Dec. 9, 1952 R. F. BREWER 2,621,277

APPARATUS FOR SEVERING METALLIC MATERIAL

Filed April 12, 1950 2 SHEETS—SHEET 1

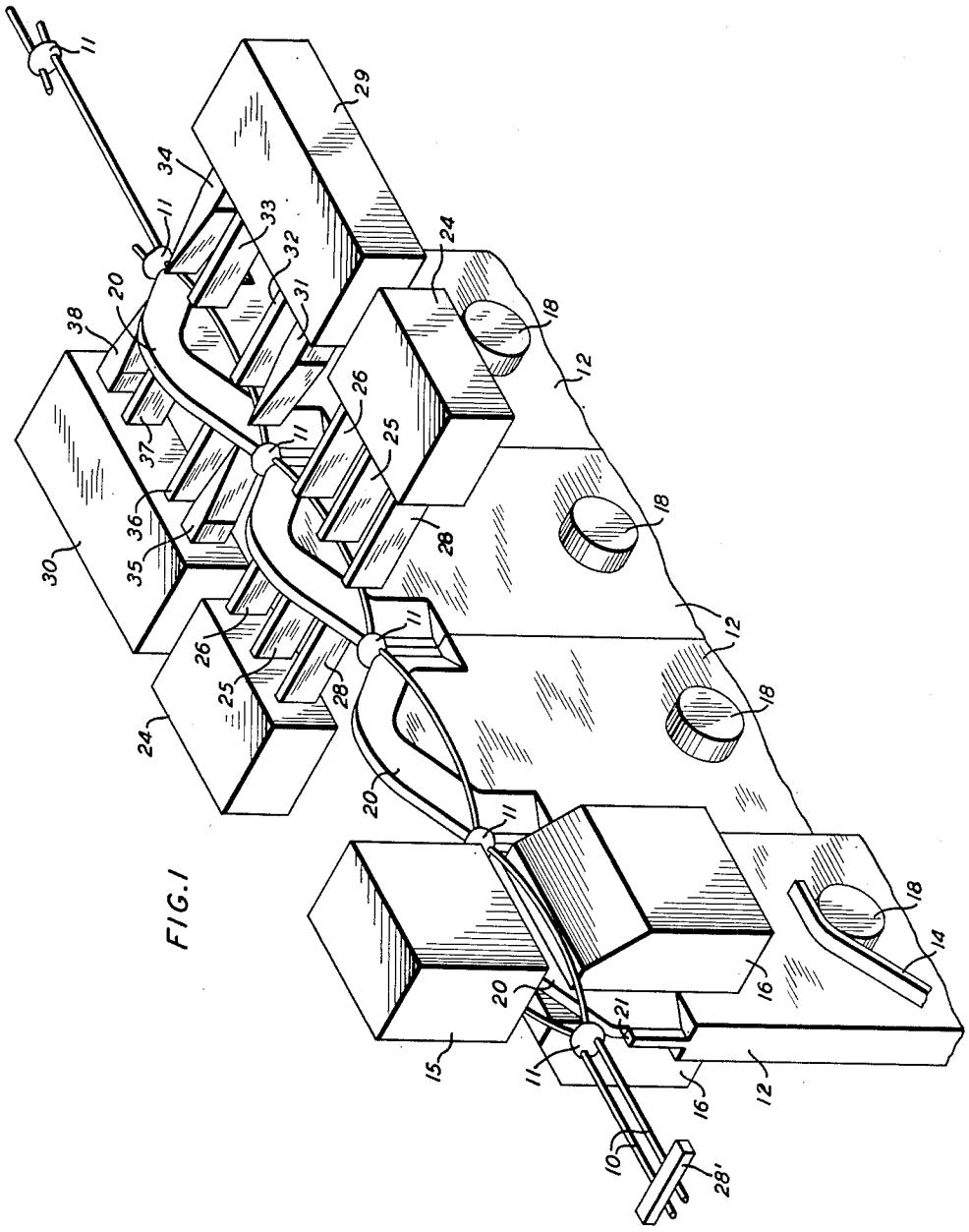


FIG. 1

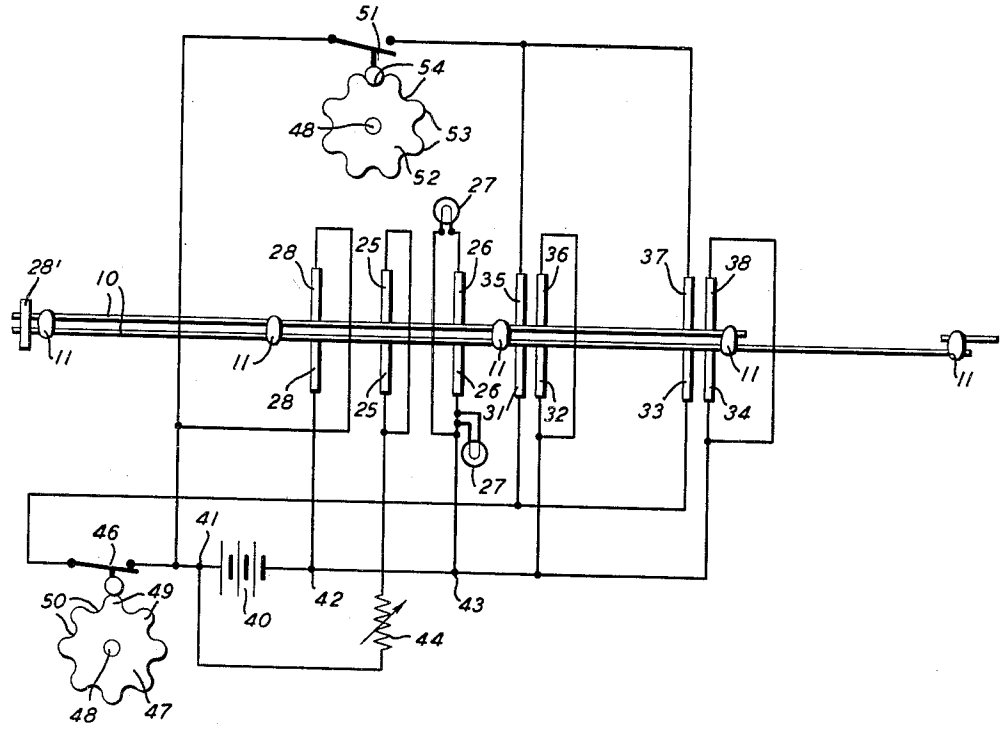
INVENTOR
R. F. BREWER
BY W. C. Parnell
ATTORNEY

Dec. 9, 1952 R. F. BREWER 2,621,277

APPARATUS FOR SEVERING METALLIC MATERIAL

Filed April 12, 1950 2 SHEETS—SHEET 2

FIG. 2



INVENTOR
R. F. BREWER
BY W. C. Parnell
ATTORNEY

Patented Dec. 9, 1952

2,621,277

UNITED STATES PATENT OFFICE

2,621,277

APPARATUS FOR SEVERING METALLIC MATERIAL

Robert F. Brewer, Quakertown, Pa., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application April 12, 1950, Serial No. 155,502

4 Claims. (Cl. 219—1)

1

This invention relates to apparatus for severing metallic material, and particularly to apparatus for removing portions of given lengths at staggered positions from parallel wires held together at spaced positions by bead-like elements.

An object of the present invention is an apparatus which is simple in structure and highly efficient in severing metallic material.

The invention is particularly adapted for use in the manufacture of a type of thermistor which comprises a bead of thermistor material with very fine lead wires embodied therein parallel to each other but extending in opposite directions from the bead. In the mass production of such devices, beads of thermistor material are applied at spaced positions on advancing parallel wires. As an intermediate step of manufacture, it is advantageous to remove alternate sections of each wire to form units of the type mentioned above in a continuous string which may be cut into single units after all the processing steps have been completed. Since the wires are usually very fine and closely spaced, the removal of a section of one wire without damaging the other is a difficult operation requiring special equipment.

With the above and other objects in view, the invention comprises apparatus for positioning contacts to engage wires or other metallic materials at selected positions and for passing current through the sections of the wires between the contacts to sever them by burning away the heated portions.

In one specific embodiment of the invention magnetic means is provided to bow out the parallel wires so that members of insulating material may be inserted between them to hold the wires firmly against the contacts during the burning operation. The wires are checked electrically before reaching the burning position and switches controlling the currents for the two wires are operated alternately to remove alternate sections of each wire.

