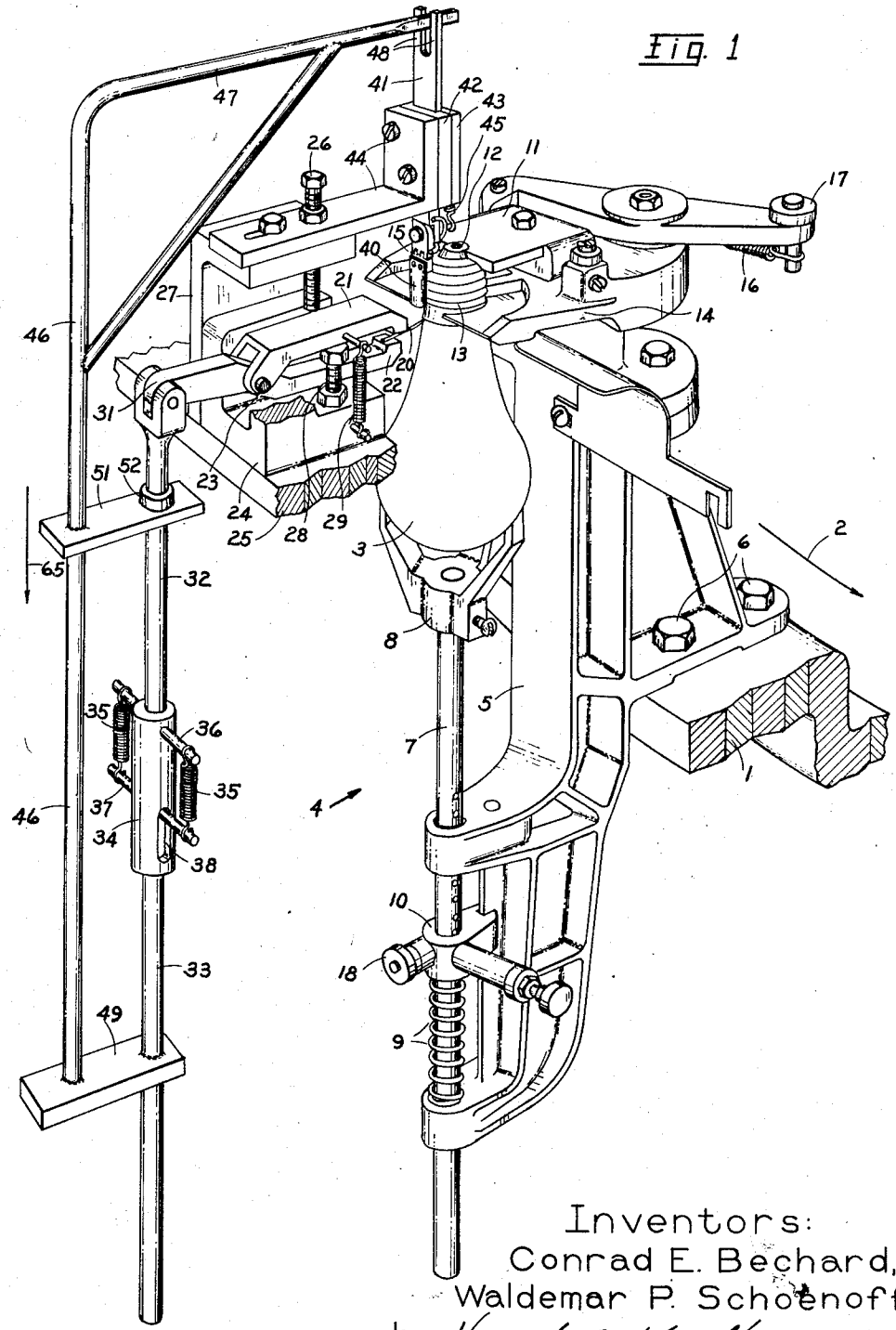
Dec. 14, 1954 C. E. BECHARD ET AL 2,696,880

