Oct. 24, 1950 A. L. QUINLAN 2,527,150

ALIGNING AND GAUGING FIXTURE

Filed Dec. 24, 1946

FIG. 1

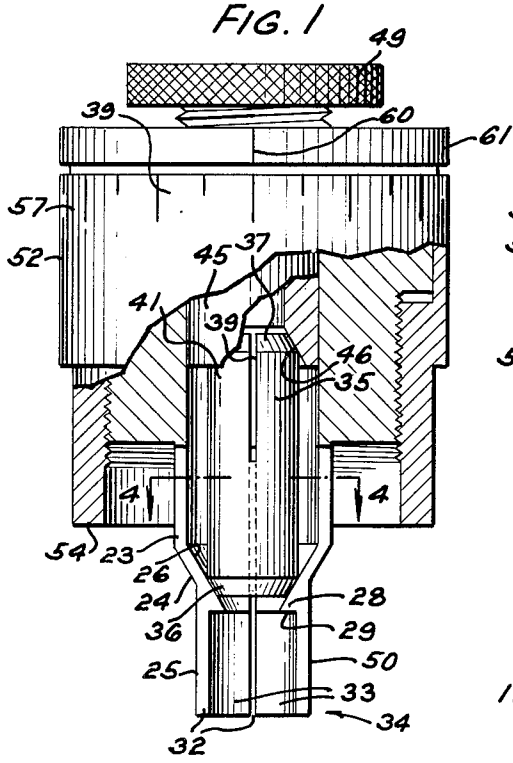


FIG. 3

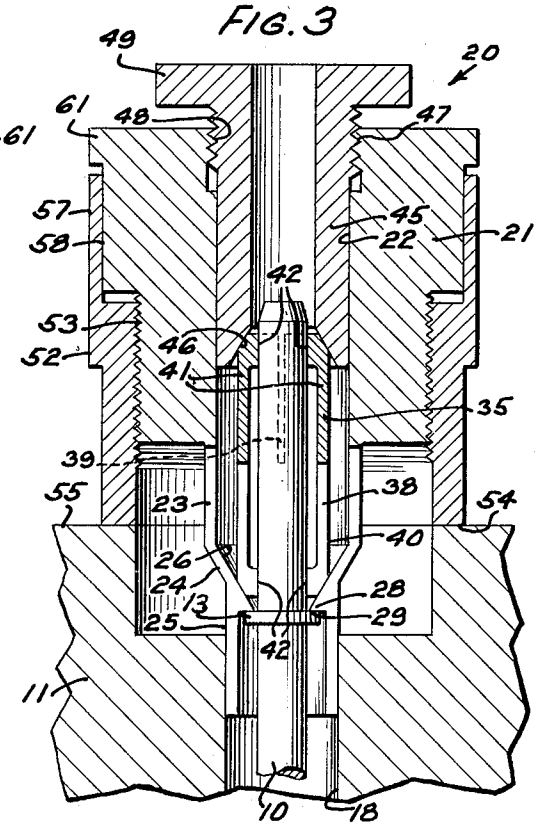


FIG. 2

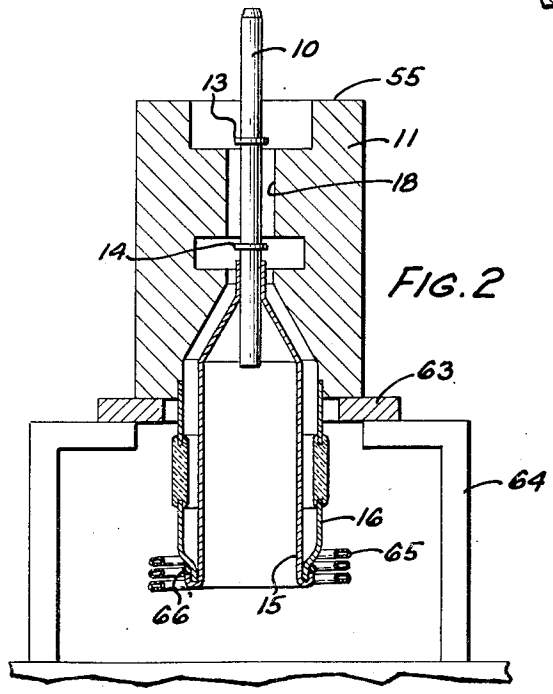
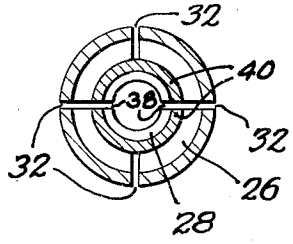