More specifically, the apparatus is for severing portions from parallel wires connected at spaced positions by bead-like elements, the apparatus including magnetic means to space the wires from each other whereby dielectric members may be inserted therebetween during the intermittent advancement of the wires longitudinally. Checking units are positioned to engage the portions of the wires between the bead-like elements in advance of the severing of the wires so that at the final position when the sets of electrical contacts are moved into engagement

2

with the portions of the wires and these portions included in electrical circuits with the contacts, they may be burned and thereby severed. The severing units, including the sets of contacts, are under the control of their respective switches which are alternately moved into closed positions whereby portions from the wires will be severed at staggered positions leaving a continuous connection of the bead-like elements through lengths of wire.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawings, wherein:

Fig. 1 is an isometric view of a portion of the apparatus illustrating the invention, and

Fig. 2 is a wiring diagram illustrating the electrical circuits of the apparatus.

Referring now to the drawings, attention is directed to Fig. 1 which illustrates only the essential features of the invention. In the present embodiment of the invention, the material to be severed includes parallel wires 10 connected together at equally spaced positions by bead-like elements 11 of thermistor material. The remaining structure of the wires after leaving the apparatus may be wound on a takeup reel (not shown). The apparatus includes a plurality of dielectric elements 12 which may be mounted individually on the links of an endless belt-like chain and constructed so that through spring or other means they are normally urged outwardly to given positions and may be forced inwardly by a cam 14 until they are freed to move between the parallel wires 10. At the first position in Fig. 1, means is provided to force the portions of the wires 10 between the adjacent beads 11 away from each other. This means includes a permanent magnet having a north pole member 15 and south pole members 16 spaced from each other upon each side of the path through which the dielectric members 12 will travel. It will be noted that the elements 12 have suitable lugs or rollers 18 positioned to engage the under surface of the cam 14 to be held downwardly until after the wire portions between which the element 12 is to be positioned have been forced outwardly by the effect of the poles 15 and 16 of the permanent magnet. During the next advancement of the elements 12, the element at the first position held down by the cam 14, is released and allowed to move upwardly into its normal position where its upper portion 20 will extend between the adjacent wire portions. The upper

portions 20 of the members 12 are formed so as to readily extend between the wire portions providing recesses 21 which serve as pockets for the bead-like elements 11. The means (not shown) for intermittently moving the elements 12 may be considered the means for intermittently moving the wires or material 10 longitudinally.

Spaced from the permanent magnet are checking units 24 having central positive contacts 25 and spaced negative contacts 26 to engage the portions of the wires and complete electrical circuits through both indicating units or lamps 27 when the wires have been properly separated. If by chance only one of the units 27 becomes energized, the operator would know that both wires were on that side of the element 12. The machine would be stopped until the wrongly positioned wire is moved onto the other side of the element. This condition should never exist, but by this added precaution, for example, both wires will not be severed at the next station. In the units 24 are contacts 28 to complete a circuit through the wires through the aid of the cross-bar contact 28' to create opposing magnetic fields in the wires adjacent the pole pieces 15 and 16 to cooperate with the magnetic flux of these pole pieces in urging the wires away from each other. For example, the lower wire 10 in Fig. 2 connected to the positive side of the battery contains a positive current, flowing toward the contact bar 28', whereas the upper wire 10 is connected to the negative side of the battery and contains a negative current, that is one traveling in the opposite direction whereby the opposing currents create opposing magnetic fields tending to move the wires away from each other assisted by the magnetic field pole pieces 15 and 16.

At the next position, severing units 29 and 30 include sets of contacts 31—32, 33—34, 35—36 and 37—38. These sets of contacts may be moved into engagement with the portions of the wires, but it depends upon the controlling switches of the units as to which portion of the wire will be severed.

Attention is now directed to Fig. 2. In the present illustration, the source of electrical energy is represented by a battery 40. It will be noted that the positive contacts 25 of the checking units 24 are connected to one side of the battery 40 at connection 41 while the negative contacts 26 are connected to the other side of the battery at connections 42 and 43. The units 24 are movable into and out of engagement with the wire portions if so desired by suitable means (not shown). The important factor being that, during the interval of rest, the contacts 25 and 26 of these units engage their respective wire portions so that these wire portions may complete the circuits in which the current may be under the control of a variable resistance 44 whereby the units may check the positions of the wires in advance of the severing operation. The unit 29, including the sets of contacts 31—32 and 33—34 are under the control of a switch 46 which is operated by suitable means whereby the switch will open and close alternately with the advancements of the wires. This means in the present embodiment of the invention includes a cam 47 driven by its shaft 48 in synchronism with the members 12 so that during one movement of the elements 12, a high portion 49 will close the switch whereas during the next movement of the elements 12, a low portion 50 will effect opening of the switch. The contacts 35—36 and 37—38 of the unit 30 are under the control of a switch 51 which has a similar actuating means or cam 52 with high portions 53 and low portions 54. The cam 52 may be mounted on the shaft 48, but it is so arranged thereon that its low portions will register with the switch 51 when the high portions 49 of the cam 47 registers with the switch 46 and in a like manner, the high portions 53 of the cam 52 will operate the switch 51 into closed position, when the low portions 50 of the cam 47 effect opening of the switch 46.