LEAD WIRE TRIMMING APPARATUS

Filed Oct. 30, 1952 2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

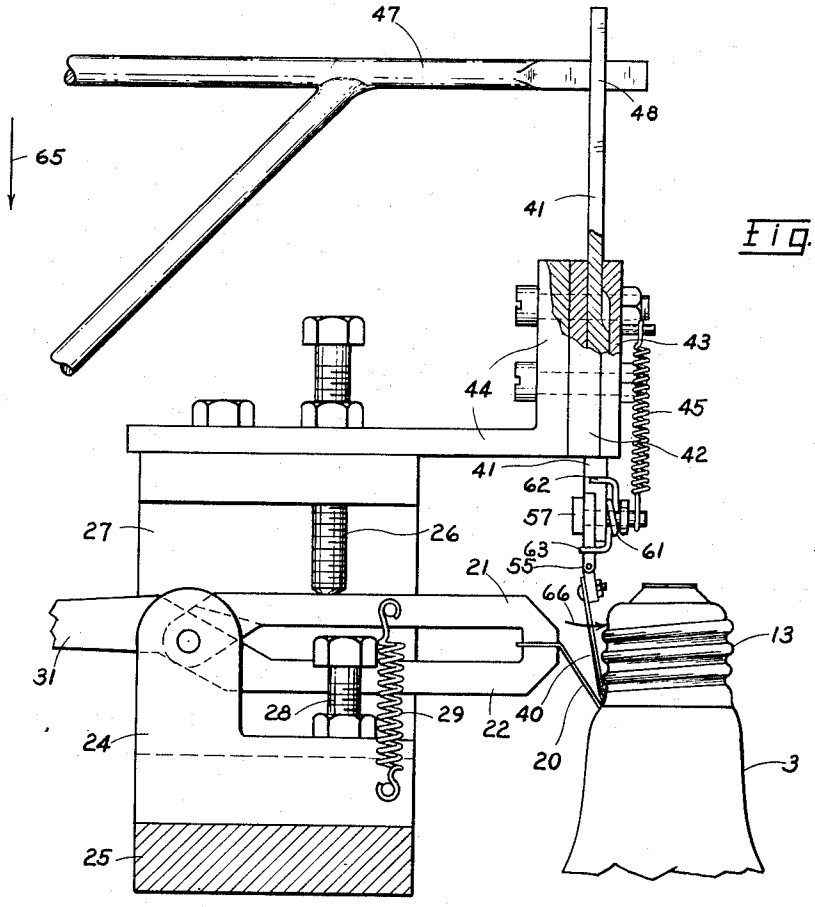


Fig. 2

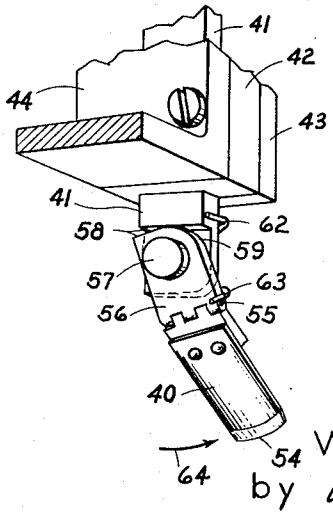


Fig. 3

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LEAD WIRE TRIMMING APPARATUS

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Application October 30, 1952, Serial No. 317,704

6 Claims. (Cl. 164—51)

This invention relates to electric lamp making machinery, and particularly to apparatus for cutting off or trimming the side lead-in wire in the basing operation. In this operation, a base is fastened to the neck of the bulb, the base is heated in order to set the basing cement, and the lead wires are trimmed and permanently connected to the metal parts of the base, the top lead to the end contact or eyelet, and the side lead to the shell of the base.

The invention is more particularly concerned with lamps wherein the side connection is in the form of a mechanical contact, such connections having recently found wide acceptance in lamps using bases made of aluminum which is not readily soldered. The mechanical contact is achieved by wedging the side lead wire between the seal shoulder or neck of the bulb and the lower edge or rim of the shell of the base which is proportioned to fit relatively tightly on the neck. It is then highly desirable that the lead be cut off as short as possible immediately at the edge of the base, because a projecting stub of any length is unsightly and also presents somewhat of a hazard from the point of view of scratching of the hands in handling.

In our copending application No. 263,458 filed December 26, 1951, entitled Electric Lamp, and assigned to the same assignee as the present invention, there is described an apparatus for cutting off a side lead wire short by pulling it against the rim of the base shell in such a manner as to effect a sharp bend at that point, and shearing it off against the rim of the shell. Where a relatively light gauge metal is used for the base shell, or where the lead wire is relatively heavy or composed of a relatively high tensile strength material such as iron, it has been found that there is a tendency towards shearing the edge of the base shell or pulling it away from the side of the bulb.

Accordingly an object of the present invention is to provide an improved apparatus for trimming a lead wire of an electric lamp in connection with the basing operation.

Another object of the invention is to provide an apparatus which is effective in cutting off short the side lead of lamps wherein the base shell is relatively weak by comparison with the tensile strength of the lead wire, and easily sheared by it.

