United States Patent

[11] 3,540,494

[72] Inventor George C. Susong
Morristown, Tennessee

[21] Appl. No. 733,568
[22] Filed May 31, 1968
[45] Patented Nov. 17, 1970

[73] Assignee The Magnavox Company
Fort Wayne, Indiana
a corporation of Delaware

[54] MACHINE FOR TREATING ELECTRICAL COMPONENTS
16 Claims, 7 Drawing Figs.

[52] U.S. Cl. 140/1, 72/384, 72/418, 72/424, 140/105
[51] Int. Cl. B21f 45/00
[50] Field of Search ..... 140/1, 71, 105; 72/384, 405, 417, 418, 424, E.C. Dig.

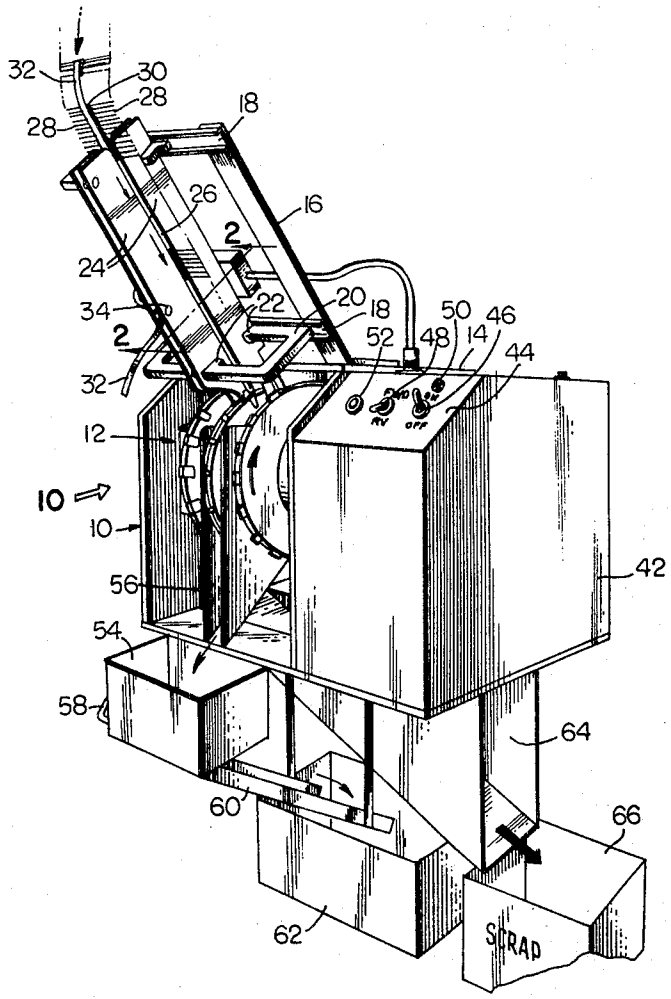
[56] References Cited

UNITED STATES PATENTS

2,450,920	10/1948	Shand	140/71
2,929,289	3/1960	Gorecki	140/71
2,961,027	11/1960	Ullman et al.	72/424
3,144,889	8/1964	Cole	140/140
3,193,171	7/1965	Johnson et al.	140/105
3,403,540	10/1968	Schwartz	72/384

Primary Examiner—Lowell A. Larson
Attorney—Richard T. Seeger

ABSTRACT: A machine for treating electrical components, such as resistors, which have leads extending from the opposite ends thereof. The machine includes a feed device for feeding the components into the machine in a direction at right angles to the length of the components. The feeding means delivers the components, one at a time, to the periphery of a wheel assembly which supports the components with the ends of the leads projecting therefrom. The wheel conveys the components through a treatment station where at least the ends of the leads are clipped off. The treatment station may also include devices for forming one, or both, of the leads to a desired configuration. The treated components are ejected from the wheel assembly after treatment and are discharged to a receiving station.



