Dec. 16, 1958 E. E. YEO 2,864,485

LAMP MOUNT POSITIONER

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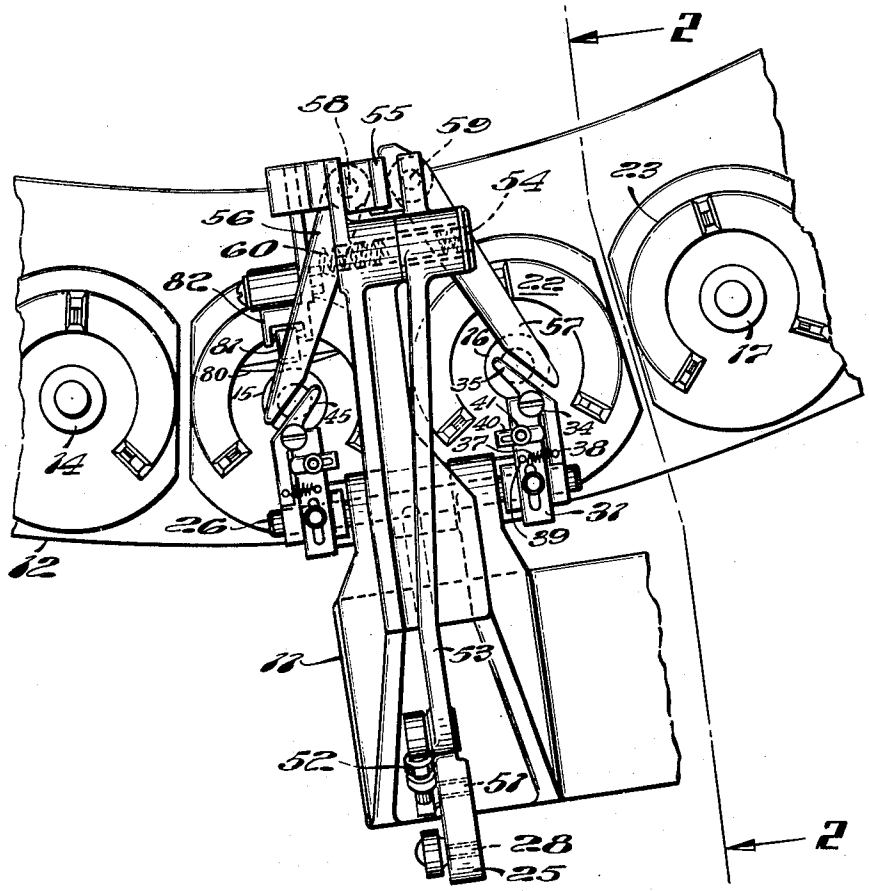


Fig. 1

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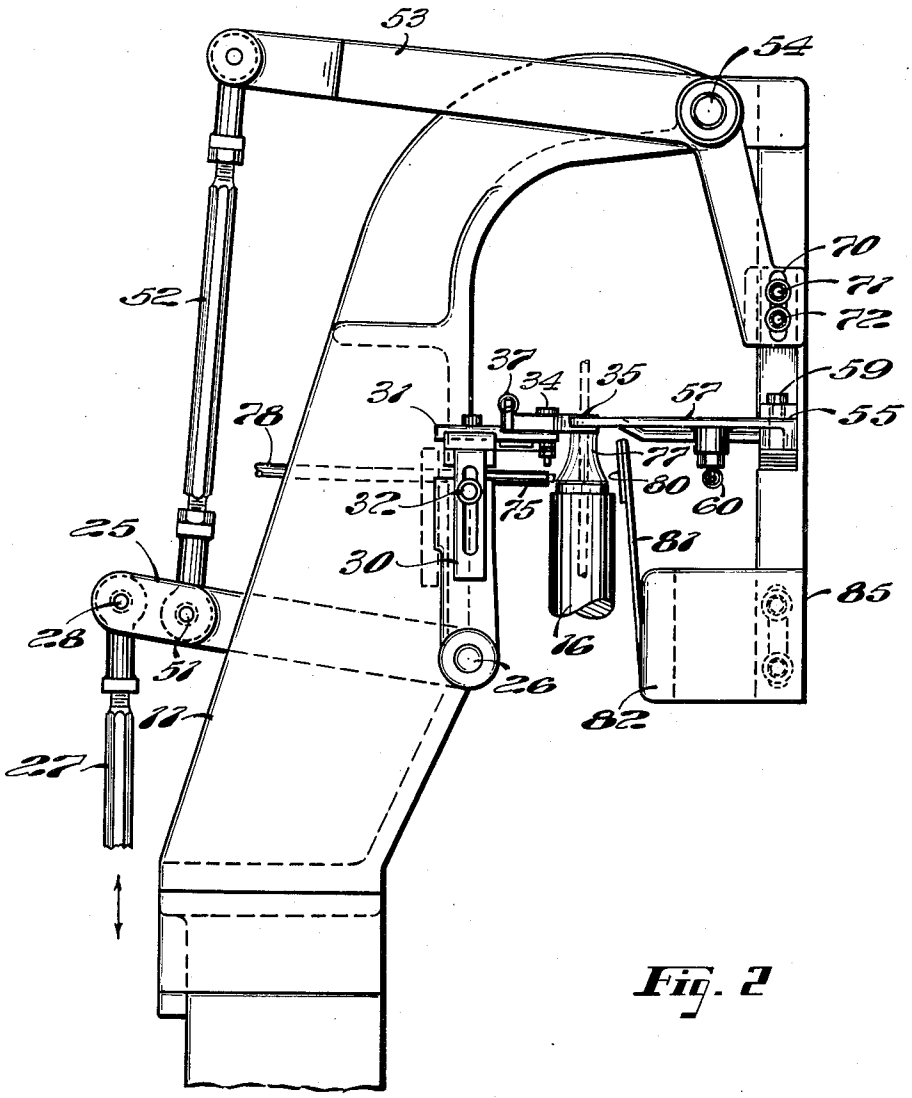


