March 8, 1955 G. E. CHILDS 2,703,523

ETCHING DEVICE FOR INCANDESCENT AND DISCHARGE LAMP SEALING AND EXHAUST MACHINES

Filed Feb. 26, 1954 3 Sheets-Sheet 1

Fig. 1.

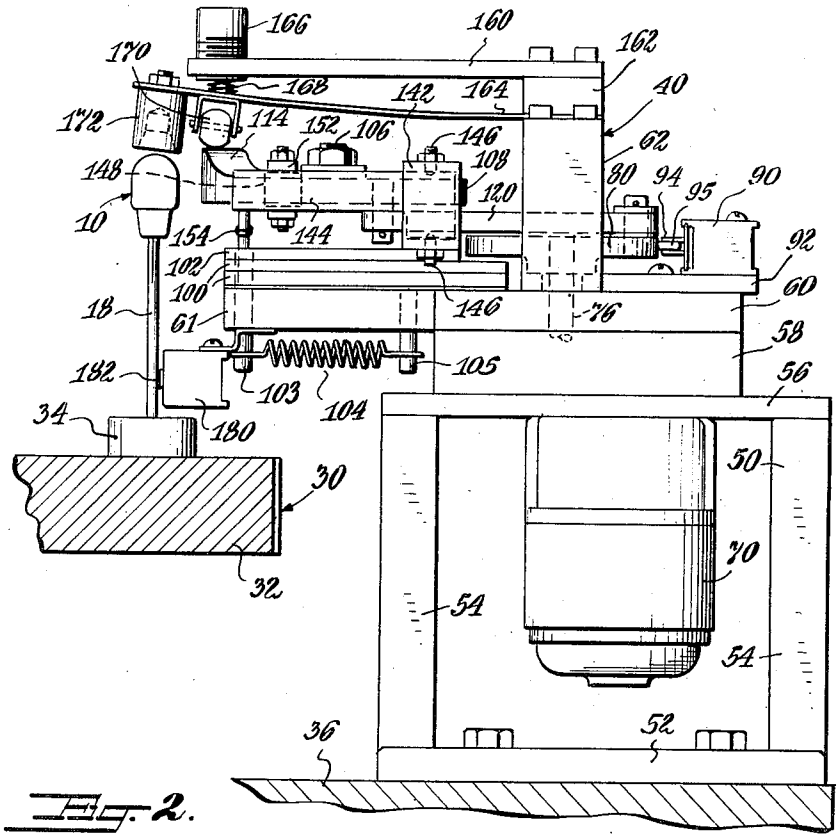
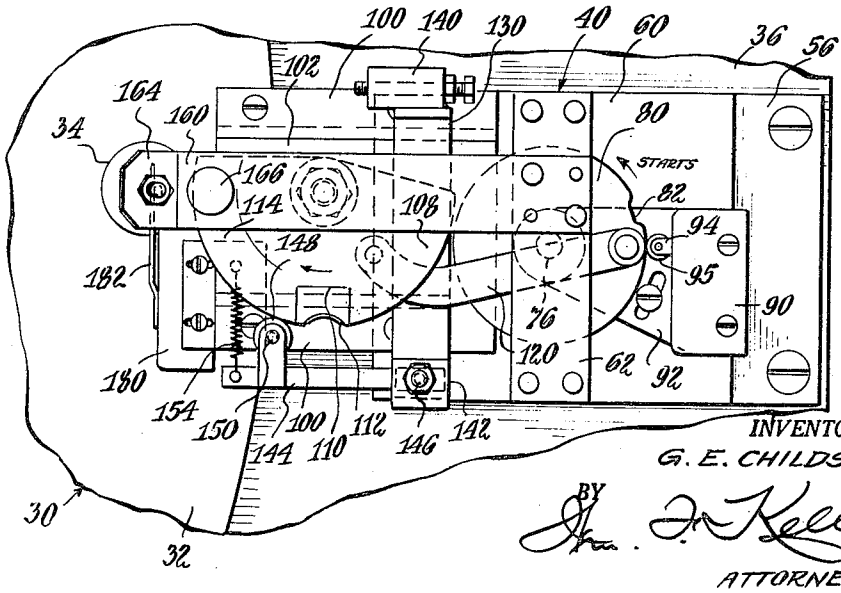


Fig. 2.