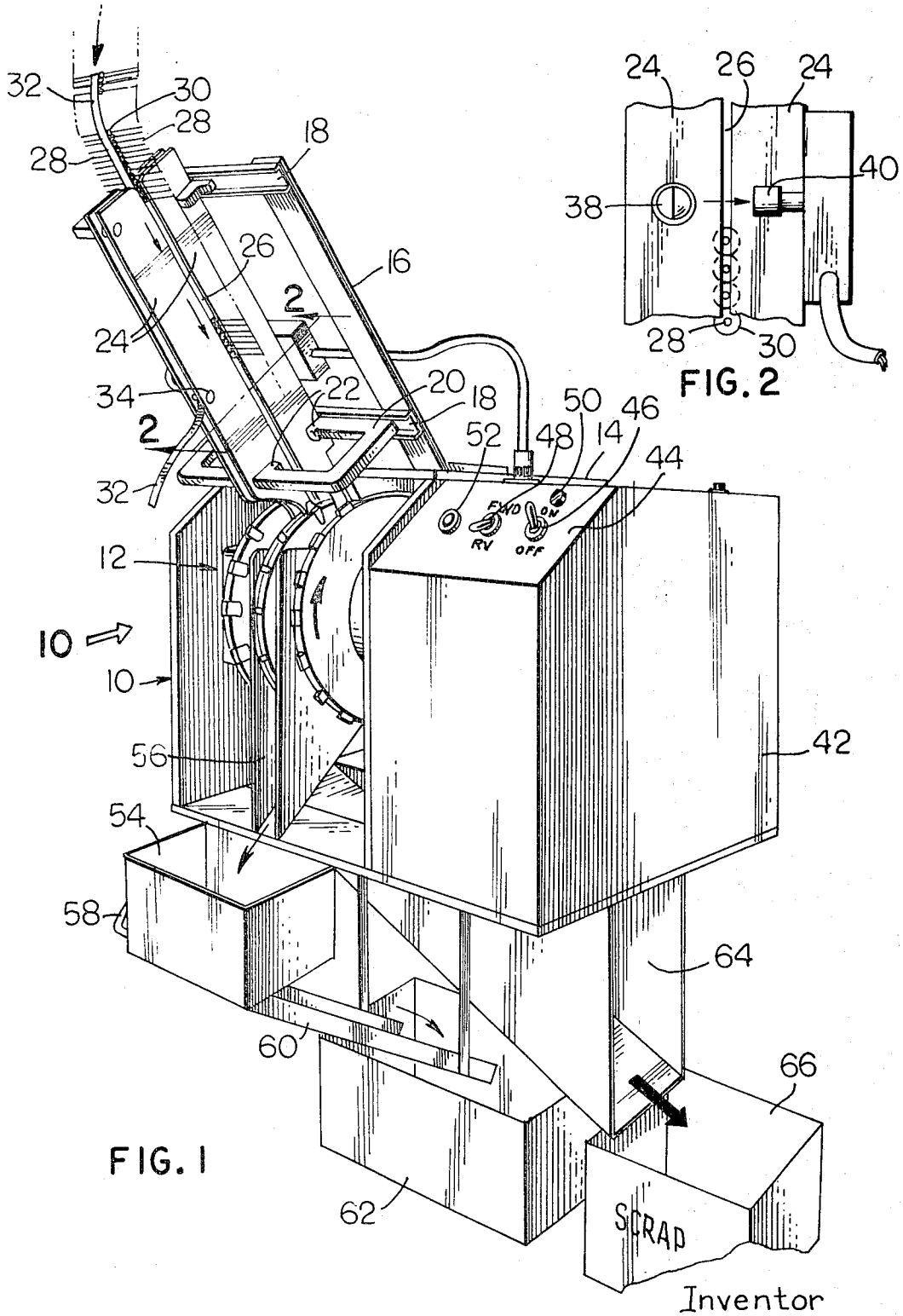


FIG. 1

FIG. 2

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

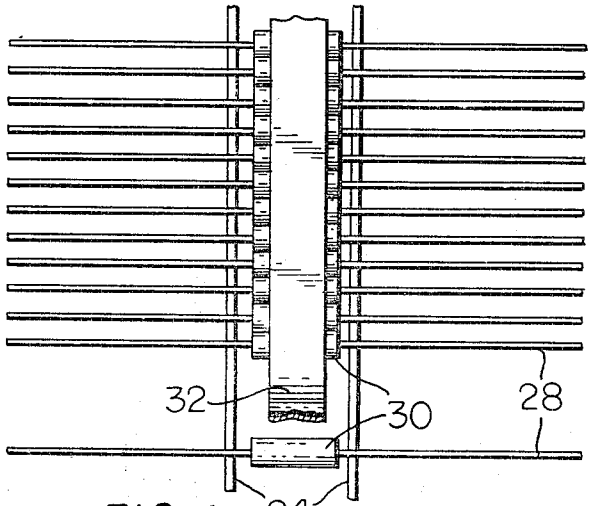


FIG. 4

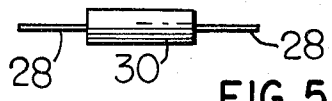


FIG. 5

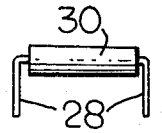


FIG. 6

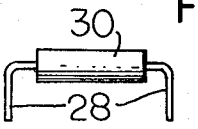