Fig. 2

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LAMP MOUNT POSITIONER

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1 Claim. (Cl. 198—33)

My invention relates to machinery for use in the manufacture of electric lamps or similar articles.

Specifically, my invention relates to machinery for positioning lamp mounts, or assemblies of filaments, lead supports and lead wires, preparatory to the performance of further operations on said lamp mounts. Such further operations may include the installation of bulbs upon said lamp mounts and the sealing, flushing and filling of said bulbs with inert gas.

Still more specifically, my invention relates to machinery for so locating electric-lamp mounts on a lamp-making machine that each lamp mount is centered on the lamp-making-machine spindle which carries it and that each lamp mount is oriented with its lead wires in a desired direction. Orientation of the lead wires is obtained by reference to the "press" or pair of flat places formed on each lamp mount after installation of the lead wires. It will be understood that, while the machine of our invention is to be described in terms of operations which it can perform upon mounts for incandescent lamps, the usefulness of our invention is not limited to the lamp industry but may extend in certain circumstances to the manufacture of electron tubes and other devices.

In the manufacture of electric lamps and other devices having central filament assemblies, or mounts, it is often important to position precisely the mounts on the machine which it to install bulbs on the mounts, seal the bulbs, flush and fill the bulbs with inert gas, and install bases or terminals thereon. For instance, in lamps having two dissimilar lead wires, one of which is to serve as a fuse, it is important that the mounts be correctly oriented during the manufacturing operations in order that the respective positions of the two lead wires may not become confused, thereby causing the connection of the fuse wire to the wrong lamp terminal. Further, in the transfer of lamp assemblies from the machine which installs and seals the bulbs thereon to another machine which exhausts the bulbs, flushes, fills and finishes them, the arrangement is often such that a predetermined rotation of each lamp assembly takes place. In such a case, it is important so to position the lamp mounts on the spindles of the sealing machine that said later rotation during transfer will result in the delivery of the lamp assemblies for the exhaust and finishing operations in exactly the right position and orientation demanded for the proper fulfillment of those operations. In particular, each lamp assembly must be delivered for finishing with a predetermined one of its lead wires in correct position for automatic threading through a hole in the lamp base and with another predetermined one of its lead wires in correct position to be automatically bent over to make contact with the inside surface of the lamp base. In the past, the positioning operation has often depended upon a human operator who centered each lamp mount on a spindle of the sealing machine and oriented each lamp mount so that its lead wires would, after the above-

mentioned transfer operation, be in the correct position for the finishing operation. However, in accordance with the objective of increasing the degree of automation in lamp manufacturing, the desirability of performing this step without depending upon a human operator has been recognized. Moreover, if the bulb installation, sealing, flushing, filling and finishing operations are to be performed in a dual fashion, performing a similar operation upon two lamps at a time, it would be desirable to have an automatic mount-positioning machine capable not only of functioning substantially without human supervision but also capable of accurately positioning and orienting two lamp mounts at a time. A lamp-mount-positioning machine satisfying these specifications has not until the present time been available.

