by the reference numeral 10. This sealing head assembly 10 comprises a sealing head shaft assembly 12, a sealing head 14 located on said shaft assembly, a magnetic centering device 16 of my invention about said head 14 and an exhaust tube holder mechanism 18 on said head assembly 10.

Sealing head shaft assembly

This sealing head shaft assembly 12 may consist, as shown in the present embodiment, of a partially hollow shaft 20 slidable in a sleeve 22, and about said sleeve a platform 24 and a driven gear 26 for rotating the head assembly 10. Between platform 24 and gear 26 on shaft 20 is the indexing table 28 of a butt sealing machine (not shown) for supporting the sealing head assembly 10 and having a bushing 30 about sleeve 22 of shaft 20.

This shaft 20 (Fig. 2) has a reduced portion 31

at its upper end on which is fitted the sealing head 14, and an axial pocket 32 opening upwardly and extending substantially $\frac{2}{3}$ of its length to close proximity with the lower surface of table 28. The bottom of shaft 20 rests on a cam track 34 which controls the vertical travel of head assembly 10 with respect to gear 26 and table 28. Near the lower portion of pocket 32, an annular groove 36 having a length slightly greater than the vertical travel of the sealing head assembly 10, is connected to pocket 32 by radial holes 38 cut through the wall of shaft 20 between groove 36 and pocket 32. Below the bottom of pocket 32, and adjacent driven gear 26, a vertical keyway 39 having a length similar to that of groove 36 is provided in the outer surface of shaft 20, for receiving the inner end of a set screw of driven gear 26, as hereinafter explained.

The sleeve 22 extends about shaft 20 substantially the combined depths of platform 24, gear 26 and table 28. It provides bearing surface for the head assembly 10 which is vertically slidable therein by means of cam track 34. When the sealing head assembly 10 is in the loading position of Fig. 2, and at the lowest point of its vertical travel, a groove 40 provided in the outer surface of sleeve 22 is juxtaposed near the bottom of groove 36 in shaft 20. Radial holes 42 cut through the wall of sleeve 22 from groove 40 connect said groove 40 to the groove 36 in shaft 20.

The platform 24, as shown in Fig. 2, suitably circular in plan and T-shaped in vertical section, has a hole 25 near its periphery for mounting exhaust tube holder mechanism 18, as hereinafter explained. It is secured to sleeve 22 by means of a screw 44. The platform rotates on the upper surface of the abutting indexing table 28.

The driven gear 26 for rotating sealing head assembly 10, as shown in Fig. 2, abuts the lower surface of table 28 on shaft 20 and has an appropriate inverted T-shaped vertical cross section. A screw 48 extending through the vertical or shank portion of gear 26 is keyed into keyway 39 in shaft 20, thereby locking gear 26 to shaft 20 and permitting vertical travel of head assembly 10 with respect to gear 26 and table 28. Table 28 contains a vacuum line 46 which registers with groove 40 in sleeve 22 for evacuating the pocket 32 of the shaft 20 as hereinafter described.

Sealing head

The sealing head 14 comprises a cylindrical lower portion or hollow supporting member 50 which is supported on the reduced upper end portion 31 of shaft 20, and a bulb adapter or holder 52 of suitable non-magnetic material, such as brass. This holder 52 has a straight-sided upper portion 53 and a flanged bottom portion 54 which is press-fitted into an axial cavity 56 in the lower portion 50 of the head 14.

The upper end of section 53 has a bulb cavity 58 with an axially conical upwardly opening pocket 59 for centering a bulb 60 loaded with a mount 62. External portions 64 of leading-in conductors 66 of the mount 62 are pre-formed before loading. The top edge of upper portion 53 of the holder 52, is suitably beveled downwardly at approximately 45° to conform to the pre-formed external portions 64 of conductors 66. An axial hole 68 in the finage-like bottom portion 54 of holder 52 extending into upper portion 53 acts as a continuation of pocket 32 in shaft 20. Four vertical holes 70, one arranged

axially and three arranged in spaced circular sequence in the present showing of Fig. 3, connect the pocket 59 of bulb cavity 58 with hole 68.

Magnetic centering device

As shown in Figs. 2, 3 and 4, and more particularly in Fig. 3, the magnetic centering device 16 of my invention consists of a permanent magnet member 72 and a balancing member 74. This member 72, as shown in Fig. 4, has a body 76 of general semi-cylindrical configuration, cast with two diametrically opposed permanent magnet centering tips 78 which project above its upper surface near the open end of the body. Both the body 76 and the tips 78 are suitably "Alnico," the trade name for a permanent magnet alloy material having the following approximate composition:

Metal	Composition Percentage
aluminum.....	11-13%.
nickel.....	19-23%.
cobalt.....	4.5-5.5%.
iron.....	the balance.

