Sept. 22, 1964 G. A. GAGNON 3,149,340

STAND UP INSERTION HEADS

Filed March 30, 1961 2 Sheets-Sheet 1

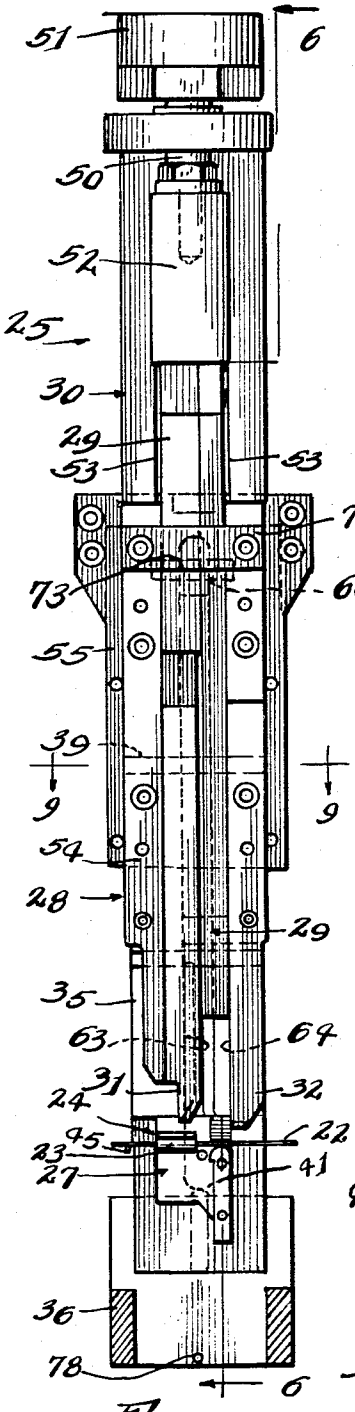


Fig. 2.

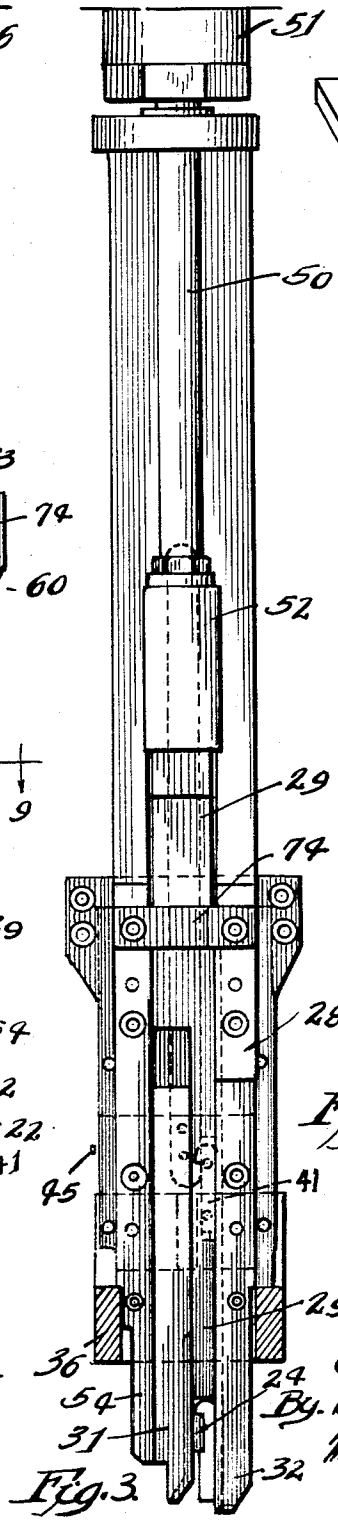


Fig. 3.

Fig. 1.

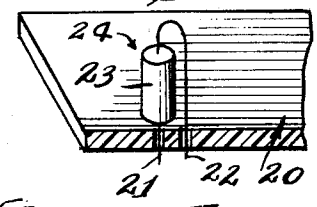


Fig. 4.