FIG. 4



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ALIGNING AND GAUGING FIXTURE

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6 Claims. (Cl. 113—99)

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This invention relates to an aligning and gaging fixture and more particularly to a fixture for use in assembling a cathode element in telescoping relation with an apertured anode member to position the parts in accurate alignment relative to each other axially and radially and to hold the parts in aligned position while they are being further processed.

An object of this invention is to provide a fixture for aligning and holding parts during assembly thereof.

In one embodiment of the present invention, a fixture is provided comprising a centrally apertured cylindrical body member having a slotted tubular end extending therefrom forming a set of jaws adapted to fit into the aperture of the anode and be expanded for aligning the anode radially relative to the body member and the body member is provided with an adjustable gaging element engageable with the anode to position it axially relative to the member. A gaging shoulder is formed on the inner sides of the anode aligning jaws to engage a shoulder on and axially position the cathode, a portion of which fits into the central aperture of the fixture and into a sleeve chuck mounted in the central aperture. The sleeve chuck has jaws at each end thereof for radially positioning and holding the cathode relative to the fixture and one set of the jaws engages conical cam surfaces on the anode positioning jaws and the other set of jaws on the sleeve engages conical cam surfaces on a hollow screw adjustably carried by the member whereby, when the fixture is applied to the anode and cathode parts and the hollow screw is moved axially, it imparts movement to the sleeve chuck and causes simultaneous actuation of the cathode aligning jaws and the anode aligning jaws to effect the alignment transversely of the anode and cathode parts relative to the fixture and to each other and to hold the parts in aligned position.

The invention will be more fully understood from the following description thereof when considered in connection with the accompanying drawings illustrating a preferred embodiment thereof in which

Fig. 1 is an enlarged elevational view of the fixture with a portion thereof in cross section;

Fig. 2 is a vertical sectional view through the sub-unit of an electronic device on a reduced scale from that of Fig. 1 showing an anode structure and a cathode structure in assembled relation on a support and in relation to an induction heating coil prior to its parts being accurately aligned;

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Fig. 3 is a sectional view through the fixture showing a portion of the anode and cathode structures being aligned thereby; and

Fig. 4 is a detail plan sectional view taken on the line 4—4 of Fig. 1.

The aligning fixture of the present invention is used for aligning an elongated cylindrical cathode member 10 (Fig. 2) of an electronic device in accurate predetermined telescoping relation within an apertured anode 11 (Fig. 2). The cathode 10 has a pair of spaced collars 13 and 14 thereon and a cylindrical shell 15 fixedly secured to the lower portion thereof, the lower end of which shell is return-bent to telescopingly engage the end of a cylindrical shell structure 16 fixedly secured to and extending from the lower portion of the anode member 11. The anode 11 is centrally apertured and the aperture varies in width along its length and includes a cylindrical surface 18 having a length substantially equal to the distance between the collars 13 and 14 of the cathode member 10. The cathode 10 and anode 11 of the electronic device have been previously assembled in approximately properly aligned position, the cathode 10 and the shell 15 secured thereto being held in position relative to the anode 11 and the shell 16 by the frictional engagement of the telescoping lower ends of the shells 15 and 16. This telescoping engagement of the lower ends of the shells 15 and 16 forms a loose joint for yieldably holding the cathode in adjusted position relative to the anode and permits a limited movement of the cathode axially of the anode and also permits a limited tilting or pivoting movement of the cathode about the lower end of the shell 16. For proper functioning of the electronic device, it is important that the axis of the cylindrical surface 18 have a predetermined relation to the axis of the cathode member and that the collars 13 and 14 be located fixed distances from the ends of the surface 18.