In accordance with the invention, the lead wire is gripped by a pair of jaws, pulled up at an acute angle upwards relative to the side wall of the base shell, and held taut. While the jaws hold the wire in this position, a cutter hinged at the lower end of a slide and having a knife edge preferably curved to the radius of the base shell, is lowered until it touches the wire. After coming in contact with the wire and as the slide continues to move down, the cutter starts to swing in and its knife edge follows the wire up to the point where the wire and the rim of the base meet. At that point, the wire being held taut, the knife edge of the cutter severs it, leaving substantially no stub projecting beyond the rim of the base shell.

The foregoing objects and other advantages and inherent functions of the invention will become apparent as the same is more fully understood from the following description which, taken in connection with the accompanying drawings, discloses a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a pictorial view of a side lead wire trimming apparatus embodying the invention and shown in conjunction with a fragment of a prior art lamp finishing machine.

Fig. 2 is a side elevation showing further details of the cutter and illustrating the relative positions of parts at the instant of shearing the lead wire.

Fig. 3 is a pictorial view illustrating the cutter in its swung aside position.

Referring to Fig. 1, a side lead wire trimming apparatus embodying the invention is illustrated in cooperative relationship with a single head of a well known type of incandescent lamp finishing machine such as is described, for instance, in U. S. Patent 1,708,756, Fagan. The machine comprises a turret or turn-table seen in part at **1**, and suitable driving means (not shown in the drawing) for intermittently rotating the turret in a counterclockwise direction, as indicated by the curved arrow **2**, to index a plurality of bulb holders along a given path to successive work stations. The electric lamp bulbs **3** are held upright, that is, neck up, in holders or heads **4** which are fastened to the turret at its periphery. In an actual commercial machine, there are forty-eight such bulb holders on the turret, and the intermittent rotation of the turret advances them to successive work stations at each index of the machine.

Each holder or head **4** comprises a bracket **5** which is bolted at **6** to the edge of the turret. The depending portion of the bracket slidably supports a vertical spindle **7** which carries at its upper end a crowfoot shaped bulb cup **8**. The spindle is urged upwards by a spring **9** causing the bulb cup to press up resiliently against the lower end of the bulb **3**. The compression of the spring may be adjusted by changing the position of the guide block **10** on the spindle. At the upper end of the bracket, there is provided a plate **11** which receives the end contact or eyelet **12** of the base **13** in a suitable aperture, and a pair of pivotable holding jaws **14**, **15** which are biased together by a tension spring **16**. The lamp is held firmly in the holder and the base is clamped down against the bulb neck by reason of the upward pressure exerted on the bulb by the bulb cup. At the same time, the jaws **14**, **15**, pressing against the sides of the base **13**, assist in seating it squarely on the neck of the bulb. At the stations of the machine where it is desired to pivot open the jaws **14**, **15** to release the base, a cam may be positioned to engage the roller **17** affixed to the rearwardly projecting portion of jaw **14**. The lamp itself may be released from the holder **4** by a cam which engages roller **18** on guide block **10** and forces it down to relieve the pressure of the bulb cup on the lower end of the bulb.

The trimming apparatus proper, provided by the invention for cutting off short the radially projecting side lead wire **20**, comprises a pair of gripping jaws **21**, **22** pivotally mounted at **23** on a pedestal **24** which is bolted to a stationary frame member **25** of the machine. The upper jaw **21** can pivot between fixed uppermost and lowermost positions, the former being determined by a stop bolt **26** threaded down through a bracket **27** which is fastened to the side of the pedestal, and the latter being determined by a stop bolt **28** which is threaded into the base of the pedestal **24** and projects vertically upwards to engage the under side of the jaw. The normal or rest position of jaw **21** is the lowermost one, as illustrated in Fig. 1 of the drawings, the jaw being biased into this position by a tension spring **29**.

The lower jaw **22** is projected rearwardly beyond the pivot point **23** into a lever arm **31** to which is attached a vertical connecting rod comprising upper part **32** and lower part **33**. The two parts are linked together through a lost motion device comprising a sleeve **34** and a pair of tension springs **35** stretched between transverse pins **36** and **37** in the upper and lower rod parts respectively. The upper pin **36** passes through a hole in both the sleeve **34** and the upper rod part **32**, thus locking these two parts together. The lower pin **37** passes through a hole in the lower rod part **33** but is otherwise free to ride in a slot **38** in sleeve **34**. This arrangement allows a lost mo-

tion through limits determined by pin 37 and its cooperating slot 38 and permits over-travel of the lower rod part 33 after jaw 22 has reached the upper limit of its travel. The limit of travel of jaw 22 of course is determined by the uppermost position to which jaw 21 may be pivoted up, and this in turn is determined by stop bolt 26.