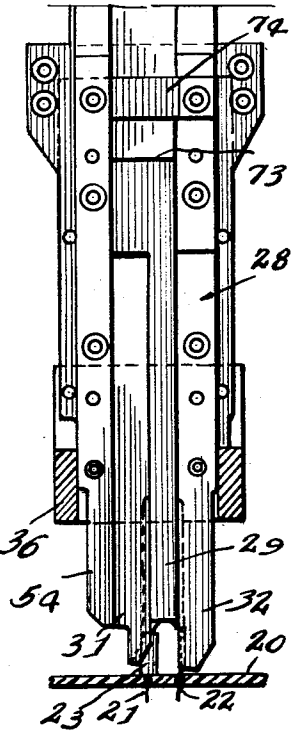
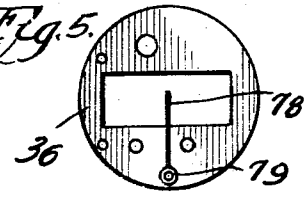


Fig. 5.



Inventor.
George A. Gagnon.
By. Hofgren, Brady
Wegner, Allen & Stallman
Attorneys.

Sept. 22, 1964 G. A. GAGNON 3,149,340

STAND UP INSERTION HEADS

Filed March 30, 1961 2 Sheets-Sheet 2

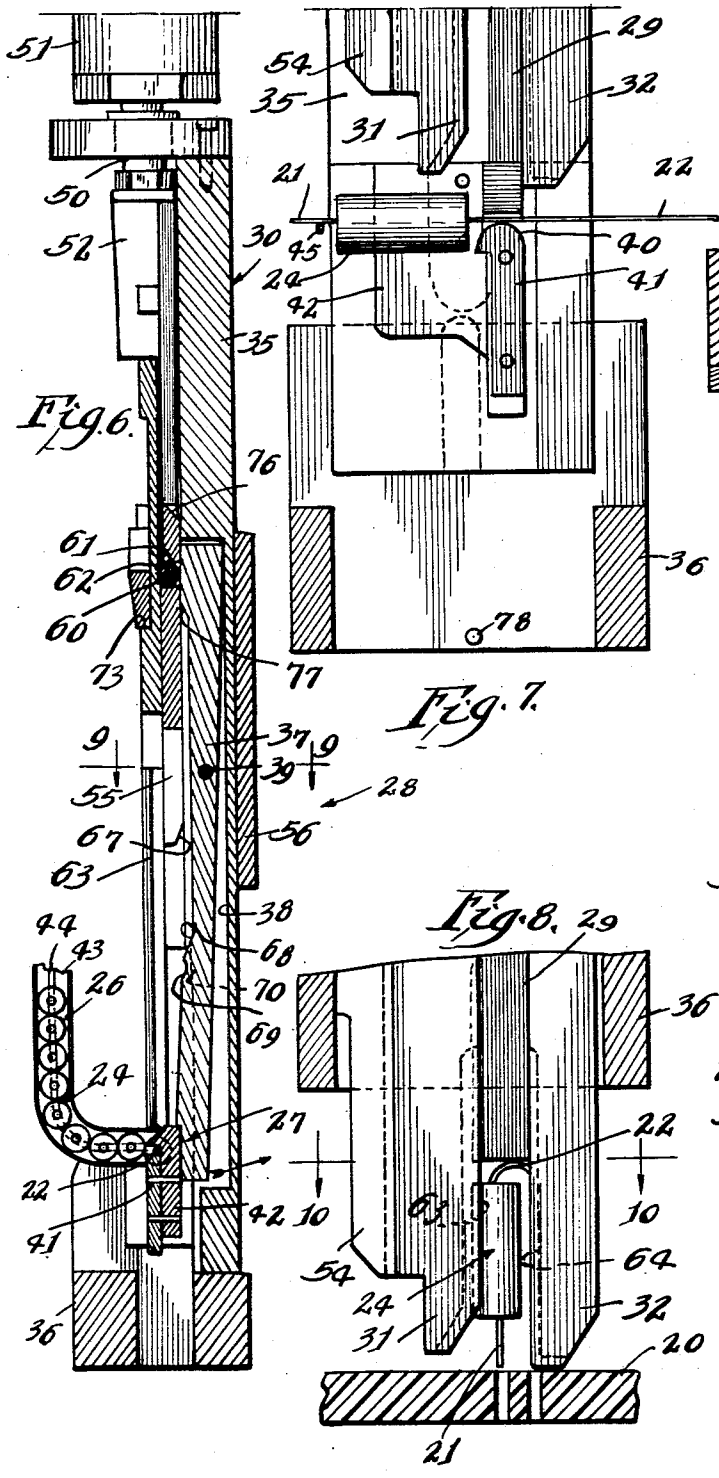


Fig. 6.

Fig. 7.

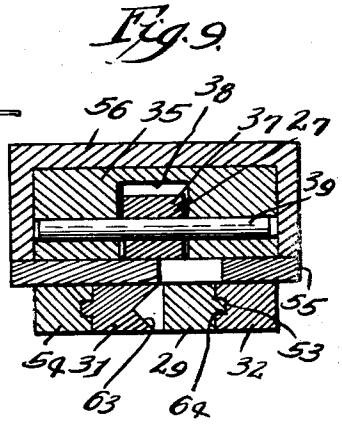


Fig. 9.

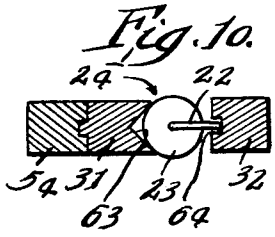


Fig. 10.

Fig. 8.

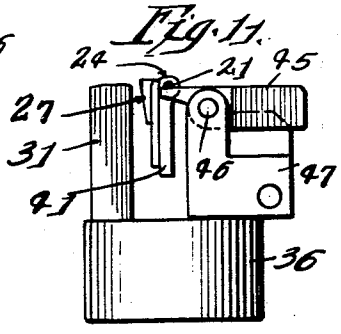


Fig. 11.

United States Patent Office 3,149,340 Patented Sept. 22, 1964

3,149,340

STAND UP INSERTION HEADS

George A. Gagnon, Wilmette, Ill., assignor to Warwick Electronics Inc., a corporation of Delaware

Filed Mar. 30, 1961, Ser. No. 99,486
8 Claims. (Cl. 1—323)

This invention relates to a device for shaping small parts, and more particularly to a head for shaping and also capable of installing electrical resistors on a mounting board.

The primary object of this invention is to provide a new and improved device for shaping small parts.

Another object of this invention is to provide a new and improved head for shaping and installing small electrical resistors on a mounting board.

A more specific object of this invention is to provide a new and improved head for shaping a resistor having a body and oppositely directed leads and installing the shaped resistor on a mounting board, the resistor being releasably held in the head while one of the leads is bent U-shape, and the shaped resistor then being released and installed on the mounting board.

Other objects and advantages of the invention will become readily apparent from the following detailed description of a preferred embodiment taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of an electrical resistor shaped and installed on a mounting board by the head of this invention, with parts broken away for clearer illustration;

FIGURE 2 is a fragmentary, front elevational view of a head for shaping and installing small electrical resistors in accordance with the invention, with parts of the head in a retracted position, and parts broken away and removed for clearer illustration;

FIGURE 3 is a fragmentary, front elevational view, similar to FIGURE 1, but showing the head in an interchange position, with parts broken away and removed for clearer illustration;

FIGURE 4 is a fragmentary, front elevational view of the lower portion of the head in an extended position, having installed a resistor in a mounting board, with parts broken away and removed for clear illustration;

FIGURE 5 is a bottom view of the head, with parts removed for clearer illustration;