To this end the fixture 20 is used and it comprises a cylindrical body member 21 which is provided with a central longitudinal aperture 22, circular in cross section. The lower portion of the body member is reduced to form a tubular extension comprising a cylindrical portion 23, a tapered portion 24, and a cylindrical portion 25, all coaxially aligned with the aperture 22 and the member 21. A conical surface 26 on the tapered portion 25, in coaxial alignment with the member 21, extends inwardly to form a shoulder 28

having a flat surface 29 engageable with the collar 13 of the cathode member 10. The opposite walls of the tubular portions 23, 24 and 25 are longitudinally slotted at right angles to each other, as indicated at 32, to provide four radially movable jaws 33 and form an anode aligning and holding expansible chuck 34.

A collet chuck for aligning and holding the cathode 10 is mounted within the aperture 22 and comprises the sleeve 35 having conical or tapering end surfaces 36 and 37, the conical surface 36 of the sleeve corresponding to and engaging the conical surface 26 of the tubular portion 24. The opposite walls of the end portions of the sleeve 35 are slotted longitudinally, as at 38 and 39, to provide, respectively, cathode aligning and holding jaws 40—40 and 41—41 at opposite ends of the collet chuck 35, the slots 38 and 39 being disposed at right angles to each other. Cylindrical aligning and gripping surfaces 42 are formed on the interior of the collet sleeve 35 adjacent the ends thereof and are adapted to align and grip the cathode 10 when compressed radially inwardly.

A hollow cylindrical actuating member 45 is mounted for axial movement in the aperture 22 and has a recessed end portion providing a conical surface 46 in coaxial alignment with the axis of the aperture 22 for engagement with the conical surface 37 of the jaws 41. Screw threads 47 formed on the actuating member 45 engage screw threads 48 in the aperture 22 and a knurled handle 49 is provided on the actuating member, by means of which the member 45 may be rotated to impart axial movement thereto. When the handle 49 is rotated to move the member 45 downwardly, the conical surface 46 thereof acts radially to compress the jaws 41 and to impart a downward movement to the sleeve 35 against the conical surface 26 and this movement serves simultaneously to expand the gripping jaws 33 of the chuck 34 against the walls of the aperture 18 of the anode member and to compress the jaws 40 and 41 of the collet sleeve 35 into gripping relation with the cathode 10. As the chuck 34 is expanded in the anode aperture 18, it serves to coaxially align the member 21 with the anode and, as the collet chuck 35 is compressed, it serves to align and hold the cathode 10 in coaxial relation with the member 21, with the result that the cathode is brought into coaxial alignment with the anode. If it is desired to position the cathode with its axis in a predetermined eccentric relation to that of the anode, the outer cylindrical surface 50 of the tubular portion 25 may be eccentrically ground to form a cylindrical aligning surface, the axis of which is offset relative to the axis of the member 21 to position the anode in the required eccentric relation to the member 21 and to the cathode.

To gage the position of the cathode 10 axially or longitudinally with respect to the anode 11, a collar 52 is adjustably mounted on the body member 21 with a screw connection 53 permitting a micrometric adjustment thereof and the collar is provided with an end gage surface 54 engageable with the end 55 of the anode member 11. An upwardly extending skirt 57 of the adjustable collar 52 encloses an enlarged portion 58 of the member 21 and has a series of graduation marks 39 thereon adjacent the upper edge of the skirt and which cooperates with a line 60 on the enlarged portion 61 of the member 21 to indicate the setting of the adjustable collar 52 relative to the member 21 and to indicate the position of the inner gage surface 29 relative to the gage surface 54 of the collar 52.

The anode and cathode structures comprising the electronic unit (Fig. 2), before being accurately aligned and soldered together, are received in loosely assembled position and are held together frictionally by the telescopic engagement of the lower ends of their shells 15 and 16 as previously described. The cathode and anode structures, with the anode flange 63 secured to the lower end of the anode, is placed on a suitable supporting fixture 64 with the lower ends of the shell members 15 and 16 in position within a high frequency induction heating coil 65. A ring of solder 66 loosely encircles the lower portion of the shell assemblies adjacent the end edges thereof for the purpose of uniting the anode and cathode structures and sealing the joint formed thereby when heat is applied thereto through the induction heating coil 65 after the cathode and anode structures have been properly aligned. Accompanying each cathode-anode unit 62 is a record sheet containing the dimensions of the critical portions of the anode and cathode structures, which may vary slightly in different units, and from the information obtained from the record sheet, the operator may adjust the collar 52 on the member 21 to effect the proper spacing of the gage surface 29 on the shoulder 28 relative to the gage surface 54 on the collar 52 to properly position the cathode axially with respect to the anode.

