

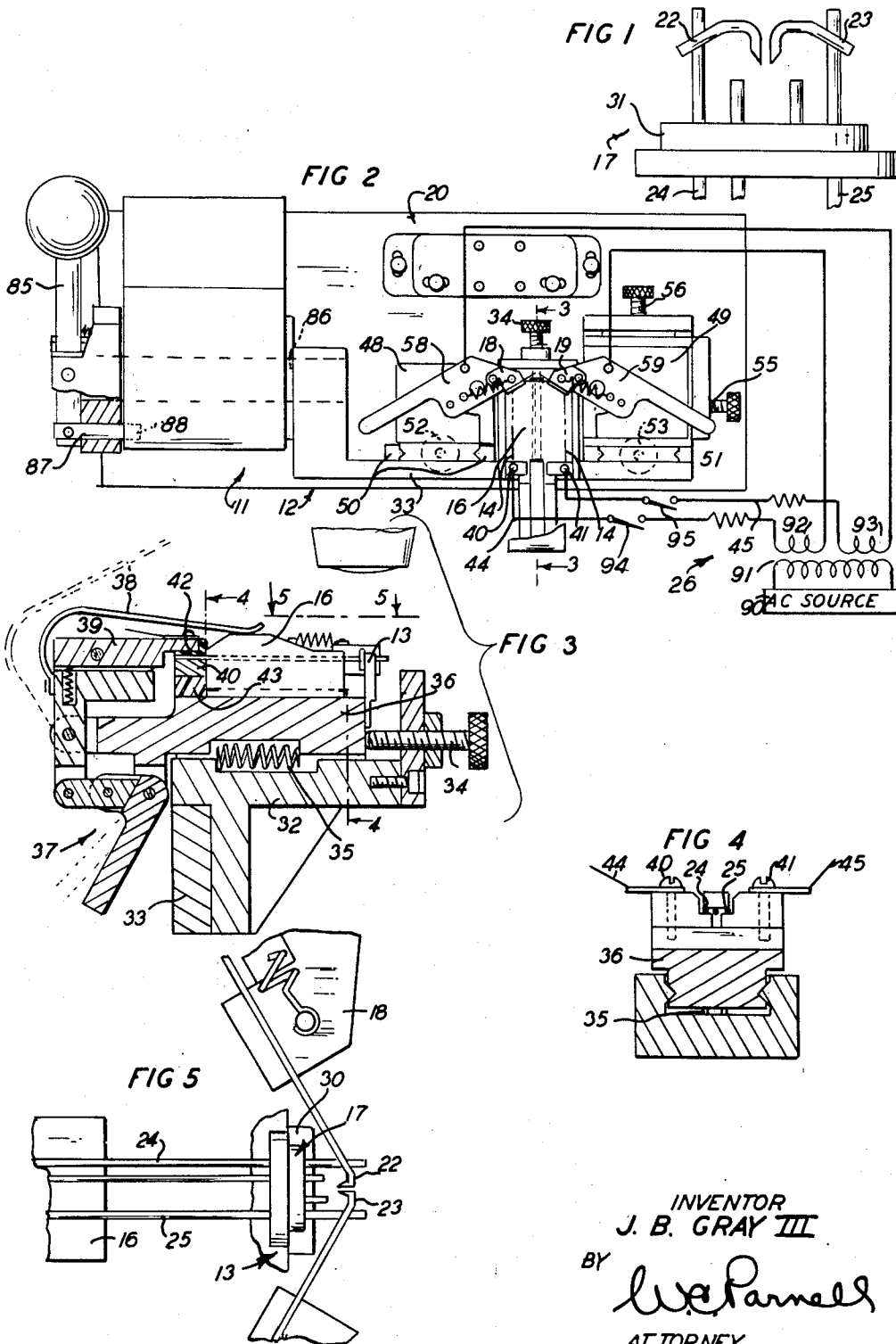
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J. B. GRAY III
ASSEMBLY FIXTURE

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ASSEMBLY FIXTURE

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11 Claims. (Cl. 219—85)

This invention relates to assembly fixtures and particularly to fixtures for assembling elongated electrodes to support wires of header members as are used in point contact type transistors.

In the manufacture of transistors of the type disclosed in the co-pending application of J. B. Gray III and W. R. Yeich, Serial No. 549,695, filed on even date herewith, the resilient point contact wire electrodes must be accurately located with respect to each other and the header proper, and then be attached as by soldering to the header support wires therefor.

The object of this invention is a fixture which facilitates the accurate positioning of the electrodes on the header supports for attachment thereto.