INVENTOR.
G. E. CHILDS.
BY
ATTORNEY.

March 8, 1955 G. E. CHILDS 2,703,523

ETCHING DEVICE FOR INCANDESCENT AND DISCHARGE LAMP SEALING AND EXHAUST MACHINES

Filed Feb. 26, 1954 3 Sheets-Sheet 2

Fig. 3.

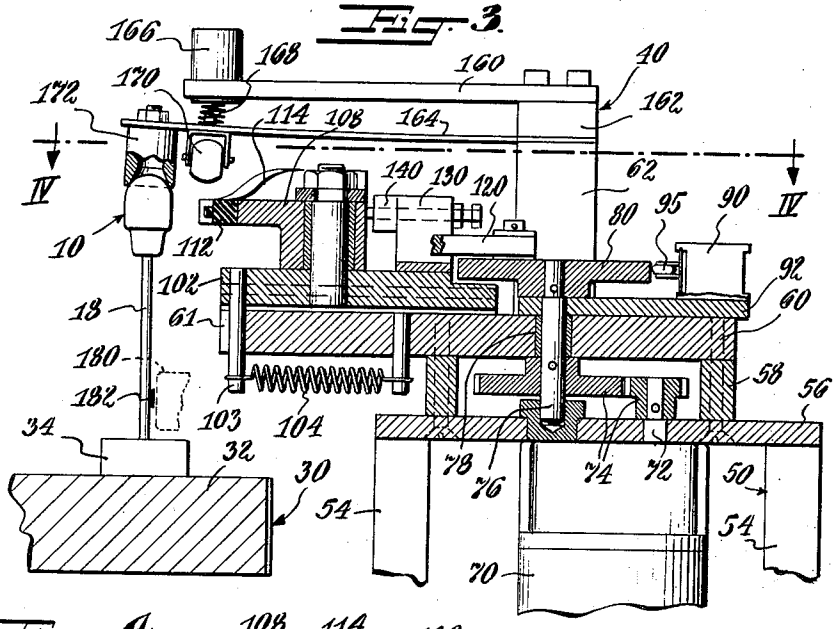


Fig. 4.

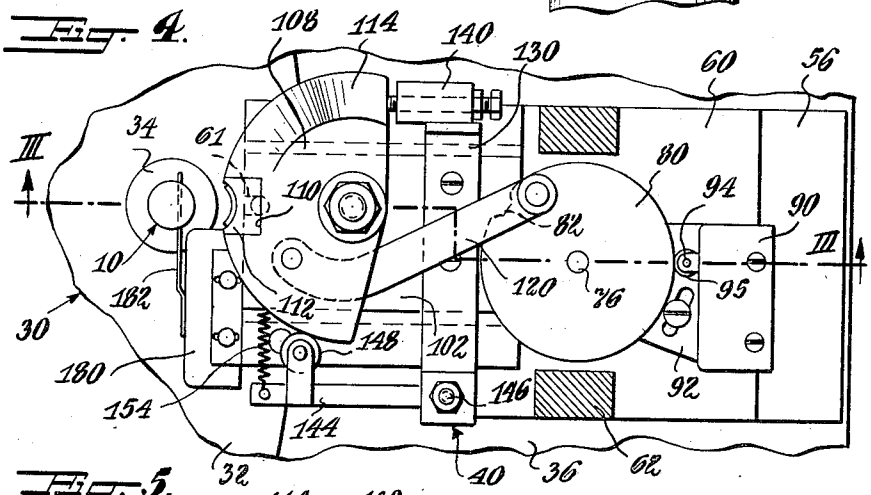
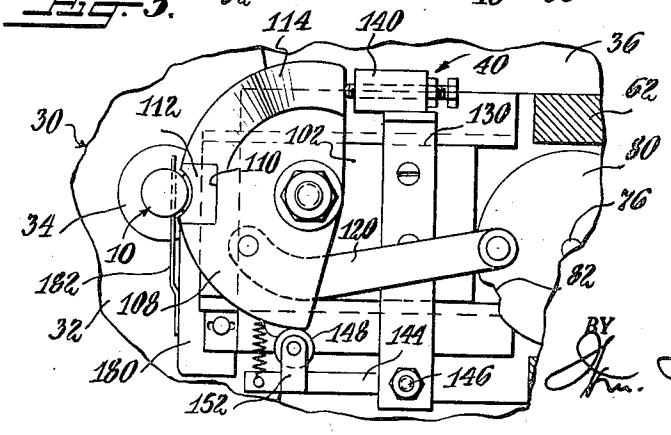


Fig. 5.