It is, therefore, an object of our invention to provide an electric-lamp-mount positioning machine capable of automatically centering lamp mounts upon respective spindles of a machine for installation of bulbs thereon.

It is another object of our invention to provide an electric-lamp-mount positioning machine capable of orienting lamp mounts so that predetermined ones of the lead wires have predetermined angular orientations with respect to the center lines of the respective spindles.

It is a further object of our invention to provide an electric-lamp-mount positioning machine capable of orienting the pairs of flat places or "presses" of the lamp mounts in predetermined directions with respect to the respective spindles.

It is a still further object of our invention to provide an electric-lamp-mount positioning machine capable of positioning simultaneously at least two lamp mounts.

Briefly, we accomplish the fulfillment of these and other objects of my invention by providing a frame adjacent the turret which carries the lamp-sealing-machine spindles, said frame being fitted with at least a pair of lever members pivoted to the frame for rotation relative thereto, each of said lever members being further equipped with at least one finger member for pressing against a press, or flat place on the lamp mount. The finger members carried by the respective lever members should be so placed that, when the lever members are caused to pivot with respect to the frame in order to position the lamp mount, the fingers approach each other in such a manner that one pair of fingers embraces the pair of flat places or press of each lamp mount which is to be positioned. The mechanical linkage should be such that the two fingers which are to position each lamp mount approach each other at a point directly over the center of the spindle carrying the lamp mount to be positioned. If the fingers are respectively spring loaded, they tend to move the lamp mount to a position along the center line of the spindle which carries it and, further, if the ends of the fingers which embrace the lamp mount are shaped so that each finger presents a face parallel to that of the finger with which it cooperates and at a desired angle with respect to a radial line of the sealing-machine turret, then each lamp mount will not only be centered on its respective spindle but it will also be rotated to assume the orientation which is desired in order to complement the further rotation to be imparted thereto in the lamp-transfer operation. In a preferred embodiment of our invention, we provide two pairs of positioning fingers so that two lamp mounts may be simultaneously positioned on their respective sealing-machine spindles. A full understanding of the structure and operation of the electric-lamp-mount positioning machine of our invention may be obtained by a study of the following detailed specification taken in conjunction with the drawings, in which:

Fig. 1 is a plan view, with some members shown in phantom fashion, of a section of a sealing-machine tur-

ret together with the lamp-mount-positioning machine of our invention; and

Fig. 2 is a side elevation view, again showing parts of some members in phantom fashion, taken along the line 2—2 of Fig. 1.

Turning to the plan view of Fig. 1, it will be seen that the lamp-mount-positioning machine of our invention is organized about a frame member 11, which may be of any suitable strong construction which is capable of supplying stable and rigid support to the moving members of the machine. Frame member 11 may, if desired, be located just outside the periphery of a turret 12 of a lamp-sealing machine which is so designed as to index, or rotate intermittently. If the sealing machine happens to be one which is designed to perform each operation upon one lamp mount at a time, the turret mechanism will probably be such as to rotate the turret in each indexing motion through an angle equal to the arc subtended by two adjacent sealing-machine spindles. In such a case, only one pair of positioning fingers will be required for the mount-positioning machine. However, inasmuch as we have found that dual operation of a sealing machine is advantageous, the preferred embodiment of our mount-positioning machine, which is the embodiment shown in Fig. 1 and which will be used in this specification for purposes of illustration, is equipped with two pairs of positioning fingers in order to permit simultaneous positioning of two lamp mounts. In this type of operation of the sealing machine and of the mount-positioning machine, the actuating mechanism of the sealing-machine turret will probably be such as to cause it to rotate during each indexing step through an angle equal to twice the arc subtended between adjacent sealing-machine spindles. In Fig. 1, which represents a sealing machine and mount-positioning machine equipped for this dual type of operation, four sealing-machine spindles are shown and may be designated by the respective reference numerals 14, 15, 16 and 17. In order to bring the spindles into the position shown in Fig. 1, turret 12 must have rotated in one indexing operation to bring spindle 16 from the station occupied in the figure by spindle 14 and to bring spindle 17 from the station occupied in the figure by spindle 15. When the positioning of the two lamp mounts carried respectively by spindles 15 and 16 has been completed, turret 12 must again index to bring, in one motion, spindle 14 to the station occupied in the figure by spindle 16 and to bring spindle 15 to the station occupied in the figure by spindle 17.