FIGURE 6 is a fragmentary, vertical sectional view taken generally along the line 6—6 of FIGURE 2 with parts removed for clearer illustration;

FIGURE 7 is a fragmentary, enlarged front elevational view of the lower portion of the head in the retracted position, with parts broken away for clearer illustration;

FIGURE 8 is a fragmentary, enlarged front elevational view of the lower portion of the head in the interchange position and adjacent a mounting board, with parts broken away for clearer illustration;

FIGURE 9 is an enlarged sectional view taken generally on the line 9—9 of FIGURES 2 or 6;

FIGURE 10 is a sectional view taken generally on the line 10—10 of FIGURE 8; and,

FIGURE 11 is a fragmentary side elevational view of the lower portion of the head in the retracted position.

While an illustrative embodiment of the invention is shown in the drawings and will be described in detail herein, the invention is susceptible to embodiment in many different forms, and it is to be understood that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

The invention is, in brief, directed to a device generally referred to as a head, for shaping and installing small parts. In the illustrated embodiment these parts are electrical resistors installed in a mounting board of a type commonly used in manufacturing television receivers, and the like. Numerous heads may be combined in series on a mass production line for simultaneously attaching various electrical components to mounting boards passing down the line. A suitable magazine consecutively inserts individual resistors into a portion of the head which releasably holds the resistor with one lead extending across an abutment. A slide then moves past the abutment and bends the lead U-shape, thereafter holding the shaped resistor. A ram releases the shaped resistor from the abutment and moves it along the slide to an installing position on a previously positioned mounting board. After crimping of the leads beneath the board as well known in the art the head retracts to release the resistor.

Referring to the drawings, FIGURE 1 illustrates a mounting board 20 which may have a printed circuit on its underside. A pair of holes in the mounting board receive resistor leads 21 and 22 which extend outwardly in opposite directions from a body 23 of an electrical resistor 24. Lead 22 is U-shape and the resistor body 23 is generally normal to the adjacent surface of the mounting board, providing a stand-up resistor installation.

As may best be seen in FIGURES 2 and 6, a head 25 has parts in a retracted position from which the parts move to an extended position, shown in FIGURE 4, for shaping a resistor 24 and installing the resistor in mounting board 20. As the head parts return from the extended position to the retracted position a magazine 26 deposits a resistor 24 on a former member 27 which holds the resistor. A slide mechanism has a first member in the form of a slide 28, and a second member in the form of a ram 29, interlocked for sliding movement from the retracted position on a frame 30 of the head. As the slide and ram move from the retracted toward the extended position a pair of fingers 31 and 32 of the slide 28 engage the resistor 24 and bend its lead 22 U-shape. Upon further movement of the slide and ram toward the extended position the ram moves the former member 27 from a forming first position, best shown in FIGURES 2 and 6, to a releasing second position, by counterclockwise movement from the position shown in FIG. 6, and the resistor 24 is released from the former member 27 and is frictionally held by the slide fingers 31 and 32.

The slide 28 and ram 29 continue to move to an interchange position, illustrated in FIGURE 8, in which position outer ends of the fingers 31 and 32 are immediately adjacent the mounting board 20. In the interchange position the ram is released from the slide 28, and the slide is interlocked with the frame 30 whereupon continued movement of the ram 29 moves the resistor 24 along fingers 31 and 32 and installs resistor leads 21 and 22 in holes in the previously positioned mounting board 20.

More particularly, frame 30 includes a body 35 rigidly secured to and extending upwardly from a base 36. Base 36 is adapted to be mounted in a suitable bucket (not shown) on a production line in which mounting boards 20 are positioned adjacent and below the head, as shown in FIGURES 4 and 8. Former member 27 has an arm 37 freely received in a longitudinally extending groove 38 in the frame body 35. Arm 37 is secured to the frame by a pin 39 for pivotal movement between the forming position and the releasing position. The former member 27 has an outstanding abutment for holding a resistor for shaping. The abutment is defined by an arcuate former surface 40 on the top end of a block 41 secured to a plate 42 which is attached to the lower end of the former arm 37.