FIG. 7

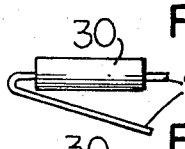


FIG. 8

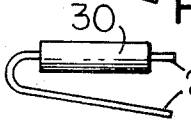


FIG. 9

FIG. 3

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

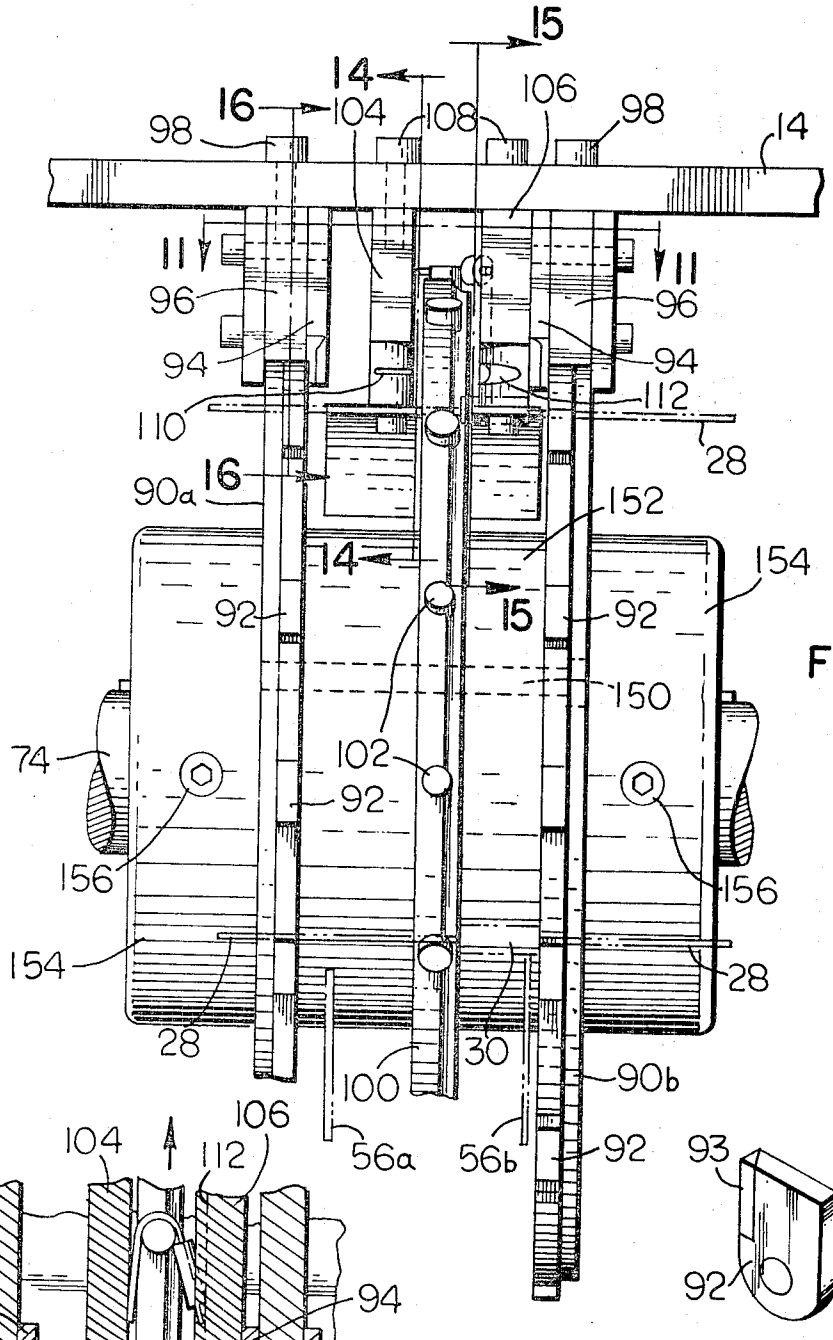


FIG. 10

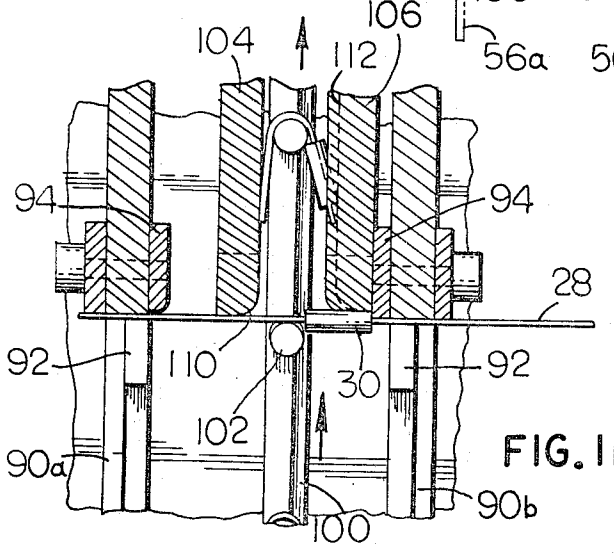
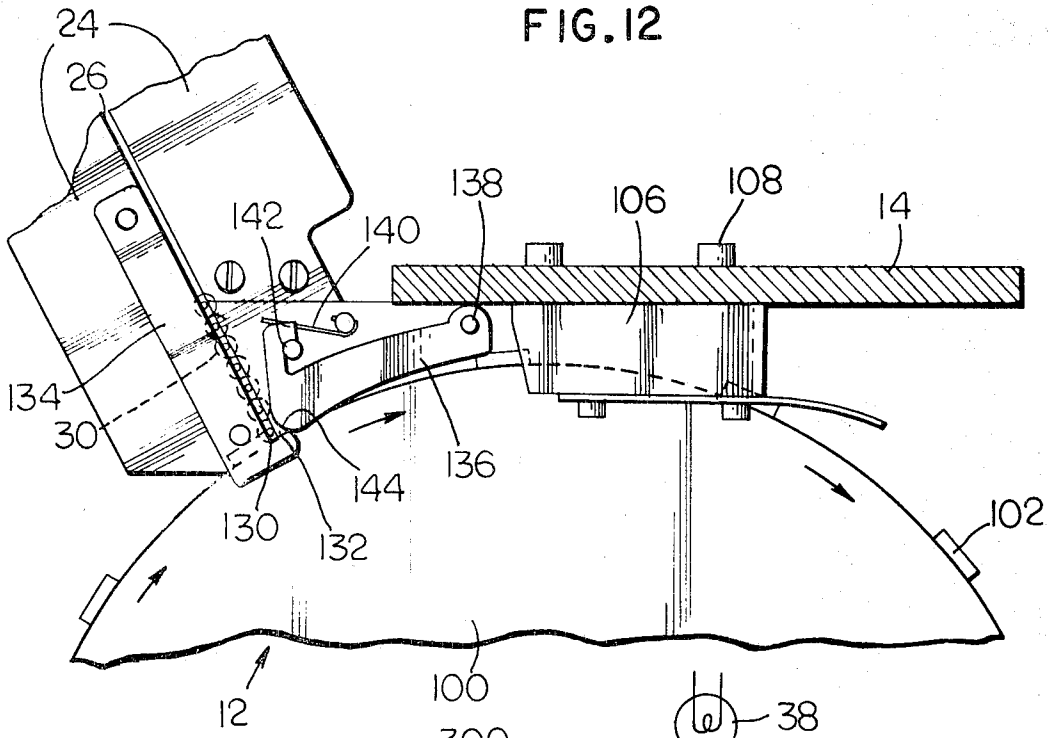