INVENTOR.
G. E. CHILDS
BY
ATTORNEY.

March 8, 1955 G. E. CHILDS 2,703,523

ETCHING DEVICE FOR INCANDESCENT AND DISCHARGE LAMP SEALING AND EXHAUST MACHINES

Filed Feb. 26, 1954 3 Sheets-Sheet 3

Fig. 6.

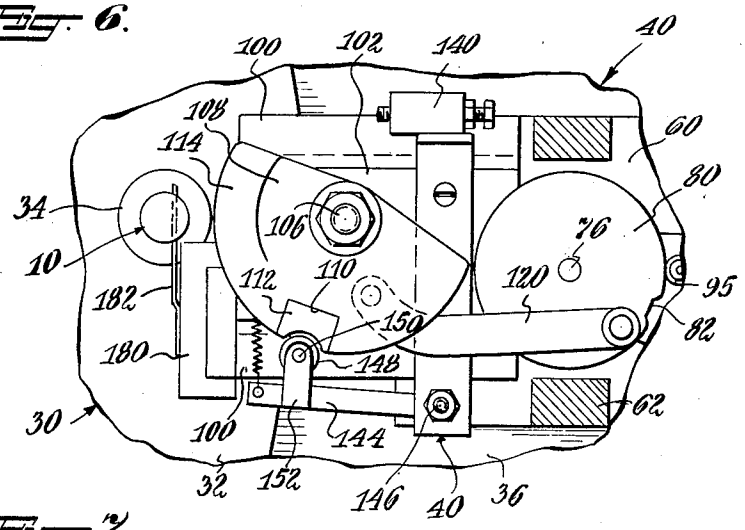


Fig. 7.

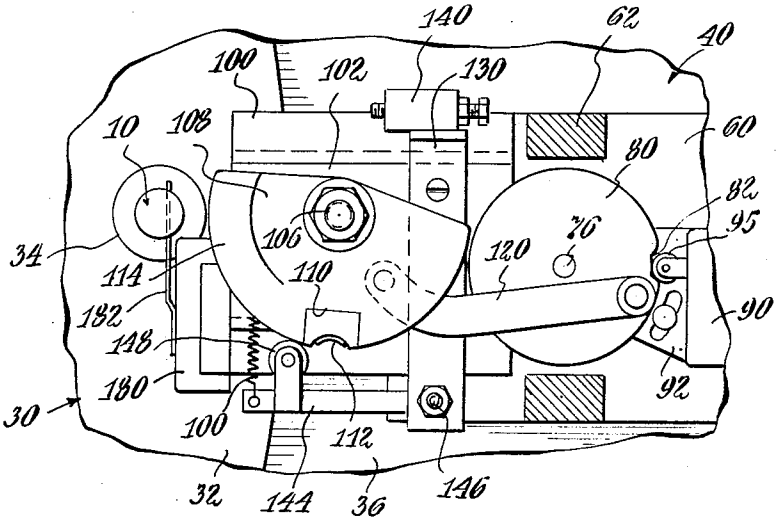


Fig. 8.

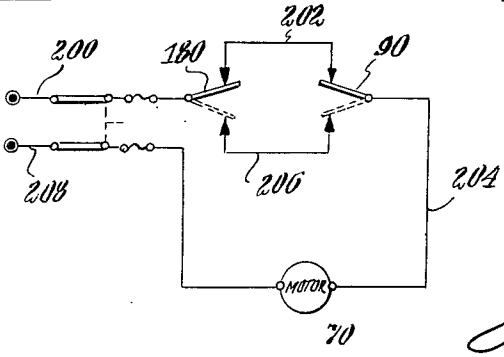
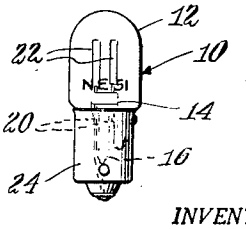


Fig. 9.