The outside diameter of body 76 and tips 78 conforms to the outside diameter of the lower portion 50 of head 14. The vertical inside surfaces of tips 78 are straight and parallel to the adjacent sides of upper portion 53 of head 14 with an air space therebetween for preventing conduction of heat from adapter 52 to tips 78. The top of tip 78 is tapered downwardly at the same angle as the upper edge of adapter 52, but it projects above said edge of adapter 52 to prevent contact between the external portions 64 of conductors 66 and said adapter edge. As shown in Fig. 3, these tips 78 have a frusto-sector shaped horizontal cross section tapering inwardly toward the center of the axis of the magnetic centering device 16. Both tips 78 are supported on each vertical side by a non-magnetic support 80, suitably of brass. These supports which are cast to the body 76 and the tips 78 conform in configuration to the tips 78 and facilitate centering of the lead-in conductor 66 on tips 78, as hereinafter explained.

The magnetic member 72 is secured to the flange of the bottom portion 54 of holder 52 by means of screws 82 (Fig. 4). Washers 84 (Fig. 1) on screws 82 between body 76 and member 72 and said flange provide an air space therebetween to impede heat conduction to magnetic member 72.

The balancing member 74 (Figs. 3 and 4) suitably a non-magnetic material such as brass is similar in shape to body 76 of magnetic member 72 and is weighted to balance the magnetic centering device 16 about the axis of sealing head assembly 10 as said assembly rotates on the sealing machine. It is secured to the flange of lower portion 54 of holder 52 by a screw 82 (Fig. 3). A suitable air space between adjacent surfaces of body 76 and member 74 is provided to eliminate heat conduction. Flat baffles 85 (Fig. 2), of suitable non-magnetic material, such as brass, may be mounted above the centering tips 78 and below the plane of the sealing fires (not shown) to protect the tips from the fires.

Exhaust tube holder mechanism

The conventional exhaust tube holder mechanism 18 (Fig. 2) has a vertical shaft 86, machined at its lower end to fit the hole 25 in platform 24 and is secured therein by a screw 87. On the

upper end of shaft 86 are a pair of rotatable gears 88 each having a tubulation holder arm 90 extending therefrom. In Fig. 2, only one of the gears 88 with its arm 90 is shown. These arms are held in compression by a spring 92. The forward ends of arms 90 have semi-circular recesses (not shown) for securing a tubulation 94 therein, as shown in Fig. 2, and for aligning said tubulation with the neck of the bulb 60, a predetermined distance thereabove.

Butt sealing machine

It will be understood that a conventional butt sealing machine, for example, a 16 head machine, as shown schematically in Fig. 6, has 16 heads similar to sealing head assembly 10. At the front of the machine, the bulb 60 and mount 62 are loaded as hereinafter explained. At station number 1 or 2 a positioning finger (not shown) pushes bulb 60 into bottom pocket 59 of bulb cavity 58, and the vacuum line is opened. Tubulation 94 is loaded into holder mechanism 18, in station 3. At the fourth station or port, the neck of bulb 60 is straightened and tubulation 94 is pushed down to a predetermined position above the neck of bulb 60. In station 5 the cam track 34 raises the bulb 60 and the mount 62 into contact with the bottom portion of tubulation 94. In stations 6 through 13 the sealing head assembly 10 is rotated by means of driven gear 26 and stationary sealing fires are applied to the parts in gradually increasing temperature steps for sealing the tubulation, mount, and bulb together. In station 14 the sealing head assembly 10 ceases to rotate and head 10 is lowered by cam track 34, thereby pulling down the mount and bulb and forming a constriction in the tubulation above the seal as shown in Fig. 5. The sealed lamp is automatically unloaded in station 15 and the bottom portion 59 of cavity 58 in bulb adapter 52 is flushed in station 16 to remove broken particles of glass and dirt therefrom.

Operation

According to my invention, the butt sealing machine is loaded in the No. 1 and No. 2 stations by inserting an inverted bulb 60 into bulb cavity 58 of the head 14 with the bulb dome resting in the bottom pocket 59 of said cavity. The mount 62 having external portions 64 of leading-in conductors 66 pre-formed at the desired 45° angle from the mount axis is inserted into bulb 60 with the bends in the conductors 66 resting on the bulb neck. The additional surface provided on each side of tips 78 by supports 80 keep the external portions 64 of conductors 66 in the plane of tips 78 and said portions 64 are positioned automatically by the magnetic tips 78 without undue operator manipulation. The external portions 64 are positioned and securely held on centering tips 78 by the magnetic force, the permanent magnet tips 78 exert on the conductors 66 as well as the gravitational force exerted by the mount 62 on the bulb neck.

The bulb is securely aligned and held by a vacuum created by the vacuum line pumping through holes 70 and 68 in bulb adapter 52; pocket 32, holes 38 and groove 36 in shaft 20; holes 42 and groove 40 in bushing 22; and vacuum line 46. As the external portions 64 are unsupported between tips 78 and the bulb neck, the action of the positioning finger in station 3 combined with the magnetic force causes a sag and a resultant spring action in the unsupported

length, thereby firmly pressing the bulb 60 against the bottom pocket 59 of bulb cavity 58 and maintaining the bulb 60 and mount 62 in this position during the remainder of the sealing operation, despite the vibration of head assembly 10 due to rotation or other causes.