FIG. 11

FIG. 13

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

FIG. 12



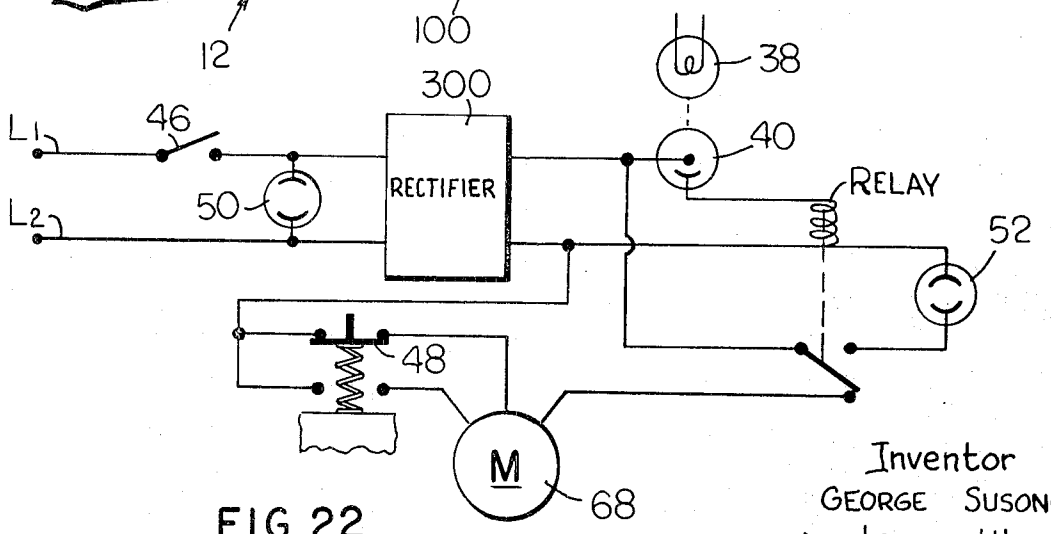


FIG. 22

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

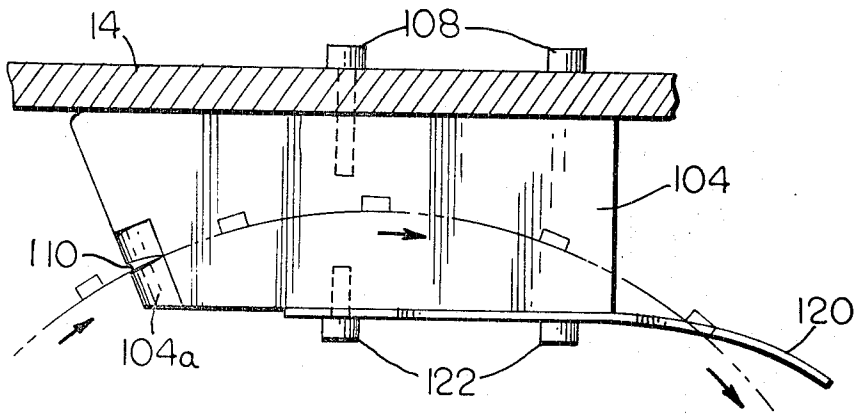


FIG. 14

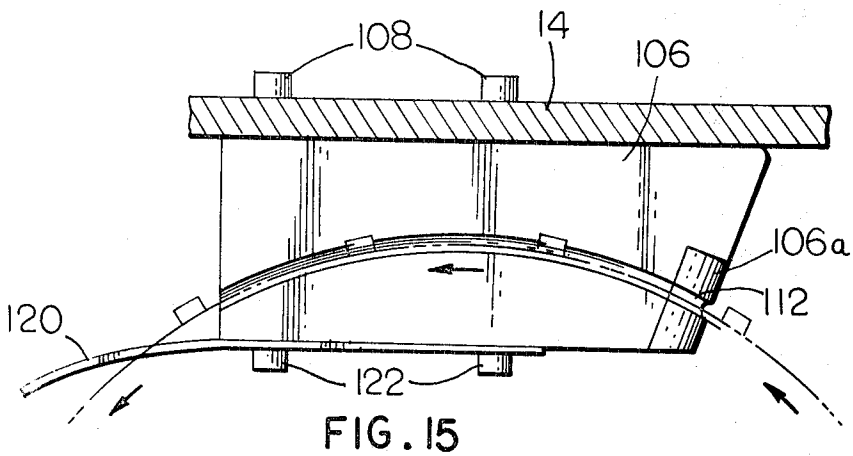


FIG. 15

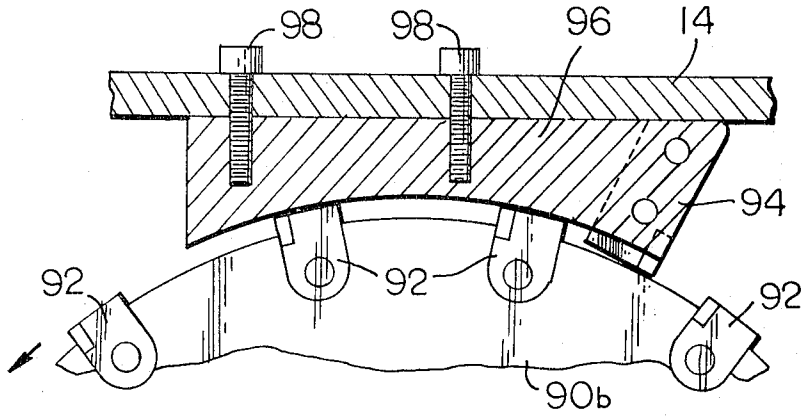


FIG. 16

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

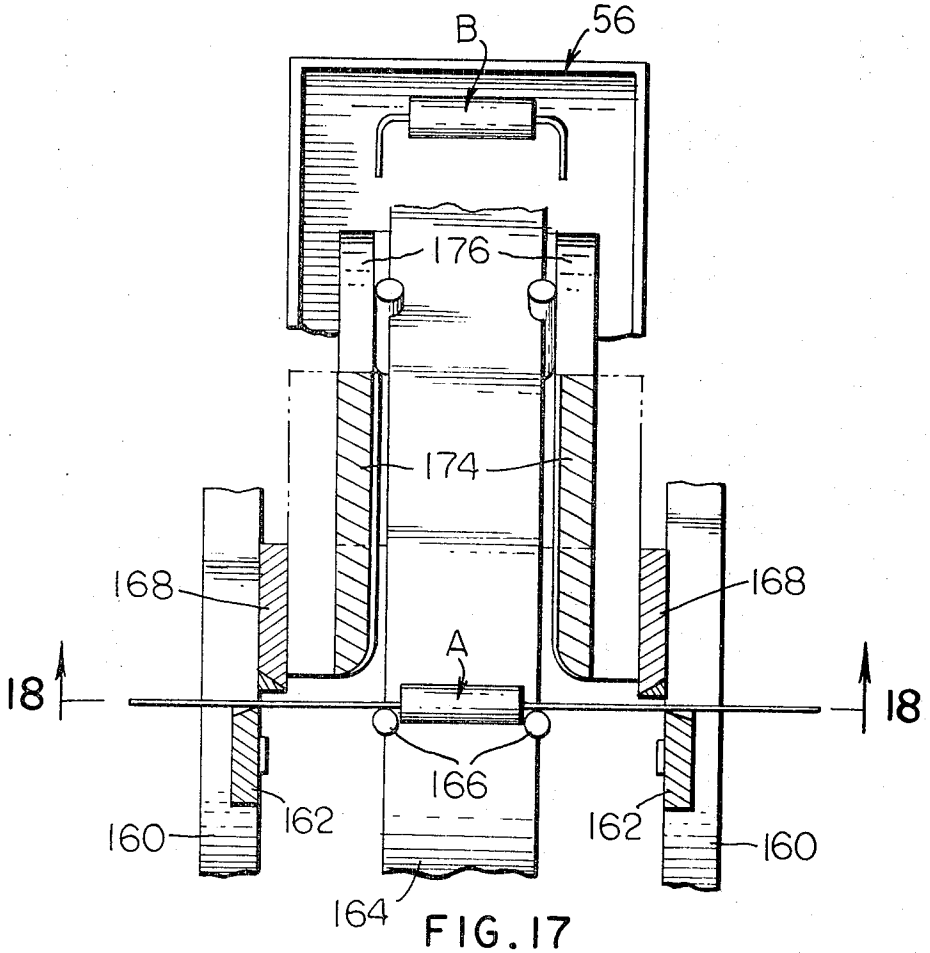


FIG. 17

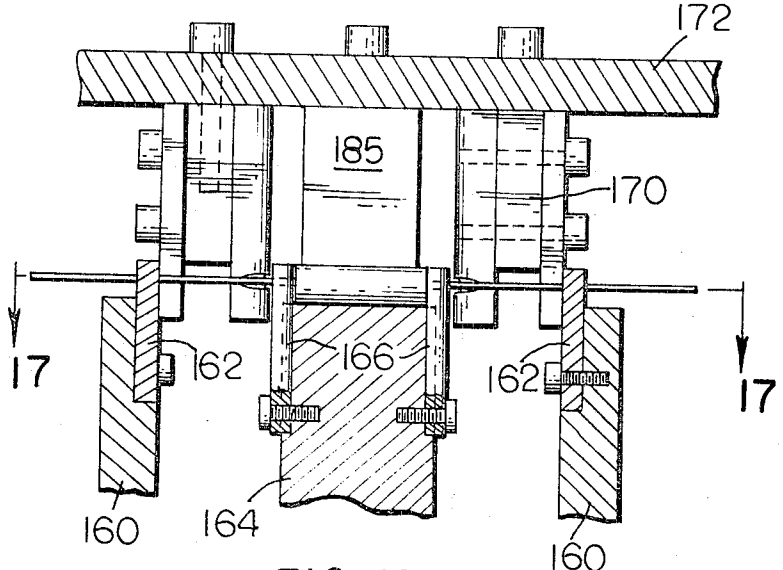


FIG. 18

Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

FIG. 19

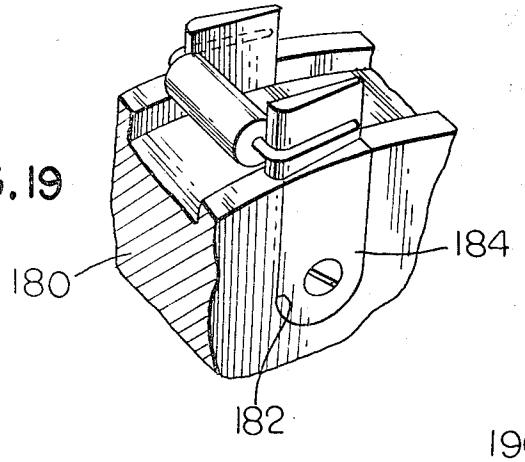


FIG. 20

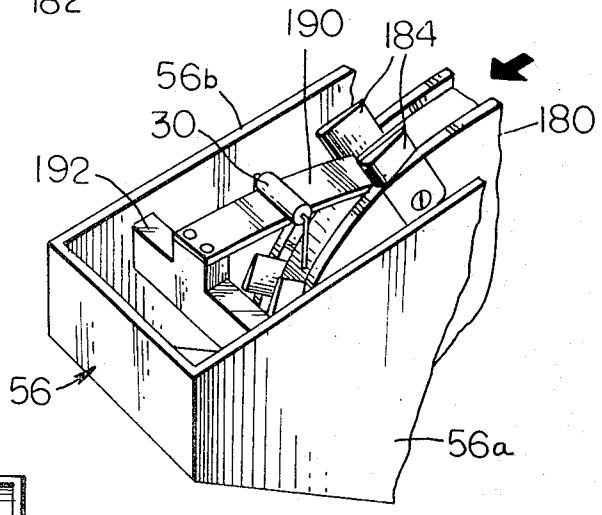
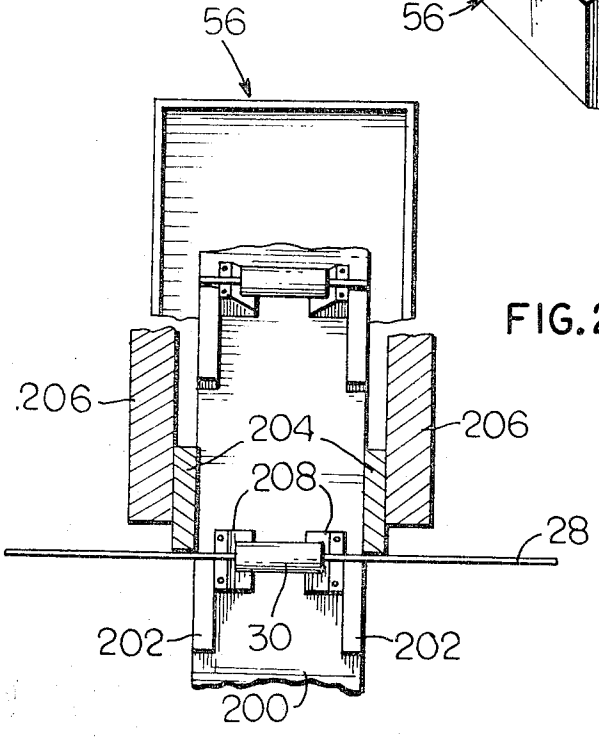


FIG. 21



Inventor
GEORGE SUSONG
by JEFFERS & YOUNG
Attorneys

MACHINE FOR TREATING ELECTRICAL COMPONENTS

The present invention relates to an apparatus for clipping and/or shaping the terminal leads of resistors or capacitors or similar electrical components.

Capacitors and resistors, particularly the latter, are used in mass quantities by the manufacturers of electrical and electronic equipment. Such units, particularly the resistors, are supplied by the manufacturers thereon with long straight leads on the ends and with the resistors usually arranged in side by side relation and secured together on a tape or other commercial type packaging. This matter of manufacturing and packaging the resistors makes it convenient to produce them with automated equipment and to ship the resistors to a user and also makes it convenient for the user to store the resistors and thereafter handle the resistors as they are being used.

The long straight leads at the ends of the resistor are supplied in this manner so that the resistor is adapted for the many different locations in which it is apt to be placed. Sometimes the resistor is connected between two terminals with straight leads and, other times, in order to fit the resistor into a circuit arrangement, the leads are bent to a particular configuration. At still other times, the resistor is placed in a printed circuit board and, in this last case, the leads are usually bent off at right angles to the length of the resistor so they can be introduced into holes provided therefor in the circuit board.

Usually the leads are clipped to a certain length and are then bent to the desired configuration.

Heretofore, it has frequently been the practice to handle each resistor individually and to clip and bend the leads manually. While this operation can be done quite quickly, it is nevertheless the case that whenever a great many resistors are handled, considerable overall time is consumed in this operation even when such equipment has been converted to automatic or semiautomatic operation.

Having the foregoing in mind, it is a primary objective of the present invention to provide an apparatus for automatically handling resistors in the manner in which they are delivered by the manufacturer and with the machine being operable for automatically clipping and shaping the resistor leads in an improved manner and in considerably less time.

Another object of this invention is the provision of a machine of the nature referred to above which is readily adjustable to meet the widely varying lengths and shapes of resistor leads desired to fit the resistors to all circuit arrangements in which they are to be placed.

A still further object of this invention is the provision of a machine of the nature referred to which will operate completely automatically and will deliver the finished resistors to one collection station while discharging the scrap cutoff ends of the leads to another station.

It is also an object of this invention to provide a device for automatically processing resistors to effect sizing and shaping of the terminal leads thereof in a very convenient and rapid manner.

The foregoing objects as well as other objects and advantages of the present invention will be more apparent upon reference to the following detailed specification taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view showing a machine according to this invention.