According to the general features of the invention, ways on a base member are adapted for receiving and positioning first a removable holder for pre-formed electrodes which are received by jaws movably mounted on the base and then a holder for header members which is clamped in the ways to position a header therein in a nest on the base. With both the electrodes and the header members positioned in the jaws and nest, respectively, the jaws are adjusted to accurately locate the electrodes along the header support wires therefor and are then soldered in the adjusted positions.

These and other features of the invention will be more fully understood from the following detailed description taken in conjunction with the accompanying drawing in which:

Fig. 1 is an elevational view of a Western Electric Company type 1894 transistor header-electrode piece part which is assembled in the fixture shown in Figs. 2 through 8;

Fig. 2 is a top or plane view of a fixture embodying the general features of the invention showing schematically a resistance heating circuit for use therewith;

Fig. 3 is an enlarged view of the fixture of Fig. 2 as seen along the plane of line 3—3 thereof;

Fig. 4 is a view along the plane of line 4—4 of Fig. 3;

Fig. 5 is a view along the plane of line 5—5 of Fig. 3;

Fig. 6 is a partial plan view of the fixture showing an electrode holder positioning therein for loading the electrodes into the jaws of the fixture;

Fig. 7 is a view of the electrodes and header as seen through a microscope on the frame of the fixture and showing the special reticle therefor; and

Fig. 8 is an end view of the electrode holder.

Referring now to the drawing, the fixture of Figs. 2 through 8 is designed to receive a header member 17 (Fig. 1) and accurately position electrodes 22 and 23 on the header support wires 24 and 25, respectively, for attachment thereto. The basic components of the fixture include a main frame 11, a rotatable base 12 on the frame, a nest member 13 for receiving header members 17, movable parallel ways 14 on the base for receiving first a removable electrode holder 15 (shown positioned in the ways in Fig. 6), and then a removable header member holder 16 (shown positioned in the ways in Figs. 2 and

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3), a pair of jaws 18 and 19 movably mounted on the base and a microscope mounted on a plate 20 of the frame for observing the manipulations in the electrodes and header members in the fixture. In an effort to simplify

the drawing, the microscope has not been shown, as it is of conventional design: therefore, only the objective lens 21 (Fig. 3) is shown. In addition, a resistance heating circuit 26 may be utilized for heating the electrodes and support wires for soldering them in adjusted position.

Specifically, the nest member 13 is provided with a recess in the top side thereof for supporting the shoulder 31 of a header positioned therein. The nest member 13 is attached to the end of block 36, the top side of which is provided with the ways 14. Block 36 in turn is mounted in dovetail engagement with a fixed member 32 attached to member 33 of the base. The ways block 36 and nest are movable along the member 32, an adjusting screw 34 which engages the end of the ways block 36 being provided for making this adjustment. A spring 35 compressed between the member 32 and the ways block 36 holds the ways block normally tensioned against the end of the adjusting screw 34. A toggle clamp 37 is provided in the other end of the ways block 36 and is used for holding the header holder 16 in the ways 14 by means of a cantilever spring member 38. In addition to carrying the spring 38, the toggle clamp also carries a member 39 for clamping the header wires 24 and 25 against terminal bars 40 and 41, respectively, which are insulatedly mounted by insulator 43 to the ways block 36. The end of the member 39 is provided with a rubber compression member 42 for holding these support wires in contact with the terminals. Terminals 40 and 41 are connected to the resistance heating circuit 26 through leads 44 and 45, respectively. The operation of this circuit will be discussed below.

Manually operable arms 58 and 59 for the electrode jaws 18 and 19 are pivotally mounted on blocks 48 and 49, respectively, which in turn are movably mounted in dovetail engagement with ways 50 and 51, respectively, on the member 33 of the base. The block 48 of jaw 18 may be adjusted along the ways 50 therefor by means of a thumb screw 52 shown in dashed lines in Fig. 2. The block 49 may also be moved along its ways 51 by means of a thumb screw adjustment 53, and in addition, may also be moved in the plane normal to the plane of motion along ways 51 by a micromanipulator mechanism, the adjusting screws 55 and 56 being provided therefor.

Arms 58 and 59 may be turned to an electrode receiving position as shown in Fig. 6, in which case, shoulders 60 on the arms 58 and 59 are aligned with the straight shank portion 61 of the electrodes 22 and 23. The jaws 18 and 19 are themselves pivotally mounted at 61 and 62, respectively, so that they may be opened to the position shown in Fig. 6 where they bear against stop pins 63 and 64, respectively. Pins 65 and 66 which extend from the jaws may be manipulated manually for opening the jaws. Springs 67 and 68 tensioned between pin 65 and a post 71 on arm 58 and between pin 66 and post 72 on arm 59, respectively, hold the respective jaws in either the opened or closed position.