After installing a prior resistor, and as the slide mechanism including slide 28 and ram 29 moves from the extended to the retracted position by engagement of cam surfaces 76 and 77 subsequently to be described, the former member 27 moves to its forming position. With reference to FIGURE 6, magazine 26 deposits a resistor 24 adjacent the former plate 42 with resistor lead 22 supported on former abutment surface 40, as may best be seen in FIGURE 7.

Magazine 26 may be of any suitable type, and as illustrated has a pair of parallel inwardly opening channels 43 receiving resistor bodies 23 with resistor leads 21 and 22 generally aligned and extending outwardly in opposite directions through slots 44 in adjacent channels 43. Curved bottom portions of the channels 43 which direct resistors 24 into the head may be suitably secured to the frame base 36.

Referring to FIGURES 7 and 11, as a resistor 24 is inserted into the head 25 its lead 21 is releasably supported on arm 45 to hold the resistor generally horizontally positioned. Arm 45 is pivoted at an intermediate point by a pin 46 to a bracket 47 suitably secured to base 36. An inner end of arm 45 receives resistor lead 21, and an outer end of arm 45 is weighted and engages a suitable stop on bracket 47 so that the arm is normally maintained in a generally horizontal position. As fingers 31 and 32 engage the resistor 24 finger 31 forces resistor body 23 and lead 21 downwardly and lead 21 pivots an inner end of arm 45 downwardly, or counterclockwise as viewed in FIGURE 11, thereby releasing resistor lead 21.

In order to reciprocate slide 28 and ram 29, the ram is connected with an actuating rod 50 of suitable reciprocating means, such as pneumatic motor 51 mounted on a flange of frame body 35. More particularly, ram 29 is detachably interlocked with a clevis 52 which is threadably secured to the actuating rod 50. Ram 29 is slidably mounted in slide 28 and has a pair of outwardly extending tongues 53 slidably received in adjacent grooves in slide finger 32 and an arm 54 of the slide. Finger 31 is secured to slide arm 54. A cam plate 55 passes between the ram 29 and frame body 30 and rigidly connects slide finger 32 and slide arm 54. A channel-shaped guide block 56 slidably embraces frame body 30 with a snug sliding fit and is secured to cam plate 55 thereby securing slide 28 to the frame for longitudinal sliding movement on frame body 30.

In the retracted position slide 28 and ram 29 are interlocked for sliding movement by a roller 60 received in a slot 61 in slide cam plate 55 and a cooperating groove 62 in the inner face of ram 29. Roller 60 spans frame body slot 38 and is retained in ram groove 62 by engagement with the adjacent face of the frame body 30.

As the slide 28 and ram 29 move from retracted toward extended position the slide fingers 31 and 32 engage resistor 24. Resistor body 23 is forced downwardly by slide finger 31 as resistor lead 21 is released from arm 45 causing a bend in resistor lead 22, and the resistor body 23 slides in a V-shaped groove 63 in finger 31. Resistor lead 22 is also bent downwardly by slide finger 32 and slides in a rectangular groove 64 in finger 32. Thus, resistor lead 22 is bent U-shaped about abutment 40 with the resistor body 23 extending coaxially with the unbent lead 21.

Continued movement of the interlocked slide 28 and ram 29 causes a beveled cam surface 67 on cam plate 55 to engage a cooperating cam surface 68 on former arm 37, thereby moving former member 27, and more particularly abutment 40, from the forming position to the releasing position, as indicated by the arrow in FIGURE 6. Resistor body 23 and resistor lead 22 are held in finger grooves 63 and 64, respectively, from which the resistor may be manually removed, if desired. However, in the preferred embodiment the resistor moves with the interlocked slide 28 and ram 29 to the interchange position, shown in FIGURE 8, wherein the free outer ends of fingers 31 and 32 are adjacent the mounting board 20. In this position a lower edge of guide block 56 engages and is stopped by frame base 36 and roller slot 61 and groove 62 are aligned with groove 69 in former arm 37 and with grooves 70 in frame body 35. Roller 60 moves in cam plate slot 61 into roller grooves 69 and 70 under the urging of ram 29, thereby interlocking slide 28 and frame body 35 and releasing ram 29 for continued movement toward the extended position shown in FIGURE 4. As ram 29 moves to the extended position it engages resistor 24 and slides the resistor through the finger grooves and inserts leads 21 and 22 in the holes in mounting board 20.