FIG. 2 is a sectional view indicated by line 2–2 on FIG. 1 showing how the components are guided into the machine.

FIG. 3 is a fragmentary perspective view showing a portion of FIG. 1 and illustrating the forming wheels and the drive therefor.

FIG. 4 is a view showing resistors advancing between the guides therefor and illustrating how the resistors are held together by a tape.

FIGS. 5 through 9 show different lead formations made with different forming wheels and forming tool arrangements according to the present invention.

FIG. 10 is a view looking in at the forming wheels and forming members for forming the resistor according to FIG. 9, said view looking at FIG. 1 in the direction of the arrow 10.

FIG. 11 is a plan sectional view indicated by line 2–2 on FIG. 10.

FIG. 12 is a side view looking in at the side of the forming wheel assembly and showing the feeding of resistors from the guide plates to the forming station.

FIG. 13 is a perspective view showing a cutter element employed for cutting off the leads of the resistors.

FIG. 14 is a sectional view indicated by line 14–14 on FIG. 10 and showing one of the stationary forming members.

FIG. 15 is a sectional view taken on line 15–15 of FIG. 10 and showing the other of the forming members.

FIG. 16 is a sectional view indicated by line 16–16 on FIG. 10 and showing a stationary cutting member and a portion of the wheel carrying the movable cutting members.

FIG. 17 is a plan sectional view indicated by line 17–17 on FIG. 18, and showing the forming of a resistor similar to that of FIG. 7.

FIG. 18 is a vertical sectional view indicated by line 18–18 on FIG. 17.

FIG. 19 is a fragmentary perspective view showing the formation of a resistor in accordance with FIG. 6.

FIG. 20 is a fragmentary perspective view showing how the resistors of FIG. 19 are ejected from the forming wheel.

FIG. 21 is a plan sectional view similar to FIG. 18 but showing how a resistor according to FIG. 5 can be centered on the cutting wheel and the terminal leads thereof clipped off to a certain length; and

FIG. 22 is a schematic showing of a control circuit for the machine of the present invention.

The present invention, in brief, comprises a machine into which resistors are fed continuously from a supply thereof consisting of a plurality of the resistors in side by side relation and bound together by a tape or other commercial type packaging. The resistors, in being fed, are delivered one at a time to the periphery of a rotating wheel arrangement with the longitudinal axis of each resistor parallel to the axis of rotation of the wheel arrangement.

The resistors are advanced, one at a time, by the wheel arrangement to a treatment station where the leads are clipped off and immediately thereafter formed to the desired configuration. The resistors are then discharged from the wheel arrangement to a finished resistor collection station while the clipped off ends of the leads are separately discharged to a scrap collection station.

The wheel arrangement is adjustable to accommodate for different sizes of resistors and the cutting means by which the leads are cut off are adjustable to provide for the desired lead length and the forming elements which form the leads after they have been cut off are also adjustable and exchangeable to provide for the desired lead configuration.

The machine is preferably provided with an automatic stop arrangement which will interrupt operation of the machine when the supply of resistors to the machine is interrupted.

Referring to the drawings somewhat in more detail, FIG. 1 is a perspective view of a machine according to the present invention with a portion of the front cover thereof removed to show some of the working parts of the machine. In FIG. 1, it will be seen that the machine comprises a frame generally indicated at 10 in which, generally indicated at 12, is a rotatable wheel assembly or arrangement which receives the resistors and carries the resistors through the treatment station, consisting of lead cutoff and forming stations to be described hereinafter.