INVENTOR.
G. E. CHILDS
BY
ATTORNEY.

United States Patent Office 2,703,523 Patented Mar. 8, 1955

2,703,523

ETCHING DEVICE FOR INCANDESCENT AND DISCHARGE LAMP SEALING AND EXHAUST MACHINES

Gordon E. Childs, Fairmont, W. Va., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application February 26, 1954, Serial No. 412,794

2 Claims. (Cl. 101—44)

The present invention relates to incandescent and discharge lamp sealing and exhaust machines and, more particularly, to an automatic etching device for such a machine.

Although the etching device of the invention may be employed with any incandescent lamp or discharge lamp sealing or exhaust machine for illustrative purposes solely, the invention will be described for use with a glow discharge lamp exhaust machine.

Glow discharge lamps are often used in the operating circuit of electrical devices (such as sensitive industrial machinery, inspection equipment and electrical appliances) to show whether or not the circuit is alive; to give an indication of the operation of the automatic machinery; to indicate the setting of a machine or the arrangement of the controls. These glow discharge lamps in which the light is generated by a discharge of electricity through a gas, for example neon, are especially satisfactory when visual indication is required.

In the past, the marking for identification of the lamp type on the relatively small glow discharge lamp envelope has been applied by an operator employing a hand operated jig.

Hence, it has been found advantageous according to the invention to provide an automatic etching device for a lamp sealing or exhaust machine which will automatically mark the lamp type identification on the lamp envelope.

Although automatic etching devices have been employed in the past, the etching device of the invention differs in construction and operation from those of the prior art. Examples of the prior art etching devices are found in U. S. Patent No. 1,992,037, entitled "Apparatus for Stamping Articles Having Curved Surfaces," issued to C. A. H. Mulder and assigned to General Electric Co.; U. S. Patent 2,201,302, entitled "Printing Device," issued to F. S. Rowe and assigned to the assignee of the subject application; U. S. Patent 2,489,259, entitled "Article Comprising and Method of Placing Indicia Thereon," issued to C. E. Bechard and assigned to General Electric Co.

The etching device of the invention has a rubber stamp containing the desired marking mounted in a sector. The sector in turn is pivoted on a slide which can move in and out toward the lamp to be marked. The top face of the sector carries a cam profile which lowers a centering guide by means of a tensioning spring and roller, as the sector rotates. The slide is retarded, except at the moment of marking the lamp, by a slide spring.

An inking roller carried on a roller arm is held against the radial face of the sector by a roller arm spring. This radial face of the sector is used as an inking plate, and the roller, in traversing it (as the sector rotates) picks up a fresh supply of etching ink and transfers it to the stamp. The device may be powered by a small electrical motor and reduction gears which drive a crank wheel. This crank wheel has a recess in its radial face which actuates a crank wheel microswitch and is linked to the sector by a connecting rod.

As the exhaust machine, for example indexes, a lamp is brought under the centering guide by the turret. The exhaust tube of the lamp depresses an exhaust tube microswitch completing a circuit through the crank wheel microswitch to a drive motor which starts turning the crank wheel and revolves the sector. When the sector has rotated about 30° the centering guide drops down over the lamp to be marked, centering the lamp and also

supporting it against the subsequent pressure of the marking stamp. The sector continues to rotate about 60° further until the stamp is lined up with the lamp to be marked. At this point, the leading edge of the sector comes up against a sector stop, which prevents further rotation of the sector. Since the crank throw on the crank wheel is greater than required to produce the above rotation of the sector, further rotation of the crank wheel forces the slide out against the pressure of the slide spring. This presses the stamp into the lamp bulb, and applies the desired etch thereto. The crank wheel continues past the outer dead center, allowing the slide spring to retract the slide. When this has been accomplished, reverse rotation of the sector takes place and the cam face on the top of the sector lifts the centering guide off the lamp bulb. When the follower on the crank wheel microswitch drops into the recess on the crank wheel, the circuit to the motor is broken and the mechanism comes to rest.

During the 90° rotation of the sector, the inking roller has traversed the radial face of the sector, picking up a fresh coating of etching ink which is deposited on the stamp during the return rotation of the sector.