Turret 12 of the lamp-sealing machine bears not only the spindles such as those enumerated above but also a bulb carrier corresponding to each of the enumerated spindles. The bulb carriers shown in Fig. 1 may be respectively designated by the numerals 20, 21, 22 and 23, and each of them may be supported upon turret 12 by a pair of side rods. Each bulb carrier is shown in sectorial form occupying approximately 240 degrees of the circumference of a circle and having approximately the remaining 120 degrees open to receive a glass bulb which is allowed to fall over each lamp mount as the next step following mount positioning in the manufacturing operation. In a form of sealing machine which we have found satisfactory, one lamp bulb may be placed over a lamp mount at the station occupied in Fig. 1 by spindle 17. It will be noted that each bulb carrier is shown in Fig. 1 to be equipped with three upstanding fingers which may be spaced at approximately 120-degree intervals. These upstanding fingers may be so shaped as to have minimum contact area with the glass bulb when said bulb has been placed thereon, thereby conducting away as little heat as possible during the performance of the sealing operation upon the lamp, when the bulb must be raised to a very high temperature.

Returning to the description of the lamp-mount-positioning machine itself, frame 11 will be seen to

carry a lever 25, which may be pivoted by means of a shaft 26 to frame 11 and which may be actuated by a push rod 27 pivoted to lever 25 by a pin 28. It will be understood that, if additional rigidity were desired, lever 25 might take the form of a fork one jaw of which could be pivoted near either end of shaft 26. Intermittent up-and-down motion may be imparted to push rod 27 by pivoting the push rod to a lever not shown in the drawings, said lever being equipped with a cam follower which rides upon a cam firmly fixed to a main power transmission shaft. As best shown in Fig. 2, lever 25 may have the configuration of a crank, the upper end of which carries a slide 30 and a fixture 31 firmly attached to slide 30. The position of slide 30 may be adjusted relative to lever 25 to bring fixture 31 to the desired height, whereupon slide 30 may be fastened to lever 25 by means of a screw 32 or any equivalent fastening means. Near one end of fixture 31 may be pivoted by means of a screw 34 a positioning finger 35, which is one of the two cooperating fingers that come to bear against the lamp-mount press. One end of positioning finger 35 may be restrained by means of a spring 37 or similar resilient means attached to a pin 38 on positioning finger 35 and to a pin 39 on fixture 31. The amount of restraint imposed on positioning finger 35 by spring 37 is in turn limited by a stop 40 fastened in an adjustable manner to fixture 31 by means of a set screw 41.

Reference to Fig. 1 will show that the positioning-finger assembly which has just been described is, in our favored configuration, only one of two similar assemblies, each of which may be actuated in like manner from lever 25 and shaft 26. Positioning finger 35 is one of two fingers which position a lamp mount carried by the sealing-machine spindle which has been designated by reference numeral 16 in Fig. 1, while a similar positioning finger 45 is one of two fingers which position a lamp mount carried by the sealing-machine spindle which has been designated by the reference numeral 15 in Fig. 1.

Fig. 2 of the drawings shows that lever 25, in addition to carrying the positioning-finger assemblies which have just been described may also have pivoted to it by a pin 51 a push rod 52 to one end of which is pivoted a crank 53 which is also in turn pivoted to frame 11 by a pin 54. The end of crank 53 which is remote from push rod 52 will be seen to carry in an adjustable fashion a member including a T-section 55 to which may be pivoted two additional positioning fingers 56 and 57 by means, respectively, of pins 58 and 59. Positioning fingers 56 and 57 will be seen to extend toward positioning fingers 45 and 35 respectively and, further, to be located in substantially the same plane. The amount by which the free ends of positioning fingers 56 and 57 may become separated may be restrained on the one hand by means of a spring 60 or other equivalent resilient means and on the other hand by a pair of stops which function to prevent the free ends of fingers 56 and 57 from approaching closer together than the centers of two adjacent sealing-machine spindles.