The frame 10 comprises a top wall member 14 and supported on the top wall member 14 is a pair of inclined straps 16. Extending laterally between these straps at spaced points therealong are transverse rails 18. The rails 18 are adapted for supporting the relatively deep "C" shaped bracket members 20 which have supporting foot portions 22 at their inner ends. The bracket members are laterally adjustable on rails 18.

Guide plates 24 are supported on the foot portions 22 of the bracket members 20 and have their adjacent edges spaced apart so as to leave a gap 26. The leads 28 of resistors 30 extend through the gaps 26 while the resistors fit in the space between the plates 24. As will be seen in FIG. 1, the resistors 30 are arranged in side by side relation and are interconnected by a tape 32. The tape 32 is stripped from the resistors as by stripping roller means 34 carried by one pair of the guide plates 24.

FIG. 2 shows how the resistors 30 are captive between the guide plates 24 with the leads 28 of the resistors extending through the gap 26 between the plates.

FIG. 2 shows a photocell detector station located at about the plane or section line 2–2 in FIG. 1 consisting of a lamp 38 and a photocell 40. When the beam from lamp 38 to photocell 40 is interrupted by resistors therebetween, the machine can run, but, when the beam is established, the machine will automatically shut off so it does not run idly.

At one side of the frame 10 of the machine is a perforated housing portion 42 and contained therein, as will be seen hereinafter, is a motor and drive train connected with the wheel assembly 12 for rotating the wheel assembly in the direction of the arrow shown thereon in FIG. 1. This housing advantageously has an inclined front wall 44 on which is mounted an on–off switch 46, and a reversing switch 48. Indicating lamp 50 indicates when power is being supplied to the machine and indicating lamp 52 indicates whether or not the machine is in operation.

FIG. 1 also shows a receiving station 54 for completed resistors which are delivered thereto from the chute means 56 in the frame of the machine. This receiving station 54 may be in the form of a box with a gate in the bottom operable by lever 58 to discharge resistors by another chute 60 into a tote box 62. The scrap cutoff ends of the leads may be delivered from frame 10 of the machine via a scrap chute 64 to a scrap station which may consist of another tote box 66.

FIG. 3 is a somewhat schematic representation of a portion of the machine and it shows the wheel assembly 12 and the power unit located within compartment 42. The power unit comprises a reversible motor 68 connected via gearing 70 with a gear 72 fixed to the end of shaft 74 of wheel assembly 12. Shaft 74 is rotatably supported in bearings 76 and 78 secured to the respective walls 80 and 82 of the frame of the machine. FIG. 3 will show that the completed resistor chute 56 extends diagonally upwardly beneath the wheel assembly 12 and includes a pair of side plates 56*a* and 56*b* which extend between various wheel portions of the wheel assembly. FIG. 3 also shows that the scrap chute 56 extends into the frame of the machine to a region beneath the wheel assembly so that the clipped off resistor ends will fall into the scrap chute and will be discharged from the machine.

FIG. 4 shows, about to scale, the appearance of one size of resistors 30 and their leads 28, the binding tape 32 for the resistors and the positions of the resistors between the guide plates 24 as they move downwardly toward the wheel assembly of the machine.

FIGS. 5, 6, 7, 8 and 9 show some of the completed resistor forms that can be made in the machine according to the present invention. FIGS. 5 through 9 do not exhaust the possibilities of resistor forms but are shown as being exemplary of the work operations carried out by the present machine.

In FIG. 5, the resistor 30 has merely had its leads 28 clipped off so they extend on opposite ends of the resistor a predetermined distance in a straight line.

In FIG. 6, the resistor 30 has had its leads 28 clipped off to a certain length and then bent rather sharply at the ends of the resistor to extend therefrom substantially at right angles.

In FIG. 7, resistor 30 has had its lead terminals 28 clipped off, then bent around a relatively gradual curve so as to extend substantially at right angles to the length of the resistor.

In FIG. 8 the resistor 30 has had the lead terminal 28 at the right side clipped off short while the lead terminal 28 at the left side has been clipped off at a longer length and has been bent backwardly at a relatively sharp angle so as to extend angularly along the side of the resistor.

In FIG. 9, resistor 30 has had its right-hand terminal lead 28 clipped off to a certain short length while the left-hand terminal lead 28 has been cut off and bent backwardly around a relatively large radius so as to extend angularly back along the side of the resistor. As the description proceeds it will be evident that other lead formations could be produced in the machine according to the present invention but FIGS. 5 through 9 will serve to show the flexibility and adaptability of the machine.

FIG. 10 is a view looking in from the front of the machine and showing one setup in which a resistor of the type shown in FIG. 9 is formed.

FIG. 11 is a plan sectional view indicated by line 11–11 on FIG. 10 and FIG. 12 is a side view 12–12 of a still further view of the feed mechanism for the resistors.

In these FIGS. it will be seen that the wheel assembly comprises a pair of axially spaced cutter wheels 90*a* and 90*b* each of which has circumferentially spaced cutter elements 92 carried thereon on the sides of the wheels facing each other. These cutter elements are adapted for cooperation with cutter elements 94 stationarily mounted in the machine on the underneath side of the top plate 14. The cutter elements are supported by blocks 96 which are suspended from beneath the top plate by screws 98. It will be appreciated that in this particular case, the movable cutter elements 92 move on the outside of the stationary cutter elements 94 and the reason for this will become apparent as the description of the resistor elements proceeds.

Each cutter element 92 may be of the form shown in FIG. 13 where it will be seen that the cutter element is in the form of a short bar adapted to seat within a correspondingly shaped recess in the supporting wheel, therefor while the cutter end of the bar projects radially from the wheel. The leading tip of the cutter element 92 may be provided with the edge of 93 of an extremely hard material such as tungsten carbide, for example.

Returning to FIG. 10 it will be seen that the wheel assembly comprises a third intermediate wheel 100 having pins 102 extending radially therefrom and carried thereby adjacent one side edge. The circumferential spacing of pins 102 is exactly the same as the circumferential spacing of cutter elements 92 and the cutter elements and pins are in axial alignment. The pins 102 are provided for the purpose of forming the left-hand lead of the resistor shown in FIG. 9.

Between blocks 96 is a pair of forming dies 104 and 106 suspended beneath the top plate by screws 108. Each forming die has an arcuate recess therein, the recess in forming die 104 being shown at 110, and the recess in forming die 106 being shown at 112. These recesses in the forming dies extend arcuately therein on the inside faces concentrically about the axis of shaft 74 of the wheel assembly.

In operation, a resistor is carried by the wheel as shown by the dotted outline toward the bottom of FIG. 10 and also as shown in the plan view at FIG. 11. The body of the resistor 30 is positioned between the wheel 100 and the right-hand cutter wheel 90*b* with the terminal leads 28 extending outwardly in front of the respective cutting element 92. Rotation of the wheel assembly will carry the resistor 30 up to the point in which it is illustrated in FIG. 11 wherein the movable and stationary cutting elements will cooperate to clip off the terminal leads of the resistors. Immediately after the terminal leads of the resistor are sheared off by the cutter elements, the pin 102 forces the resistor in between the forming dies 104 and 106. The relatively shallow groove 110 in the forming die 104 toward the left catches the pertaining resistor lead whereas the larger groove 112 in the right-hand forming die 106 catches the end of the body of the resistor. Continued movement of the wheel will carry the resistor between the forming dies and will bend the left-hand lead around the pertaining pin as is illustrated in FIG. 11.