The fixture 20 may then be applied to the cathode-anode unit and the upper end of the cathode 10 will fit within the central aperture of the member 21 and within the sleeve 35 and the jaws 33 of the chuck 34 will fit within the aperture 18 of the anode and the fixture will be supported on the anode with the gage surface 54 of the adjusting collar 52 in engagement with the surface 55 of the anode. The operator may then hold the aligning fixture 20 down in engagement with the anode member and, by engaging the shell portion 15 of the cathode from the bottom, he may move the frictionally supported movable cathode structure upwardly until it is stopped by the engagement of the collar 13 thereon with the gaging surface 29 on the fixture. The actuator member 45 may then be rotated to move the collet sleeve 35 downwardly and compress it between the conical surfaces 26 and 46 and thus expand the chuck 34 against the interior surface 18 of the anode and simultaneously therewith contract the jaws 40 and 41 into gripping engagement with the cathode 10 to align and hold the cathode 10 relative to the anode 11. With the anode and cathode parts thus properly aligned, the induction coil 65 may be energized to effect the heating of the solder ring 66 and the bonding together of the shells 15 and 16 thereof. After the solder joint has cooled and the cathode 10 has been fixedly secured in predetermined aligned relationship to the anode 11, the actuating member 45 may be loosened and the aligning fixture removed from the cathode and anode assembly.

What is claimed is:

1. A fixture for aligning and clamping a first part and an apertured second part in predetermined telescoping relation to each other comprising a body member provided with an aperture therethrough for receiving therein a portion of said first part and having fixed thereon a set of jaws at one end thereof disposed about the axis of said aperture and adapted to fit into the aperture in said second part and to be expanded into

gripping relation with said second part for aligning the member transversely with respect to said second part, a sleeve member mounted for axial movement within said body member and having a set of jaws operable to align and clamp said first part in a predetermined relation to said body member, cam elements on each of said set of jaws, said cam elements on one set of jaws being disposed in engagement with the cam elements of the other set of jaws and operable for causing simultaneous actuation of said sets of jaws to effect the inward movement of one set of jaws into gripping engagement with said one part and the outward movement of the other set of jaws into gripping engagement with said second part in response to a relative axial movement of said members, and means carried by one of said members operable for axially moving one of said members relative to the other.

2. A fixture for aligning and holding a first part and an apertured second part in predetermined telescoping relation to each other comprising a body member provided with an aperture therethrough for receiving therein a portion of said first part and having formed thereon a slotted tubular end portion forming a plurality of gripping and aligning fingers in concentric relation to the axis of said aperture, said aligning fingers being insertable in the recess in said second part and being outwardly movable into gripping engagement therewith for aligning the second part relative to the body member, tapered cam surfaces on the inside of said positioning fingers forming a conical surface coaxial with the axis of the recess in said body member, a cylindrical sleeve member mounted within said recess with one end thereof in engagement with said conical surfaces, the end portions of said sleeve being longitudinally slotted to provide a plurality of jaws at each end thereof, interior part engaging surfaces on said jaws adjacent each end thereof engageable with the first part for aligning and holding said part relative to the body member, and an actuator member having cam surfaces engageable with the jaws at one end of said sleeve and movable axially in said body member to cause the movement of said sleeve and the simultaneous actuation of the aligning jaws and fingers to effect the movement inwardly of said jaws into gripping engagement with said first part and the movement outwardly of said fingers into gripping engagement with said second part for aligning the parts relative to the body member and to each other and for holding the parts in aligned position.

3. A fixture for aligning and holding a cylindrical first part and an apertured second part in a predetermined telescoping relation to each other comprising an apertured member for receiving a portion of said first part in the aperture therein and having formed thereon a set of jaws at one end thereof disposed about the axis of said aperture and adapted to fit into the aperture in said second part and to be expanded into gripping relation with said part for aligning the second part with its axis in a predetermined relation to said member, elements on said jaws engageable with the first part to position said part axially relative to said member, an element on said member engageable with the second part for positioning said member axially relative to said second part, a sleeve member mounted in telescoping relation with said apertured member for receiving a portion of said first part therein and having a set of jaws at one end thereof adapted

to be moved into gripping engagement with said first part to align said part with its axis in a predetermined relation to said member, cam surfaces on each of said sets of jaws, said cam surfaces on one set of jaws being disposed in engagement with the cam surfaces of the other set of jaws and operable for causing the movement of one set of jaws into clamping engagement with said first part and of the other set of jaws into clamping engagement with said second part in response to relative axial movement of said members, and means carried by one of said members operable to effect an axial movement of the other of said members.