As the exhaust machine indexes, the exhaust tube of the glow lamp is carried off the exhaust tube microswitch, thus again completing the circuit to the motor through the crank wheel microswitch. This causes the crank wheel to rotate a slight amount until the roller follower on the crank wheel microswitch climbs out of the recess on the radial face of the crank wheel, thus breaking the circuit to the motor again. The mechanism is now set to begin a new cycle when the exhaust tube microswitch is depressed by the exhaust tube of the next lamp.

The etching device of the invention produces a single cycle of the etching operation for each lamp to be marked. The device synchronizes itself with the exhaust or sealing machine without the necessity for a direct connection to the exhaust machine drive. In the event a lamp is missing, the etching device will not cycle, thus preventing the accumulation of an excessive amount of ink on the etching stamp.

In its general aspect the present invention has as its objective an improved automatic etching device for an incandescent or discharge lamp sealing or exhaust machine.

A specific object of the present invention is an etching device which produces a single cycle of etching operation for each lamp to be marked.

A further object is an etching device which synchronizes itself with an exhaust or sealing machine without having direct connection to the drive of said machine.

An additional object is an etching device which will not cycle when a lamp is missing from a head of an exhaust or sealing machine and thus prevents the accumulation of excessive amounts of ink on the etching stamp.

Other objects of the present invention will become apparent to those skilled in the art to which it appertains as the description thereof proceeds, both by direct recitation thereof and by implication of the context:

In the drawings in which like numerals of reference indicate similar parts throughout the several views:

Fig. 1 is a side elevational view of the etching device of the invention showing a lamp carrying head just indexed into the etching station of said machine and the actuating of the exhaust tube microswitch by the tubulation of the lamp.

Fig. 2 is a top elevational view of the etching device of Fig. 1 showing the position of the parts at the start of the etching cycle.

Fig. 3 is a vertical sectional view of the etching device along the line III—III of Fig. 4 in the direction of the arrows and showing the crank wheel moved approximately 120° from the starting position and the slide and etching stamp ready to move forward for the etching operation.

Fig. 4 is a horizontal sectional view of the etching device of Fig. 3 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 etching device

in the bulb etching position and showing the position of the parts after the crank wheel has rotated about 180° from the starting position.

Fig. 6 is a top elevational view of the etching device and showing the crank wheel approximately 315° from the starting position and the inking roller in the stamp inking position.

Fig. 7 is a view similar to Fig. 6 and showing the crank wheel rotated approximately 345° from the starting position and the crank wheel microswitch in engagement with a lowered face portion of the crank wheel.

Fig. 8 is a diagrammatic wiring diagram of the etching device.

Fig. 9 is a side elevatonal view of a glow discharge lamp which has been etched by the device of the invention.

Lamp

Referring now to the drawings and particularly to Fig. 9, the reference numeral **10** designates a glow discharge lamp. This lamp **10** has an envelope **12** and an electrode mount **14** sealed thereto. The electrode mount **14** may comprise a vitreous stem **16** having an exhaust tubulation **18** (Figs. 1 and 3), leading-in and supporting conductors **20** sealed through said stem and electrodes **22** carried on the inner ends of said leading-in and supporting conductors **20**. As shown in Fig. 9, the sealed exhausted lamp **10** may be provided with a base **24** secured about the seal with conventional cement.

Exhaust machine

Although an exhaust machine **30** (Figs. 1 through 7) has been fragmentarily associated in the drawings with an etching device **40** of the invention, it will be understood that the etching device **40** is not restricted in its use solely to exhaust machines. The etching device **40** may be employed equally as well with any incandescent lamp or glow discharge lamp sealing or sealex machine.

As shown in Figs. 1 through 7, the exhaust machine **30** has a rotatable turret **32** for carrying a plurality of heads **34** through a like number of work stations, and a stationary table or frame portion **36**. At station 1 of the exhaust machine **30**, a glow discharge lamp **10** may be loaded by manual or automatic means into an exhaust head **34**. At station 2, for example, the lamp **10** may be etched by the etching device **40** of the invention.