The manner of operation of the mount-positioning machine of our invention may best be understood by reference to Fig. 2, which shows that, when push rod 27 moves upward, lever 25 rotates causing positioning fingers 35 and 45 to move to the right. Moreover, when push rod 52 is simultaneously caused by lever 25 to move upward, crank 53 is rotated in a clockwise direction, which causes positioning fingers 56 and 57 to move toward the left into proximity respectively with positioning fingers 45 and 35. If lamp mounts are in position on spindles 15 and 16 of the sealing machine, each of the lamp mounts will be embraced between a pair of positioning fingers and will be rotated until the orientation of the mount press with respect to the spindle axis is the same as that of the faces of the positioning fingers. While reasonably good positioning of lamp mounts may be

obtained without employing positioning fingers which are spring-loaded, we have found that, in such a case, each lamp mount may be forced toward one side of its supporting spindle and may not be free to rotate into proper orientation with respect to the spindle axis. Therefore, we prefer to employ positioning fingers all of which are spring-loaded and all of which are capable of exerting approximately equal forces upon their respective lamp-mount presses. The obtaining of such equal forces may, in view of the longer lever arms employed in fingers **56** and **57** than are employed in fingers **45** and **35**, require that restraining spring **60** be made somewhat stiffer than restraining spring **37** and its counterpart on the assembly which carries positioning finger **45**. The lamp-manufacturing steps which follow positioning of the lamp mounts in our favored apparatus happen to produce further rotations of the mounts such that we choose to employ positioning-finger end faces which make an angle of approximately 40 degrees with a radial line of the sealing-machine turret at that point.

Inasmuch as the correct functioning of the positioning fingers depends upon their being brought to bear against the presses or flattened places of their respective lamp mounts, it is important that the assemblies be so adjusted that the positioning fingers are at the correct height to come into engagement with the mount presses. If the respective lamp mounts are loaded upon the sealing-machine spindles in such a way that each spindle supports the flare of a lamp mount, the heights of the positioning fingers above the tops of the sealing-machine spindles may have to be changed when the type or size of lamp being manufactured is changed, because the presses of some sizes of lamp mounts are located higher above their respective flares than are those of other sizes of lamp mounts.

Reference has been made in the paragraphs above to the fact that sealing-machine turret **12** indexes periodically to bring the sealing-machine spindles, and the respective lamp mounts which they carry, to stations where the lamp mounts may be positioned and their presses oriented by the mount-positioning machine of our invention. It will be appropriate to explain the time sequence of the indexing and positioning operations in order that a fuller understanding of the coordination between the sealing machine and the mount-positioning machine may be obtained. The periodic indexing motion of sealing-machine turret **12** may be obtained by means of a ratchet wheel firmly fixed to the shaft of the sealing-machine turret, said ratchet wheel being actuated through a pawl and linkage connected with a cam follower which in turn bears against a cam upon a main power-transmission shaft. The design of this latter cam should be such that a substantial period of time elapses between indexing motions of turret **12**. When turret **12** has been indexed to bring two mount-carrying spindles to the stations occupied by spindles denominated by the reference numerals **15** and **16** respectively, push rod **27** of the mount-positioning machine is then caused to move upward by means of the lever, cam follower, and cam which drive it. As has been explained, upward motion of push rod **27** causes, in the preferred embodiment, positioning fingers **45** and **35** respectively to approach positioning fingers **56** and **57**, embracing and orienting the respective presses of the pair of lamp mounts therebetween. When this positioning and orienting operation has taken place, push rod **27** is caused by its lever, cam follower, and cam mechanism to move downward, thereby causing the respective pairs of positioning fingers to retract and to leave room for the sealing-machine spindles and lamp mounts to pass between them. When retraction of the positioning fingers is complete, the next indexing step of turret **12** may then take place, bringing two fresh spindles to the stations respectively occupied by spindles **15** and **16** in Fig. 1. The lengths of the lever arms of lever **25** and crank **53** must clearly be such as to cause the positioning fingers to retract far enough to permit the indexing of turret **12** to take place. If such a design were not employed, a collision between the positioning fingers and the lamp mounts could occur, and the positioning of the lamp mounts which is the objective of the mount-positioning machine would be lost. One way of controlling the relative amounts of travel of the two pairs of positioning fingers, in addition to the choice of lever arms of lever **25** and crank **53**, is the choice of position on lever **25** at which pin **51** pivots push rod **52** thereto. It will also be noted that the adjustment of the height of slide **30** and the height of T-section **55** affects not only the respective heights at which the positioning fingers embrace the lamp mount, but also affects the mounts of horizontal travel of the two pairs of positioning fingers in approaching the lamp mount and in being retracted therefrom. Adjustment of the height of T-section **55** can be obtained, for example, by means of a slot **70** in the end of crank **53** at the point where crank **53** supports the member of which T-section **55** is a part. Two bolts **71** and **72**, which may support the members of which T-section **55** is a part, are free to be set at any points in slot **70**, thereby establishing the height of T-section **55** with respect to crank **53**.