As actuating rod 50 reverses its direction and draws the ram toward the retracted position, a shoulder 73 on the outer face of the ram 29 engages and is stopped by a stop plate 74 which is secured to the top end of finger 32 and slide arm 54. In this position ram roller groove 62 is adjacent to and receives roller 60 thereby again interlocking slide 28 and ram 29, and releasing the slide from interlocked relationship with frame body 35 so that the slide and ram may move together to the retracted position.

Upon continued movement of the slide 28 and ram 29 from the interchange position toward the retracted position a second beveled cam surface 76 on cam plate 55 engages a second beveled cam surface 77 on former arm 37 thereby pivoting the former member 27 from the releasing position to the forming position shown in FIGURE 6. Forming member 27 is held in the forming position by engagement of its upper end with the inner face of cam plate 55.

Should the leads of a resistor 24 not be crimped and the resistor remain in the slide fingers 31 and 32 the resistor could be carried in the fingers back toward base 36. To prevent the resistor from becoming entangled in the former member 27, or otherwise jamming the head, an ejector spring 78 is suitably secured, as by a bolt 79, in a slot in the lower face of frame base 36. Thus the resistor is free to pass outwardly of the head past the ejector spring 78 when being inserted, but engagement of the ejector spring on the bottom face of the frame base 36 prevents the spring from arching and stops the resistor from traveling upward with the slide and ram as they are retracted.

It should be noted that as the slide fingers 31 and 32 move past the former 41 they engage the leading resistor 24 in the magazine to prevent the resistor from prematurely entering the head. Similarly a resistor properly placed adjacent the former plate 42 prevents a following resistor from falling from the magazine into the head.

At the beginning of a cycle, the slide 28 and ram 29 are in their fully-retracted, upper position and the former member 27 is in its forward position with a component in position having one lead resting on the curved abutment 40 of the former member. The cylinder 51 is actuated to lower the ram 29 and slide 28 together, with the slide fingers 31 and 32 moving past abutment 40 to shape the component to the shape shown in FIGURE 8. The former member 27 is cammed rearwardly to release the component from support by the former member and the ram 29 is declutched from the slide 28 to permit movement of the ram relative to the slide. This, then, causes ejection of the component from the slide fingers and placement in the mounting board. Reversal of the cylinder 51 then elevates the ram and slide after the slide is again clutched to the ram and the former member is moved forwardly to position to receive the next component.

I claim:

1. A head for shaping a resistor having a body and oppositely directed wire leads, comprising: a frame; a member mounted on said frame for movement between

a forming position and a releasing position; means comprising an abutment extending outwardly from said member and a pivoted arm on said frame for releasably holding said resistor with one lead extending across said abutment and the other lead extending across said arm when said member is in its forming position; a mechanism including a slide and a ram slidable on said frame past said abutment; means comprising a pair of fingers on said slide for bending said one lead generally U-shape as said mechanism moves in one direction past said abutment to shape said resistor, and for holding the shaped resistor, said fingers being positioned on the slide to move along opposite sides of said abutment with one finger engaging a lead and the other finger being spaced a greater distance from the abutment to engage the resistor body and place said body between the latter finger and said abutment; and means on said ram for moving said member to its releasing position to release said shaped resistor, and for discharging said resistor from said fingers as said ram moves in said one direction.

2. The head of claim 1 and means responsive to movement of said slide opposite said one direction for ejecting a resistor which has not been discharged from said fingers.