Etching device frame

The etching device **40** has a frame **50** which in the showing in Figs. 1 and 3 may comprise a lower plate **52** for securement to the stationary table **36** of the machine **30**, a plurality of columns or mount rods **54** upstanding from the lower plate **52** and an upper plate **56** carried on the upper ends of the rods **54**. A hollow reduction gear box **58** (Figs. 1 and 3) carried on the upper plate **56** supports a horizontal slide mounting plate **60** which extends substantially beyond the upper plate **56**. The left hand end (when viewed in Figs. 1 through 7), of the slide mounting plate **60** is provided with a vertical anchor pin clearance slot **61** which also serves as a stop for limiting the recovery motion of a slide **102**, as hereinafter explained. Suitably adjacent the mid-portions of the slide mounting plate **60** and the gear box **58**, an inverted generally U-shaped bulb holder or centering guide bridge **62** is upstanding from the slide mounting plate **60**.

Etching device drive

Driving means **70** for the etching device **40** (Figs. 1 and 3) may comprise a fractional horsepower motor suitably affixed to the underside of the top plate **56** of the frame **50**. As shown particularly in Fig. 3, a drive shaft **72** extends through the upper plate **56** and is connected by suitable reduction gearing **74** to a vertical crank wheel shaft **76**. This vertical shaft **76** is suitably journalled in a lower bushing (Fig. 3) carried by the upper plate **56** and a sleeve type bushing **78** secured within the slide mounting plate **60**. The crank wheel shaft **76** extends through the slide plate **60** and carries on its upper end a crank wheel **80**, whose outer periphery also serves as a microswitch cam. As shown in Figs. 1 through 7, the crank wheel **80** is generally cylindrical in shape and its outer periphery is provided with a recess or lowered portion **82** for use with a crank wheel microswitch **90**, as hereinafter explained.

Crank wheel microswitch

The crank wheel microswitch **90** may be suitably mounted on an adjustable microswitch mounting plate **92** carried by the right end portion (when viewed in Figs. 1 and 3) of the slide mounting plate **60** and pivoted on the crank wheel shaft **76**. By pivoting the plate **92** on the shaft **76** the switch **90** may be radially adjusted with respect to the recess **82** of the crank **80**. This microswitch **90** shown in Figs. 1 through 7 has a movable roller arm **94** which carries a roller **95** thereon for engagement with the outer periphery of the crank wheel **80**.

Slide

The left hand portion (when viewed in Figs. 1 through 7) of the slide mounting plate **60** carries a pair of longitudinal slide guides **100**. The slide **102** is suitably dovetailed into the guides **100** and is horizontally reciprocable therein, as hereinafter explained. The left hand end of the slide **102** (when viewed in Figs. 1 and 3) carries a depending anchor pin **103** which extends through and substantially beyond the anchor pin slot **61** in the slide mounting plate **60**. Slide recovery means **104** extend between the anchor pin **103** and an anchor pin **105** depending from the underside of the slide mounting plate **60**. This recovery means **104** may, in the showing of Figs. 1 and 3, comprise a suitable spring.

A stationary sector shaft or pivot pin **106** is carried by, and is upstanding from, the slide **102**. A sector **108** is suitably journalled by means of bushings (Fig. 3) on the pin **106**. This sector **108** is retained on the upper threaded end of the pivot pin **106**, as by a nut, shown particularly in Figs. 1 through 7.

Sector

The sector **108** is a generally semi-cylindrical plate having a stamp recess **110** cut in its outer generally semicircular periphery for the mounting therein of a suitable stamp **112** for marking the identification of a lamp type on the relatively small glow discharge lamp envelope **12**. The right hand end portion (when viewed in Figs. 2 through 7) of the periphery of the sector **108** serves as an inking plate and carries a supply of suitable etching ink for use as hereinafter explained. The left hand end of the top face of the sector **108** carries an inclined bulb holder or centralizing guide cam or profile **114** for use as hereinafter explained. An arcuate connecting rod **120** joins the sector **108** to the crank wheel **80**.

Sector stop and inking roller arm

A generally U-shaped mounting bracket **130** is carried by the right hand end of the slide **102** (when viewed in Figs. 1 and 3) suitably between the sector pin **106** and the bulb holder bridge **62**. The vertical arms of the bracket **130** may handily extend beyond the slide **102**. The horizontal portion of the bracket **130** is sufficiently thin to permit clearance between the connecting rod **120** and itself.