The actual cutting of the lead wire is done by a knife edged cutter 40 which is suspended above the wire from a supporting member in the form of a vertically reciprocable slide bar 41 riding in a slideway formed between a channeled block 42 and cover plate 43. Block 42 is supported from bracket 27 by a bracket 44 which locates it above and somewhat to the front of the base of the lamp supported in the bulb holder. The slide bar 41, and of course the cutter 40 depending from it, are normally held up by a tension spring 45. The downward reciprocation of the slide bar is effected from the movement of the lower connecting rod part 33 through an auxiliary connecting rod 46 provided with a side arm 47 which engages the forked upper end 48 of the slide bar. The attachment of rod 46 to rod part 33 is through lower plate 49 which is welded to both rods. Upper plate 51 is welded to rod 46 only and has a bushing 52 making a sliding fit with rod part 32 to maintain the parts in alignment.

The details of the cutter 40 and the manner of attaching it to slide bar 41 are best seen in Figs. 2 and 3. The cutter has a bevelled knife edge at 54, preferably curved to the radius of the base shell, and is suspended so that the edge is generally transverse to the projecting lead 20, being hinged at 55 to an intermediate swivel member 56, which member is pivotally fastened at 57 to the lower end of slide bar 41. The hinge at 55 provides freedom to swing in a plane radial to the bulb, that is, in a plane normal to the circular path of movement of the heads 4. The pivotal mounting at 57 permits the cutter to be swung out from the vertical to the right, as seen in Fig. 3, but not to the left. The abutting shoulders at 58 on the slide bar and on the intermediate member 56 prevent swinging to the left, whereas the curved shoulder at 59 on the intermediate member allows swinging to the right. However the cutter is normally biased into the vertical position illustrated in Fig. 1, by a spiral spring 61 whereof one end engages the slide bar at 62 and the other end engages member 56 at 63. The purpose of this arrangement is to allow the cutter to swing out along the direction of movement of the bulb holders 4 if it should by chance be struck by an interfering portion of a lamp improperly mounted in a holder. The cutter then merely pivots aside, as indicated by curved arrow 64 in Fig. 3, and then swings back into place after the defectively mounted lamp has passed, and no harm is done to the cutting mechanism.

In operation, a lamp arrives at the trimming station with the side lead wire projecting radially outward in a plane substantially normal to the edge of the base shell. During the dwell interval of the head at the station, connecting rod 32, 33 is reciprocated vertically down, as indicated by arrow 65, and then up again. This may be accomplished through the usual rocker arm and cam arrangement, the cam being driven in synchronism with the driving means of the turret. As the lower rod part 33 moves down, the upper rod part 32 initially moves with it and pivots lower jaw 22 up until the lead wire is caught between jaws 22 and 21. Jaw 21 thereupon pivots up with jaw 22 and the lead wire is pulled up at an inclination and tensioned as illustrated in Fig. 2. The tension exerted on the lead wire is determined by the force with which jaw 21 bears against jaw 22 and this of course is regulated by the size of spring 29. The spring tension is selected to permit the lead wire to slip through the jaws before reaching the breaking point. After the jaws have reached their uppermost position as determined by stop bolt 26, the continued downward movement of the lower rod part 33 is taken up by the lost motion device including sleeve 34. The auxiliary rod 46 however continues to move down and cross arm 47, having reached the bottom of slot 48 in slide bar 41, causes the cutter 40 to be lowered. The knife edge initially comes into contact with the inclined lead wire at a point intermediate the gripping jaws and the rim of the base. Thereupon the cutter begins to swing in towards the base, as indicated by curved arrow 66 in Fig. 2, and the knife edge follows the lead wire to the point where it meets the rim of the base shell. Finally the sharp edge of the cutter shears off the wire short at the rim of the base shell, leaving substantially no stub protruding.

It will be appreciated that the cutting mechanism which has been described is extremely flexible in its operation. Since the cutter is not fixed in position, it does not necessarily cut the wire at one fixed point in space irrespectively of variations in the precise location of the base or of the bulb holder or of the other parts of the machine in which unavoidable dimensional variations are always present. Instead, by reason of the mounting arrangement, the cutter is guided by the lead wire to the precise point where the lead wire ought to be sheared and there shears it. Thus it is not necessary to rely upon extremely accurate mechanisms or extremely accurate positioning of the base in order to achieve the required closeness of cut and accomplish the object of the invention.