3. The head of claim 1 wherein said pivotal arm is releasably retained for holding said resistor lead by a weighted end of the arm.

4. A head for shaping a resistor having a body and oppositely directed wire leads, comprising: a frame; a member mounted on said frame for movement between a forming position and a releasing position; means comprising an abutment on said member for releasably holding said resistor with one lead extending across said abutment when said member is in its forming position; a mechanism including a slide and a ram slidable on said frame past said abutment; means comprising a pair of fingers on said slide positioned on the slide to move along opposite sides of the abutment with one finger engaging said one lead for bending said one lead generally U-shape and the other finger being spaced a greater distance from the abutment to engage the resistor body between the latter finger and said abutment with said one lead generally parallel to the resistor body and the other lead coaxial with the resistor body; and means on said ram for moving said member to its releasing position to release said shaped resistor.

5. A head for shaping a resistor having a body and a pair of leads extending outwardly from opposite ends of the body in coaxial relation with the body, comprising: means including an abutment for releasably holding said resistor with one lead extending past said abutment; means including a pair of members movable past said abutment in one direction with one member spaced from the abutment a distance equal to the thickness of a lead for bending said one lead generally U-shape and the other member being spaced from the abutment a distance equal to the thickness of the resistor body for engaging and holding the resistor with the body and other lead still coaxially disposed; and means for discharging said resistor from said members.

6. A component forming and inserting head for shaping a component having a body and wire leads of a cross-sectional size less than the body extending from opposite ends of the body to place the extremities of said leads in generally parallel relation, said body being coaxial with one lead and a U-shaped bend in the other lead, comprising; a frame, a pair of spaced apart bending fingers mounted on said frame for movement along parallel paths, a former member pivotally mounted on said frame and having an abutment with an operative position between said paths, means for holding the component in position for shaping with one lead resting on the abutment and in the path of one finger with said body at a side of the abutment and in the path of the other finger, the fingers being positioned on the frame to move in their paths past said abutment one to each side thereof whereby said one finger engages the lead resting on the abutment and said other finger engages said body, said body-engaging finger being at a greater distance from the abutment than said one finger because of the greater cross-sectional size of said body whereby the body is positioned between the abutment and the body-engaging finger when the one lead is bent, means for moving said abutment away from operative position, and means for ejecting a shaped component from said fingers.

7. A head as defined in claim 6 in which said component resting on the abutment is unbalanced because of the body being to one side and a pivoted arm on the frame engageable with the underside of a component lead for releasably supporting said unbalanced component.

8. A component forming and inserting head for shaping a component having a body and wire leads of a cross-sectional size less than the body extending from opposite ends of the body to place the extremities of said leads in generally parallel relation with said body coaxial with one lead and a U-shaped bend in the other lead, comprising; a frame, a pair of spaced apart bending fingers mounted on said frame for reciprocating movement, a former member pivotally mounted on said frame and having an abutment with an operative position, means for holding the component in position for shaping with one lead resting on the abutment and said component body to one side of the abutment, the fingers being positioned on the frame to move past said abutment one to each side thereof whereby one finger engages the lead resting on the abutment and the other finger engages said body, said body-engaging finger being at a greater distance from the abutment than the other finger because of the greater cross-sectional size of said body to provide space for the body between the body-engaging finger and the abutment, means for relatively moving said abutment and shaped component away from each other, and means for ejecting a shaped component from said fingers.

References Cited in the file of this patent

UNITED STATES PATENTS

2,088,563	Ash et al.	Aug. 3, 1937
2,635,234	Reed	Apr. 21, 1953
2,893,008	Gagnon	July 7, 1959
2,896,213	Alderman	July 28, 1959
2,904,786	Hazel	Sept. 22, 1959
2,911,646	Vossen	Nov. 10, 1959
2,961,027	Ullman	Nov. 22, 1960

FOREIGN PATENTS

850,248	Great Britain	Oct. 5, 1960