When viewed in Figs. 2 and 4, the upper vertical arm of the mounting bracket **130** carries an adjustable sector stop **140**. The bottom vertical arm (when viewed in Figs. 2 and 4) carries a horizontal pivot pin mounting plate **142** which extends inwardly toward the slide **102**. A horizontal inking roller arm **144** is suitably pivotable on a vertical pivot pin or shaft **146** extending between the plate **142** and the horizontal portion of the mounting bracket **130**. As shown particularly in Figs. 2 and 4, the inking roller arm **144** carries an inking roller **148**. The roller **148** may be mounted on a vertical pin or shaft **150** journalled within arms **152** extending inwardly from the inking roller arm **144** toward the sector **108**. Suitable compression means **154** are provided to maintain the roller **148** in engagement with the periphery of the sector **108**. The means **154** may comprise a roller arm spring extending from an anchor pin upstanding from the slide **102** and another anchor pin depending from the outer portions of the inking roller arm **144**.

Bulb holder or centering guide

As shown particularly in Figs. 2 and 4, a horizontal bulb centering guide stop arm **160** is mounted on a spacer block **162** (Fig. 1), carried on the horizontal member of the bridge **62**. A resilient bulb centering guide arm **164** is secured between the spacer block **162** and the horizontal member of the bridge **62**. The outer end of the guide

stop arm **160** is provided with a tensioning spring adjusting member **166**, which in the instant showing of Figs. 1 and 3 may comprise a headed bolt threadable in the stop arm **160** and carrying a depending spring **168**, the lower end of which is in engagement with the flexible bulb centering guide arm **164**.

Suitably below the member **166** the resilient guide arm **164** is provided with a bulb centering guide roller **170** which is maintained in engagement with the bulb centering guide cam **114** on the sector **108** by the adjustable member **166**. The outer or left hand end (when viewed in Figs. 1 through 7) of the resilient guide arm **164**, carries an inverted cup-like bulb holder or centering guide **172**, suitably contoured to engage and hold the dome of the envelope **12** of the glow discharge lamp **10** in an axial position and to prevent breakage of the exhaust tubulation **18** during the etching operation.

Exhaust tube microswitch

An exhaust tube microswitch **180** may be mounted by means of a suitable bracket (Fig. 1) to the left hand end portion of the bottom face of the slide mounting plate **60**. This switch **180** has a laterally extending tubulation engaging arm **182** (Figs. 2 and 4) for use as hereinafter explained.

Circuit

The operating circuit of the etching device **40**, shown diagrammatically in Fig. 8, has a line **200** extending from one side of a suitable supply through a suitable fuse to one side of the exhaust tube switch **180**. A line **202** connects the other side of the switch **180** to the crank wheel switch **90** when both are in their "up" position, shown in Fig. 8. A line **204** connects the other side of the crank wheel switch **90** to the motor **70**. The "down" positions, shown by the dotted lines (Fig. 8), of the switches **90** and **180** are connected by a line **206**. A line **208** connects the other side of the supply through a suitable fuse to the other side of the motor **70**.

Operation

As a head **34** of the exhaust machine **30** indexes from station 1, the lamp loading station, into station 2, the bulb etching station, the tubulation **18** of the lamp **10** engages the contact arm **182** of the exhaust tube switch **180**, depressing the arm **182** and moving the switch **180** into the "up" position shown in Fig. 8.

It will be understood, as shown in Fig. 2, that the roller **95** of the crank wheel switch **90** (at the start of the etching cycle) is in engagement with the raised portion of the periphery of the crank wheel **80** and that the switch **90** is in the "up" position, shown in Fig. 8.

A closed circuit exists through the conductor **200**, exhaust tube switch **180**, conductor **202**, crank wheel switch **90**, conductor **204**, motor **70** and conductor **208**. The motor **70** is energized and the crank wheel **80** and the sector **104** rotate in a counterclockwise and clockwise direction respectively from the positions shown in Fig. 2.

During the first approximately 120° of counterclockwise rotation of the crank wheel **80** and clockwise rotation of the sector **108** (Figs. 3 and 4), the inking roller **148** rides over the rubber stamp **112**, applying ink thereto, and over the inking plate portion of the periphery of the sector **108**, picking up ink therefrom. Simultaneously, the bulb centering guide roller **170** on the resilient bulb centering guide arm **164** rides down the inclined cam **114** on the other side of the sector **108**. The dome of the envelope **12** of the lamp **10** is secured within the bulb holder **172**, as shown in Figs. 3 and 4. It will be also understood that the leading edge of the sector **108** is now in engagement with the sector stop **140** and the etching stamp **110** is aligned with the envelope **12** of the lamp **10**.