Considering now the operation of the apparatus, it will be observed that during the intermittent motion of the members 12, the metallic material or the parallel wires 10 with their connecting bead-like elements will be advanced intermittently longitudinally. As the portions of the wires come within the field of the magnet, they are forced away from each other assuring proper spacing of the wire portions for the upper portion 20 of the adjacent element 12 to pass therebetween into the normal position when released by the cam 14. The contacts 28 of the units 24, as previously described, will assist in the separation of the wires. Also the contacts 25 and 26 will engage the wire portions between each set of bead-like elements to check the accurate positioning of these portions. By observing the drawings, it will be noted that during the previous operation of the apparatus, a portion of a given length of the topmost wire had been severed therefrom. Therefore during the operation of the apparatus in the present position, the unit 29 will function while the unit 30 will remain ineffective. Attention is also directed to Fig. 2 illustrating the switch 46 closed for completing a circuit from the battery through the sets of contacts in their given order, for example, through contact 31, the adjacent wire portion and contact 32 and also through contact 33, the adjacent wire portion and contact 34 to the other side of the battery. The electrical energy passing through these wire portions between the sets of contacts is sufficiently high to burn the wire, thus severing a portion of a given length from between the adjacent beads. During the next operating cycle of the apparatus, the switch 46 will be open and the switch 51 will be closed rendering the unit 30 effective to complete circuits through its sets of contacts 35—36 and 37—38 to burn the material at the ends of the wire portion which is to be severed therefrom. These operations are repeated resulting in severing portions of given lengths alternately from the wires at staggered positions leaving the beads joined by lengths of single wires which may be severed later at their midpoints and to serve as leads for the individual beads of thermistor material.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An apparatus for severing portions from parallel wires connected at spaced positions by bead-like elements, the apparatus comprising magnetic means to force the portions of the wires between the bead-like elements away from each other, sets of electrical contacts positioned to engage the portions of their respective wires, and electrical circuits including their respective

sets of contacts closed by the said portions of their wires and supplied with electrical energies sufficient to burn the portions of the wires between the contacts in the said sets and thus sever the wires.

2. An apparatus for severing portions from parallel wires connected at spaced positions by bead-like elements, the apparatus comprising magnetic means to force the portions of the wires between the bead-like elements away from each other, dielectric members movable between the spaced wire portions, sets of electrical contacts positioned to engage the portions of their respective wires, and electrical circuits including their respective sets of contacts closed by the said portions of their wires and supplied with electrical energies sufficient to burn the portions of the wires between the contacts in the said sets and thus sever the wires.

3. An apparatus for severing portions from parallel wires connected at spaced positions by bead-like elements, the apparatus comprising magnetic means to force the portions of the wires between the bead-like elements away from each other, dielectric members movable between the spaced wire portions, electrical heating elements to engage and preheat the portions of the wires between the bead-like elements, sets of electrical contacts positioned to engage the portions of their respective wires, and electrical circuits including their respective sets of contacts closed by the said portions of their wires and supplied with electrical energies sufficient to burn the portions of the wires between the contacts in the said sets and thus sever the wires.

4. An apparatus for severing portions from parallel wires connected at spaced positions by bead-like elements, the apparatus comprising a plurality of dielectric members normally movable intermittently in a given path while extending between the respective portions to advance the wires intermittently, magnetic means to force the portions of the wires between the bead-like elements away from each other prior to the dielectric members moving therebetween, means to hold the dielectric members out of the said path until their respective wire portions have been moved away from each other, electrical heating elements to engage and preheat the portions of wires between the bead-like elements, sets of electrical contacts positioned to engage the portions of their respective wires, electrical circuits for the electrical heating elements, and switches for the circuits closed alternately to supply electrical energies sufficient to burn and thus sever the portions of the wires alternately between the bead-like elements.

ROBERT F. BREWER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,339,417	Pierce	May 11, 1920
1,461,228	Schwerin	July 10, 1923
1,639,688	Duncan	Aug. 23, 1927
2,435,441	Grouse	Feb. 3, 1948