Thus it will be seen from the foregoing description that I have achieved a magnetic centering device 16 for a sealing head assembly 10 employing the force of magnetism in addition to the force of gravity to center the mount relative to the bulb during the sealing operation. This magnetic centering device has a permanent magnet centering tip 78 located symmetrically at the sides of the bulb adapter 52 of the sealing head 14.

Although a preferred embodiment of my invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims.

I claim:

1. A sealing head assembly for a butt sealing machine having a rotatable indexing table, and comprising: a sealing head shaft assembly supported on said table, said sealing head shaft assembly consisting of a sleeve fixed to said table, a partially hollow shaft rotatable and vertically reciprocable in said sleeve, a platform on said sleeve above said table, and a driven gear on said sleeve and keyed to said shaft below said table; a sealing head on said shaft, said sealing head comprising a lower hollow supporting member on the upper end of said shaft, a non-magnetic bulb holder having a flanged bottom portion provided with a hole therethru and fitted into the hollow portion of said supporting member and an upper portion provided with a bulb cavity, a conical upwardly opening pocket for centering a bulb therein and a plurality of holes connecting said pocket with the hole of said flanged bottom portion; an exhaust tube holder mechanism on said platform, a magnetic centering device on and about said head, means for rotating and vertically reciprocating said sealing head with respect to said table, and means for evacuating said hollow shaft and to apply vacuum to said bulb holder.

2. A sealing head assembly for a butt sealing machine having a rotatable indexing table, and comprising: a sealing head shaft assembly supported on said table, said sealing head shaft assembly consisting of a sleeve fixed to said table, a partially hollow shaft rotatable and vertically reciprocable in said sleeve, a platform on said sleeve above said table, and a driven gear on said sleeve and keyed to said shaft below said table; a sealing head on said shaft, said sealing head comprising a lower hollow supporting member on the upper end of said shaft, a non-magnetic bulb holder having a flanged bottom portion provided with a hole therethru and fitted into the hollow portion of said supporting member and an upper portion provided with a bulb cavity, a conical upwardly opening pocket for centering a bulb therein and a plurality of holes connecting said pocket with the hole of said flanged bottom portion; an exhaust tube holder mechanism on said platform, said exhaust tube holder mechanism comprising a vertical tube holder shaft secured at one end to said platform, a pair of rotatable gears on the upper end of said tube holder shaft, and a spring-biased tubulation holder arm extending from each of said gears provided with recesses in their outer ends for securing a tubulation therein; a magnetic centering device on and about said head, means for rotating and

vertically reciprocating said sealing head with respect to said table, and means for evacuating said hollow shaft and to apply vacuum to said bulb holder.

3. A sealing head assembly for a butt sealing machine having a rotatable indexing table, and comprising; a sealing head shaft assembly supported on said table, said sealing head shaft assembly consisting of a sleeve fixed to said table, a partially hollow shaft rotatable and vertically reciprocable in said sleeve, a platform on said sleeve above said table, and a driven gear on said sleeve and keyed to said shaft below said table; a sealing head on said shaft, said sealing head comprising a lower hollow supporting member on the upper end of said shaft, a non-magnetic bulb holder having a flanged bottom portion provided with a hole therethru and fitted into the hollow portion of said supporting member and an upper portion provided with a bulb cavity, a conical upwardly opening pocket for centering a bulb therein and a plurality of holes connecting said pocket with the hole of said flanged bottom portion; an exhaust tube holder mechanism on said platform, said exhaust tube holder mechanism comprising a vertical tube holder shaft secured at one end to said platform, a pair of rotatable gears on the upper end of said tube holder shaft and a spring-biased tubulation holder arm extending from each of said gears provided with recesses in their outer ends for securing a tubula-

tion therein, a magnetic centering device on and about said head, said magnetic centering device comprising a permanent magnet member about said bulb holder, secured to said flanged bottom portion of said sealing head, said permanent magnet member having a body provided with an open end and two diametrically opposed permanent magnet centering tips projecting above the upper surface of said permanent magnet member and said bulb holder at the open end of said body and a non-magnetic support on either side of each of said tips, said tips and said supports tapering downwardly from the center of the axis of said device for support and engagement thereon of the outer portions of lead-in conductors, and a non-magnetic balancing member secured to said flanged bottom portion of said sealing head and weighted to balance the magnetic centering device about the axis of said sealing head assembly as said assembly rotates on the sealing machine, means for rotating and vertically reciprocating said sealing head with respect to said table, and means for evacuating said hollow shaft and to apply vacuum to said bulb holder.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,716,167	Grogan	June 4, 1929
2,549,359	Bakanau	Apr. 17, 1951