The preceding discussion has impliedly assumed that each pair of sealing-machine spindles arriving at the sealing-machine stations where the mount-positioning machine is located both carry lamp mounts. If, for any reason, one of the sealing-machine spindles arriving at the mount-positioning station should not be carrying a lamp mount, it would be advantageous to detect the absence of a lamp mount in order that a lamp bulb may not later be loaded upon the spindle not carrying a lamp mount. We have found that the mount-positioning machine is a convenient place to locate a detector for sensing the presence or absence of a lamp mount on either one or two of the sealing-machine spindles. Such a detector may comprise a nozzle **75** directed at the center line of one of the sealing-machine spindles and slightly above the upper extremity of the spindle, in a position which will be occupied by a flare **77** of a lamp mount, if one is present on the spindle. Nozzle **75** may be connected through a hose **78** to a supply of compressed air which will then be free to flow through nozzle **75** against flare **77** of the lamp mount. We have found that it is desirable to place somewhere in the compressed-air line a filter capable of removing from the compressed air substantially all foreign material which might otherwise become attached to the lamp mount and contaminate it. Inasmuch as the surface of the lamp mount against which the air is directed will, after the sealing operation, be at least partially sealed within the lamp bulb, it is important that no foreign substances be allowed to remain thereon. It has been found that sintered bronze is a satisfactory filter material for removing foreign matter from the compressed air employed in the detector, and that a gauge pressure of approximately 10 pounds per square inch is satisfactory for the detection function. If a lamp mount is not present upon the sealing-machine spindle over which compressed air is directed from nozzle **75**, the stream of compressed air will be free to strike a baffle **80** which may be carried by a sping-loaded arm **81** which in turn operates a "microswitch" **82** or similar device. The "microswitch" is a very sensitive device such that, when arm **81** is deflected slightly by virtue of pressure applied to baffle **80** by the compressed air, an electric circuit is altered in such a way as to send out a signal to the apparatus which installs the glass bulbs upon the lamp mounts. The design of the bulb-installing apparatus is such that it can "remember" the fact that a certain sealing-machine spindle at which arm **81** is deflected is a spindle which does not carry a lamp mount and that it should not have a lamp bulb supplied to it. While we prefer to sense the presence or absence of lamp mounts upon only one

of each pair of sealing-machine spindles which arrives at the mount-positioning stations, one may, if so desired, install detectors so that the presence or absence of a lamp mount can be sensed for spindles located at both the stations occupied by spindles **15** and **16** in Fig. 1. If, as is the case in our preferred embodiment, the presence or absence of a lamp mount on the spindle designated by the numeral **16** is not sensed at either mount-positioning station, the sensing may be done by means of a detector mounted at the next station to which spindle **16** will be indexed, that is to say, the station which is the next one to the right of the station occupied by spindle **17** but which is not shown in Fig. 1. It will be understood that, not only may the number of mount detectors employed be varied, but also the nature of the detectors may be changed to any other form of detector capable of sensing the presence or absence of a lamp mount on the sealing-machine spindle adjacent it. A detector may be mounted upon a member **85** connected to T-section **55** or, alternatively, may be mounted upon the frame of the mount-positioning machine or in any other place where firm and stable support may be obtained.

It will be seen that our objective of automatically positioning lamp mounts on sealing-machine spindles and orienting the presses thereof at desired angles is fulfilled by means of the machine which we have described in this specification. While one particular over-all embodiment has been chosen for the purpose of illustration of the principles of our invention, it will be understood that various changes may be made in the number, nature, array and disposition of the mechanical components without departing from the essence of our invention.

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

In a lamp making machine, an orientating mechanism for a mount having a hollow bottom flare adapted to center on a spindle and an upper pair of flats on opposite sides of the mount, a spindle on which the mount is positioned and rotatable relative to the axis thereof, a pair of fingers on opposite sides of the spindle and movable toward and from the flats, said fingers having planar flat engaging portions which are directly opposite each other when the flats are engaged, and at an oblique angle to the direction of motion of the fingers, whereby a mount may be oriented on the spindle.

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