The electrode holder 15 comprises a main plate 78 and a ways positioning member 80 attached thereto having shoulders 75 and 76 for fitting into the ways 14 of the ways block 36 shown in dashed lines in Fig. 8. Shoulders 77 extend beyond the lower surface of and along each side of the main plate 78 of the holder and a pair of jaws 79, which are pivotally mounted to the main plate 78, are provided for holding electrodes 22 and 23 against the shoulders. Actuating pins 81 for the jaws 79 extend through a notched-out end portion of the holder so that the jaws may be manually manipulated from the top side of the holder as seen in Fig. 8. A spring 82 is tensioned

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between pins 81 of the jaws to hold the jaws normally in a closed electrode engaging position. The electrodes are pre-formed before the electrode holder is positioned in the ways 14.

The header member holder 16 is a nylon (or other insulator material) block having a plurality of holes extending therethrough for the wires of the header and has parallel sides and shoulders for fitting into the ways 14.

The base 12 may be rotated on the frame 11 by means of a lever 85 which is connected to the end of a shaft 86 extending from the base 12. The base may be locked in a plurality of adjusted positions by means of a pin 87 carried at the end of the lever 85 which may be positioned in holes 88 in the frame.

The resistance heating circuit 26 includes an A. C. source of power 90, a step down transformer 91 having low voltage, high current windings 92 and 93 which are connected through switches 94 and 95 to the fixture terminals 40 and 41, respectively. The other sides of the windings 92 and 93 are connected to the arms 58 and 59 of the electrode jaws 18 and 19, respectively. When the electrodes 22 and 23 have been finally adjusted, the switches 94 and 95 may be closed to complete a circuit through the secondary windings of the transformer, the support wires 24 and electrode 22 on the one hand, and through support wire 25 and electrode 23 on the other hand. Current through the relatively high impedance of the mechanically connected support wires and their respective electrodes produces sufficient heat for melting solder which may be applied manually for soldering the electrodes to the support wires.

In operation, the two arms 58 and 59 are aligned as shown in Fig. 6, the blocks 48 and 49 being lowered so that the jaws are positioned beneath the electrodes 22 and 23 of the holder 15, respectively, which is placed in the ways. The jaws are then opened and raised manually by means of the adjusting screws 52 and 53, respectively, until the electrodes are positioned between shoulders 60 and the jaws 18 and 19 which are then moved into clamping engagement. The electrode holder jaws 79 are then opened and the holder is lifted out, leaving the electrodes clamped in jaws 18 and 19, respectively. The header member holder is then placed in the ways 14 so that the shoulder 31 of a header member in the holder is positioned in the recess in the nest member 13 and the toggle clamp is then closed to clamp the holder in the ways. The arms 58 and 59 are then pivotally turned to the position shown in Fig. 2 and the adjustable blocks 48 and 49 and the nest 13 adjusted to position the electrodes along the support wires 24 and 25 of the header as shown in Fig. 7. Fig. 7 shows a special gaging reticle which is provided for the eyepiece of the microscope which is in fixed position on the frame and aligned so that the points of the electrodes are in the approximate center of the field of vision. Guide lines 91 are provided for the top of the header and line 90 for spacing the pointed ends of the electrodes from the header. Calibrated lines 92 are provided for gaging the spacing between the ends of the electrodes 22 and 23. In the actual adjusting sequence, first the header is adjusted by the thumb screw 34 until the header comes to the guide line 91. The electrode 22 is next brought down into contact with the header lead or support wire 24 and then the right electrode 23 is adjusted in three dimensions so that it is against the header support wire 25, and at a prescribed spacing from the other electrode, the spacing being gaged by means of the calibrated scale 92. The electrodes are then soldered one at a time as discussed above in connection with the heating circuit shown in Fig. 2, or manually with a carbon-tip resistance soldering pencil. The various clamps and jaws are then released and the unit removed, and the ends of the electrodes 22 and 23 are cut off.

It is to be understood that the above described arrangements are simply illustrative of the application of the

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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. In a fixture for assembling elongated electrodes to support wires of a header member, a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, movable jaws on the base for receiving electrodes from an electrode holder positioned in the ways, means for clamping the header holder in the ways to locate a header therein in the nest member, means for adjustably positioning each of the jaws to locate electrodes therein on the respective support wires of a clamped header and for controlling the spacing between the ends of the electrodes, and optical viewing means mounted on the base at a fixed position from the header holder clamping means, said viewing means having a reticle with a graduated scale for accurately gaging the spacing between the ends of the electrodes.