FIG. 14 shows the side of forming die 104 facing the gap through which the resistor moves. At least the entrance end of forming die 104 includes a carbide block 104*a* in which the shallow groove 110 is at least initiated. This groove 110 may continue completely across the inner face of the forming die as shown by the dot-dash lines or may terminate at the rear end of the carbide block.

FIG. 15 shows the side of forming die 106 facing the gap through which the resistor is drawn and at least the entrance end of this forming die also comprises a carbide block 106*a* in which at least the initial portion of groove 112 is located. This groove preferably extends completely across the face of the forming die to keep the resistor in place and is not necessarily carbide completely across its length although this can be done, if desired.

FIGS. 14 and 15 will also show ejection cams or plates 120 fastened to the bottoms of the forming dies 104 and 106 by screws 122. These ejection cams or plates serve to dislodge the formed resistor from the wheel assembly after the resistor emerges from the forming dies and the resistor so ejected will drop between side plates 56*a* and 56*b* into chute 56 and be discharged to the receiver for the finished resistors.

As will be seen in FIG. 10 by the dot-dash lines, the side plates 56*a* and 56*b* of the finished resistor chute are located inside the wheels 90*a* and 90*b* and on opposite sides of the central wheel 100. In this manner the clipped off ends of the terminal leads will fall outside the side plates 56*a* and 56*b* while the finished resistors will be discharged into the space between side plates 56*a* and 56*b*. It is understood, of course, that the side plates 56*a* and 56*b* are cut out, or terminate, in the region in which the resistors are delivered to the forming wheel and where they pass through the forming station so as not to interfere with the operation of the machine.

Slightly in advance of the point where the terminal leads of the resistor are cut off is the feeding station and which is illustrated somewhat schematically in FIG. 12. In FIG. 12 the top plate 14 from which the cutting and forming elements are suspended is illustrated and the cutting station and the point where the formation of the resistor leads is initiated is at the top center of the wheel assembly 12. Somewhat in advance of this position, the inclined guide plates 24 extend downwardly to closely adjacent the periphery of the wheel assembly. The resistors 30 are guided downwardly in slots 26 and each reaches a terminal position identified at 130 and determined by a ledge 132 formed on the lower end of a pair of laterally guide members 134 secured to the sides of a corresponding pair of the guide plates 24. Immediately adjacent the lowermost resistor in slots 26, in the direction of the movement of the resistor, is a detent arm 136 pivoted at 138 and lightly spring pressed by a spring 140 toward the wheel assembly. A stop pin 142 limits the total possible movement of arm 136 so that it will not drop down and interfere with rotation of the wheel. The nose end of arm 136 is rounded as at 144 so that when a resistor is picked up by the wheel assembly and moved toward the right, as viewed in FIG. 12, arm 136 will be cammed upwardly and permit the resistor to pass therebeneath and advance toward the cutting and forming station. Arm 136 will hold the resistor against the wheel assembly during this movement so that the resistor remains in an operative position on the wheel. As will be seen in FIG. 11, the resistor is fed with its body in the space between pinwheel 100 and cutter wheel 90*b* and in FIG. 12 the side of cutter wheel 90*b* is shown.

Referring back to FIG. 10, it will be noted that the wheel assembly for the operation just described is made up by taking the central wheel 100, carrying the pins 102, and the two outer wheels 90*a* and 90*b*, carrying the cutter elements 92, and bolting the wheels together as by screws, one of which is shown at 150 in FIG. 10 with spacer elements 152 interposed between the individual wheels to produce the proper spacing thereof. The bolted together wheels are then located axially on shaft 74 and are clamped in place by the clamp member 154 which may be secured in place by set screws 156.

It will be understood that the forming members 104 and 106 and the blocks 96 which carry the cutting elements 94 are also preferably adjustably supported on plate 14 so that all of the operative elements of the structure can be brought into the proper interrelationship and locked in place. The guide plates 24 can be adjusted toward or away from each other by adjustment of the bracket member 20 on the rails 18 and the guide elements 134 can also carry out a guiding function so that the resistors will be delivered to exactly the right position on the wheel assembly and be carried thereby to the stationary cutting elements and forming members for carrying out the described operation.

It has been mentioned that the resistor formed in the structure above described is that shown in FIG. 9 wherein the left-hand terminal lead has a rather long radius bend therein. The resistor illustrated in FIG. 8 which has a relatively small radius bend in the left-hand lead would be constructed in exactly the same manner except that the pinwheel between the cutting wheels would carry pins of a smaller diameter and at least the forming member 104 would be adjusted over closer to the central wheel 100. In the case of a wheel carrying quite small pins for making a very short radius bend in the lead of the resistor, the pins would preferably be set at the extreme edge of the supporting wheel therefore and could even project slightly therefrom and in this manner the pins urged pass quite close to the forming member for bending the wire and thereby produce a relatively sharp bend in the wire.

Turning now to the resistor of FIG. 7, this is advantageously formed by utilizing two pinwheels in the middle of the wheel assembly or by using one pinwheel with two sets of pins therein, one along each edge. Cutting wheels would be disposed on opposite sides of the center wheels and these would slip the leads off and thereafter the pinwheels would draw the resistor between a pair of forming members which would bend the leads backwardly to the position shown in FIG. 7.

FIGS. 17 and 18 illustrate the manner in which a resistor according to FIG. 7 could be formed. FIG. 18 can be considered as a view taken on line 18–18 of FIG. 17 and FIG. 17 can be considered to be a view taken on line 17–17 of FIG. 18. In these FIGS. the two cutting wheels are indicated at 160 and carry carbide edged cutting elements 162 on the inner sides. Positioned between wheels 160 is a pinwheel 164 which carries pins 166 along its opposite edges. Wheel 164 could, as mentioned, be in the form of two separate wheels so as to be adjustable to various sizes of resistors or could be in a form of a single wheel when a large quantity of a single type of resistor was to be produced. Movable cutter elements 162 cooperate with stationary cutting elements 168 carried on blocks 170 suspended from beneath a top plate 172 and blocks 170 carry forming members or dies 174. In the arrangement of FIGS. 17 and 18 the resistors are delivered by an arrangement as shown in FIG. 12 to the center wheel 164 and are moved thereby toward the stationary cutting edges and forming members. The resistor at "A" in FIG. 17 is just at the point that clipping of the leads is to commence whereas resistor "B" in FIG. 17 has passed completely through the lead clipping and forming station and has been ejected from the center wheel by ejector plates or cams 176 and is dropping into chute 56.

As will be seen in FIG. 18, an arrangement of the nature illustrated in FIGS. 17 and 18 it may be advantageous to provide a hold down member 185 suspended from top plate 172 and positioned over the middle of the center wheel 164 for retaining the resistor in place on the wheel until it reaches the point that the ejection cams 176 engage the resistor and push it off said wheel.