While a certain specific embodiment of the invention has been shown and described, it will be appreciated that various modifications may be made without departing from the invention. The apparatus can readily be modified to shear off lead wires on different types of bases, and it is accordingly intended to cover any such modifications coming within the true spirit and scope of the invention.

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

1. A lead wire trimming apparatus comprising means for holding upright a based bulb having a side lead wire projecting radially, means for tensioning said wire at an upward inclination, a cutter having a knife edge, means suspending said cutter substantially vertically above the wire with its knife edge transverse thereto and allowing swinging of the cutter in a plane radial to the bulb, and means for lowering said suspending means to cause the cutter to engage the wire and to be guided thereby in order to sever the wire close to the bulb.

2. A lead wire trimming apparatus comprising means for holding upright a based bulb having a side lead wire projecting radially, means for gripping said wire and pulling it taut at an upward inclination, a cutter having a knife edge, a supporting member located above said wire, hinge means suspending said cutter substantially vertically below said member with its knife edge transverse to the wire and allowing swinging of the cutter in a plane radial to the bulb, and means for lowering said member to cause the cutter to engage the wire at a point intermediate said gripping means and the bulb in order to be guided by the wire and sever it close to the bulb.

3. A lead wire trimming apparatus comprising means for holding a bulb having a generally cylindrical base seated thereon with a side lead wire projecting radially, means for gripping said wire and holding it taut at an acute angle upwards with respect to the side of the base, a vertically reciprocable member, a cutter having a knife edge, a hinge suspending said cutter substantially vertically below said member with its knife edge located above said wire and transverse thereto and allowing the cutter to swing in a plane radial to said base, and means for lowering said member to cause the cutter to engage the wire at a point intermediate said gripping means and the bulb in order to be guided by the wire and sever it close to the bulb.

4. A lead wire trimming apparatus comprising means for holding a bulb having a generally cylindrical base seated thereon with a lead wire projecting radially from under the rim of the base, means for gripping said wire and holding it taut at an acute angle upwards with respect to the side of the base, a slide member vertically reciprocable above the wire, a cutter having a knife edge, hinge means suspending said cutter from said member with its knife edge transverse to the wire and allowing the cutter freedom to swing in a plane radial to the base, and means for lowering said member to cause the cutter to engage the wire at a point intermediate said gripping means and the rim of the base, whereby to cause said knife edge to follow the wire up to the rim of the base and sever it thereat.

5. A lead wire trimming apparatus comprising holding means for supporting neck-up a bulb having a base including a generally cylindrical shell seated on the neck of the bulb with a lead wire projecting out radially from between the rim of the base shell and the neck of the bulb, a pair of wire gripping jaws pivotally mounted op-

posite said holding means, said jaws being located to encompass said wire in their unactuated position, means resiliently closing said jaws together upon said wire and pivoting them upwardly to tension said wire at an acute angle with respect to the side of the base shell, a slide member vertically reciprocable by the side of said holding means above said lead wire, a cutter having a knife edge, hinge means suspending said cutter from said member with its knife edge transverse to the wire and allowing the cutter freedom to swing in a plane radial to the base, and means for lowering said member to cause the cutter to engage the wire at a point intermediate said gripping jaws and the rim of the base shell, whereby to cause said knife edge, through a swinging movement of said cutter, to follow said wire up to the rim of the base and sever it thereat.

6. A lead wire trimming apparatus comprising a plurality of holding means indexable along a given path past a trimming station, said means being adapted to support neck-up a bulb having a base including a generally cylindrical shell seated on the neck of the bulb with a lead wire projecting out radially from between the rim of the base shell and the neck of the bulb, a pair of wire gripping jaws pivotally mounted at said station, said jaws being located to encompass said wire in their unactuated

position, means resiliently closing said jaws together upon said wire and pivoting them upwardly to tension said wire at an acute angle with respect to the side of the base shell, a slide member vertically reciprocable at said station above said lead wire, a cutter having a knife edge, and means suspending said cutter from said member with its knife edge transverse to the wire and comprising a hinge allowing said cutter freedom to swing in a plane radial to said base and a spring loaded pivot normally biasing said cutter into said plane but allowing it to swing along the path of movement of said holders when forced by an interfering portion, and means for lowering said member to cause the cutter to engage the wire at a point intermediate said gripping jaws and the rim of the base shell to cause said knife edge, through a swinging movement of said cutter, to be guided by said wire to the rim of the base shell to sever the wire thereat.

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