4. A fixture for aligning and holding a shouldered cylindrical part and an apertured part in predetermined telescoping relation to each other comprising a body member provided with a central aperture therethrough for receiving a portion of said cylindrical part therein and having a plurality of aligning and gripping fingers formed on one end thereof arranged in concentric relation to the axis of said aperture and adapted to fit into the aperture of said apertured part, a shoulder element on the inside of said aligning and gripping fingers engageable with the shoulder on the cylindrical part for positioning the part axially relative to the body member, an element on the body member having a surface thereon engageable with the apertured part to position the apertured part axially relative to the body member, conical surfaces on the interior of said aligning and gripping fingers, a sleeve member within the aperture of said body member having longitudinally slotted end portions providing a plurality of jaws at each end thereof with the jaws at one end of the sleeve engaging the conical surfaces on said aligning and gripping fingers, and an axially movable hollow member within the aperture of said body member and having a conical surface engageable with the jaws at the other end of said sleeve, said hollow member being operable to impart axial movement to said sleeve and to cause the contraction radially inwardly of the jaws on the sleeve and simultaneously therewith the radial outward movement of the aligning and gripping fingers for effecting the aligning of the parts in a predetermined relation to the body member and to each other and the clamping of the parts in aligned position.

5. A fixture for aligning and holding a first part and an apertured second part in predetermined telescoping relation to each other comprising a body member provided with an aperture therethrough for receiving therein a portion of said first part and having a plurality of jaws formed at one end thereof disposed about the axis of said aperture and adapted to fit into the aperture of said second part and to be expanded into gripping relation with said part for aligning the second part in a predetermined position relative to said body member, tapered cam surfaces on the inside of said jaws, a sleeve member mounted for axial movement within the recess of said body member and with one end thereof in engagement with the tapered cam surfaces, said sleeve member being adapted to receive a portion of said one part therein and having a plurality of jaws at the other end thereof movable inwardly for grippingly engaging said first part to align and hold said first part in a predetermined position relative to said body member, and an axially movable actuating member mounted in the aperture of said body member and having a tapered cam surface engageable with the jaws

on said sleeve member, said axially movable actuating member being operable to impart movement to said sleeve member and cause the actuation of one of said sets of jaw members inwardly into gripping engagement with said first part and the other of said sets of jaw members outwardly into gripping engagement with said second part to effect the aligning of the parts transversely relative to the body member and to each other and to hold said parts in aligned position.

6. A fixture for aligning and holding a cylindrical first part and an apertured second part in a predetermined telescoping relation to each other comprising an apertured body member for receiving a portion of said first part in the aperture therein and having a plurality of fingers formed at one end thereof disposed about the axis of said aperture and adapted to fit in the aperture in said second part and to be expanded into gripping relation with said part for aligning the second part in a predetermined position transversely relative to said member, shoulders on said fingers engageable with the first part to position said part axially relative to said member, an element on said member engageable with the second part for positioning said member axially relative to said part, means for adjusting said element axially on said member, a sleeve mounted in telescoping relation within said member adapted to telescopingly receive a portion of said first part therein and having a plurality of jaws at each end thereof movable inwardly into engagement with said first part to transversely align and hold the first part relative to said member, an actuating element movable in the aperture in said member operable for axially moving said sleeve and having a conical cam surface engageable with the jaws at one end of said sleeve for actuating said jaws at said one end of said sleeve, and conical cam surfaces on said fingers engageable with the jaws on the other end of said sleeve and capable of causing the movement of said jaws on the other end of said sleeve inwardly into gripping engagement with said first part and the movement of said fingers outwardly into gripping engagement with said second part in response to relative axial movement between said sleeve and said member, said actuating element being operable to cause the axial movement of said sleeve and effect the simultaneous actuation of said jaws inwardly into gripping engagement with said first part and said fingers outwardly into gripping engagement with said second part for aligning the parts relative to the member and to each other and for holding said parts in aligned position.

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