For forming the resistor shown in FIG. 6, the same sort of operation is carried out except that instead of the pins 166 on the center wheel 164, the center wheel of the type shown in perspective in FIG. 19 can be employed. The wheel 180 in FIG. 19 is provided with peripheral notches 182 of the same type that are formed in the cutter wheels to receive the cutting inserts. In these notches 182 are forming members 184 which

project radially from the edge of the wheel and which preferably are somewhat tapered from front to back. The resistor is received on wheel **180** between the forming elements **184**, as shown in dot-dash outline in FIG. **19** and is conveyed thereby between forming members such as are shown at **174** in FIGS. **17** and **18**. In this manner relatively sharp bends can be produced in the terminal leads of the resistor as opposed to the rounded bends formed therein with the arrangement according to FIGS. **17** and **18**.

It will be evident upon observation of FIG. **19** that ejection of the resistor therefrom cannot be accomplished readily with the same cam arrangement that is shown in FIG. **17**, although it is possible, of course, to position the cams so that they ride close along the sides of the radially outwardly projecting end parts of the forming members, no great certainty of ejection of the resistors from the forming members will be had by this type of ejector. An ejector of the general nature of that shown in FIG. **20** would be suitable for ejecting formed resistors from the wheel according to FIG. **19**. FIG. **20** a relatively thin blade **190** as provided which will engage underneath the resistors and lift them off the forming members **184** and convey them away from the wheel so that they drop into chute **56**. Plate **190** could be supported on a bracket **192** located in the chute **56** and in this manner the resistors would readily be stripped from the wheel and dropped into the discharge chute.

The resistor according to FIG. **5** could, of course, be made quite simply merely by delivering the resistor to a pair of spaced cutting wheels which move past corresponding stationary cutting edges. This operation is shown in FIG. **21** wherein cutting wheel **200** have cutting elements **202** along the opposite edges thereof which move past stationary cutting elements **204** which are supported on the support blocks **206**. With this arrangement the leads of the resistor are merely cut to length. Since the leads are not formed around any forming member, no particular ejecting means for the resistors is required and they can be permitted merely to drop from the cutter wheel into the discharge chute **56**.

In the FIG. **21** arrangement it will be appreciated that it might be the case that the leads would be clipped to such lengths that the movable cutter elements would be spaced substantially from the outer ends of the resistor element thereby introducing the possibility of the resistor shifting laterally in one direction or the other and coming out with one short lead and one long lead. This possibility can be overcome in a number of different manners and FIG. **19** merely illustrates a pair of somewhat wedged shaped blocks **208** which guidingly engage the lower edge of the resistor and hold it substantially centered between the cutting elements so that the leads will be cut off at the same length. The arrangement of FIG. **21** could, if desired, employ a hold down suspended from the top plate for holding the resistor down against the rotating cutter wheel until after the leads were severed, if so desired.

FIG. **22** illustrates one manner in which the motor **68** could be controlled. FIG. **22** shows the on–off switch **46** which connects the power lines L1 and L2 with the input side of a rectifier **300**. Neon lamp **50** shows when switch **46** is closed. One side of the output side of the rectifier is connected through reversing switch **48** with the reversible motor **68** and motor **68** is also connected to the other side of the rectifier through the blade of a relay R. Relay R is normally deenergized to complete the circuit to motor **68**, but is energized when the supply of resistors feeding to the forming wheel is interrupted and photocell **40** is illuminated by lamp **38**. Neon lamp **52** indicates the condition of energization of relay R and, thus, whether the machine is in operation or out of operation.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and accordingly, it is devised to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. In a machine for treating electrical components having terminal leads extending therefrom in opposite directions; a frame, generally vertically extending feed means on the frame for feeding said components in a direction at right angles to said leads, a rotatable wheel assembly in the frame at the lower end of said feed means for receiving said components from said feed means at a predetermined peripheral point on the wheel assembly with said leads parallel to the axis of rotation of the wheel assembly, a treatment station in said frame comprising stationary component treating elements in the frame adjacent the periphery of said wheel assembly and spaced from said feed means in the direction of movement of the adjacent periphery of the wheel assembly, circumferentially spaced movable cutter component treating elements radially projecting from said wheel assembly and forming driving connections between said wheel assembly and said components and movable through said treatment station and past said stationary elements which serve as complementary cutting components as the wheel assembly rotates, said feed means being operable to supply said components one at a time to said wheel assembly during rotation thereof and immediately in front of the movable cutter component treating elements on said wheel assembly, said treating elements cooperating to effect cutting of the said components as the components are conveyed through said treatment station by said wheel assembly, and means for discharging the treated components from said machine.

2. A machine according to claim **1** in which said treating elements move in close proximity to each other and comprise stationary and movable cutter elements in said treatment station and on said wheel assembly respectively which cooperate for clipping the said leads of the components as they pass through said treatment station.

3. A machine according to claim **2** in which said treating elements also comprise forming elements in the treatment station and on said wheel assembly which cooperate as the components pass through said treatment station to engage and bend at least one of said leads to a desired configuration.

4. A machine according to claim **3** in which the forming elements comprise forming plate means in said treatment station extending parallel to the direction of travel of the component and facing the adjacent end of the component, said plate means having means for engaging and bending at least one lead of the component passing through the treatment station.

5. A machine according to claim **4** in which the forming element on the wheel assembly cooperating with said forming plate comprises pin means projecting radially from the forming wheel assembly and moving close by said forming plate means.

6. A machine according to claim **4** in which the forming element on the wheel assembly cooperating with said forming plate comprises blade means projecting radially from the forming wheel assembly and moving close by said forming plate means.

7. A machine according to claim **1** in which said wheel assembly comprises a shaft and wheels mounted thereon and axially adjustable thereon.

8. A machine according to claim **2** which includes a discharge chute for receiving treated components from said wheel assembly and operable for discharging the treated components to a receiving station.

9. A machine according to claim **8** which includes discharge means separate from said discharge chute for receiving the clipped off ends of the leads and discharging the said clipped off ends to a scrap station.

10. A machine according to claim **3** which includes hold-down means between said predetermined peripheral point on said wheel assembly and said treatment station to hold said components against the periphery of the wheel assembly.

11. A machine according to claim **3** which includes a discharge chute for receiving treated components from said wheel assembly and operable for discharging the treated components to a receiving station, and means following said treatment station for ejecting treated components from said wheel assembly and into said discharge chute.

12. A machine according to claim 1 which includes a drive motor for said wheel assembly, and control means operable upon the interruption of the supply of components in said feed means to interrupt the energizing circuit to said motor.

13. A machine according to claim 12 in which said control means includes a light source on one side of the path of the components in said feed means and a photocell on the other side of said path, and a relay in the motor energizing circuit under the control of said photocell.

14. A machine according to claim 13 in which said drive motor is reversible, and manual switch means in the energizing circuit for said motor for effecting the reversal thereof.

15. A machine according to claim 1 in which said feed means comprises pairs of coplanar plates arranged in laterally spaced relation, each pair of plates defining a gap therebetween for receiving one of the leads of the components being fed into the machine, said pair of plates being adjustable laterally to accommodate components of different lengths.

16. A machine according to claim 15 in which said components are supplied to said feed means in parallel side by side relation and secured together by a binding tape, and said feed means includes means for stripping said binding tape from the components.