Further rotation of the crank wheel **80** in a counterclockwise direction will cause the sector **108** to force the slide **102** to move to the left, when viewed in Figs. 3 through 5, against the pressure of the slide spring **104**. Since the sector **108** is restrained from further rotation by the stop **140**, the connecting rod **120** forces the slide **102** and the sector **108** and stop **140** to move to the left (when viewed in Fig. 5) to imprint lamp type identification marking on the envelope **12** of the lamp **10**.

The crank wheel **80** is rotated further from the position shown in Fig. 5 to the position shown in Fig. 6, approximately 330° from its starting position. Since the crank wheel has moved past the dead center, the recovery spring **104** has returned the slide **102** and the sector **108** and the stop **140** carried thereon to its position, shown in Fig. 4. The connecting rod **120** then reverses the former rotation of the sector **108** and rotates the sector **108** in a counterclockwise direction from position shown in Fig. 5, to the position shown in Fig. 6 where the rubber stamp **112** again engages the inking roller **148**.

Simultaneously, the guide roller **170** on the resilient bulb centering guide arm **164** rides up the inclined cam **114** on the sector **108**, thus raising the bulb holder **172** above the envelope **12** of the lamp **10** to permit the indexing thereof from station 2, the etching station to station 3 of the exhaust machine **30**.

As the crank wheel **80** rotates about 15° further from the position shown in Fig. 6 to the position shown in Fig. 7 the roller **95** of the switch **90** encounters the lowered portion **82** in the periphery of the crank wheel **80** and the switch **90** is moved from the "up" to the "down" position, shown in Fig. 8. This breaks the circuit to the motor **70** and the crank wheel **80** ceases to rotate. Indexing of the exhaust machine head **34** rolls the exhaust tubulation **18** off the arm **182** of the exhaust tube switch **180**, thus moving the switch **180** from its "up" position to its "down" position shown in Fig. 8.

This completes a circuit to the motor **70** through conductor **200**, exhaust tube switch **180**, conductor **206**, crank wheel switch **90**, conductor **204**, and conductor **208**. The motor **70** then moves the crank wheel **80** in a counterclockwise direction so that the roller **95** leaves the lowered portion **82** of the crank wheel **80** and engages the normally raised portion thereof, thus moving switch **90** from its "down" position to its "up" position, shown in Fig. 8 and breaking the circuit to the motor **70**.

It will be understood that the tubulation **18** of a lamp **10** held in the next indexing head **34** coming into station 2 engages the arm **182** of the switch **180** (as hereinbefore described) to move the switch **180** from its "down" position to its "up" position, shown in Fig. 8 and restarting the etching cycle.

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

I claim:

1. An etching device for an incandescent and discharge lamp exhaust machine having at least a frame, a rotatable crank wheel on said frame, means on said frame for rotating said wheel, crank wheel contact means on said frame and operable by said wheel to intermittently actuate said wheel rotating means, a slide reciprocable on said frame, a sector rotatable on said slide, marking means on said sector, means for connecting said sector and said wheel, means on said frame for limiting the rotation of said sector, inking means on said frame in engagement with said sector, and exhaust tube contact means on said frame and operable by an exhaust tube of a lamp to intermittently actuate said wheel rotating means.

2. An etching device for an incandescent and discharge lamp exhaust machine having at least a frame, a rotatable crank wheel on said frame, means on said frame for rotating said wheel, crank wheel contact means on said frame and operable by said wheel to intermittently actuate said wheel rotating means, a slide reciprocable on said frame, a sector rotatable on said slide, marking means on said sector, bulb centering guide cam actuating means on said sector, means for connecting said sector and said wheel, means on said frame for limiting the rotation of said sector, inking means on said frame in engagement with said sector, exhaust tube contact means on said frame and operable by an exhaust tube of a lamp to intermittently actuate said wheel rotating means, and a cam actuated bulb centering guide on said frame above said sector and said wheel for centering and supporting a lamp.

No references cited.