2. A fixture for assembling elongated electrodes to support wires of a header member comprising a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, movable jaws on the base for receiving electrodes from an electrode holder positioned in the ways, means for clamping the header holder in the ways to locate a header therein in the nest member, means for adjustably positioning each of the jaws to locate electrodes therein on the respective support wires of a clamped header and for controlling the spacing between the ends of the electrodes, and means for soldering the electrodes to the header support wires.

3. A fixture for locating elongated electrodes on support wires of a header for attachment thereto comprising a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, movable jaws on the base for receiving electrodes from an electrode holder positioned in the ways, means for clamping the header holder in the ways to locate a header therein in the nest member, and means for positioning the jaws to locate electrodes therein on the respective support wires of the clamped header and for controlling the spacing between the ends of the electrodes.

4. A fixture for assembling elongated electrodes to support wires of a header member comprising, a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, movable jaws on the base for receiving electrodes from an electrode holder positioned in the ways, means for clamping the header holder in the ways, means for moving the ways and nest member, means for soldering the electrodes to the header support wires, optical viewing means mounted on the base at a fixed distance from the ways, a reticle for the viewing means having a graduated scale for accurately gaging the spacing between the ends of the electrodes and means for soldering the electrodes to the header support wires.

5. A fixture according to claim 3 having means for connecting the jaws and the clamped header support wires in a resistance heating circuit for passing current serially

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through each of the support wires and corresponding electrode when the electrodes have been moved into contact with the support wires.

6. A fixture for locating elongated electrodes on support wires of a header for attachment thereto comprising a main frame, a base member rotatably mounted on the frame, means for rotating the base and locking it in a plurality of rotated positions, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, movable jaws on the base for receiving electrodes from an electrode holder positioned in the ways, means for clamping the header holder in the ways to locate a header therein in the nest member, means for positioning the jaws to locate electrodes therein on the respective support wires of the clamped header and for controlling the spacing between the ends of the electrodes, optical viewing means on the frame positioned at a fixed distance from the ways, and a reticle for the optical viewing means having a graduated scale for accurately gaging the spacing between the ends of the electrodes.

7. A fixture for locating elongated electrodes on support wires of a header for attachment thereto comprising a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, a pair of movable elements on the base, actuating means for the elements, an electrode receiving jaw on each of the elements, spring biasing means for the jaws for holding them in either an open or a closed condition, means for clamping the header holder in the ways to locate a header therein in the nest member, and means for positioning the jaws to locate electrodes therein on the respective support wires of the clamped header and for controlling the spacing between the ends of the electrodes.

8. A fixture for locating elongated electrodes on support wires of a header for attachment thereto comprising a base member, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, a pair of movable elements on the base, actuating means for the elements, pivotal members on each of the elements, an electrode receiving jaw on each of the pivotal members, spring biasing means for the jaws for holding them in either an open or a closed condition, means for clamping the header holder in the

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ways to locate a header therein in the nest member, and means for positioning the jaws to locate electrodes therein on the respective support wires of the clamped header and for controlling the spacing between the ends of the electrodes.

9. A fixture according to claim 5 having spaced-apart contactor elements between the ways for connecting the header support wires in the resistance heating circuit and a toggle action clamp on the base for clamping the header holder in the ways, said clamp also having a resilient element thereon for clamping each of the header support wires into electrical contact with the contactor elements.

10. A fixture for locating elongated electrodes on support wires of a header for attachment thereto comprising a main frame, a base member rotatably mounted on the frame, means for rotating the base and locking it in a plurality of rotated positions, a nest member on the base for receiving the header members, a removable holder for the electrodes having releasable clamping means for holding the electrodes in spaced relation, a removable holder for the header members, ways on the base for successively receiving the holders, a pair of movable elements on the base, actuating means for the elements, pivotal members on each of the elements, an electrode receiving jaw on each of the pivotal members, spring biasing means for the jaws for holding them in either an open or a closed condition, means for clamping the header holder in the ways, means for moving the ways and nest member, means for positioning the jaws to locate electrodes therein on the respective support wires of the clamped header and for controlling the spacing between the ends of the electrodes, and means for connecting the jaws and the clamped header support wires in a resistance heating circuit for passing current serially through each of the support wires and corresponding electrode when the electrodes have been moved into contact with the support wires.

11. A removable electrode holder for the fixture of claim 3 comprising a main plate having a pair of parallel sides, a shoulder extending beyond one side of the main plate along each of the two parallel sides, a pair of jaws pivotally mounted on said one side of the main plate for holding electrodes against the shoulders, actuating pins on the jaws extending beyond the other side of the main plate and a spring tensioned between the pins for holding the jaws closed.

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