Nov. 25, 1952 L. C. MORRELL 2,618,839

APPARATUS FOR WELDING DOUBLE TABS TO CATHODE SLEEVES

Filed Dec. 3, 1951

FIG_1

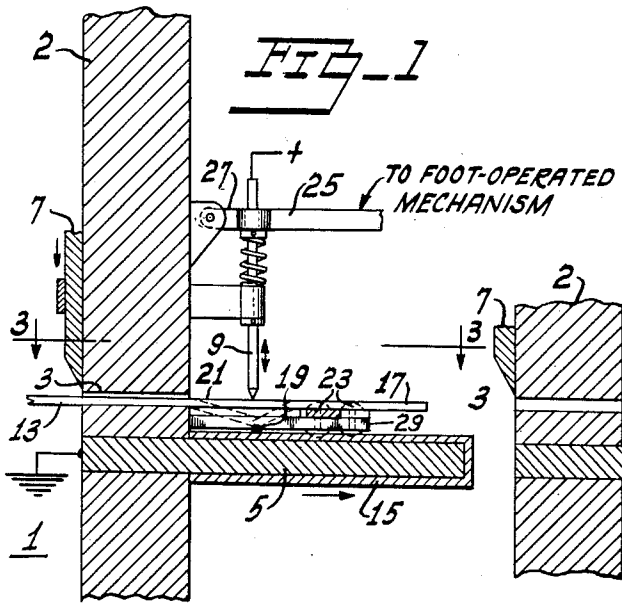
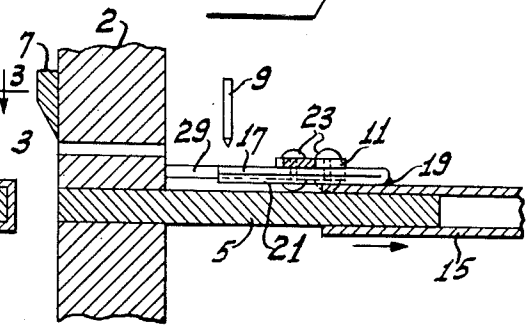


FIG_2



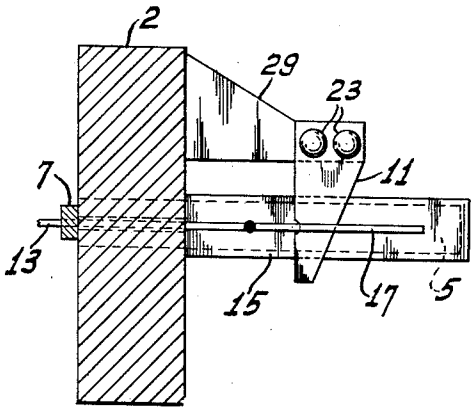


FIG_3

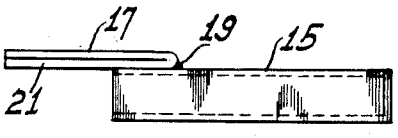


FIG_4

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APPARATUS FOR WELDING DOUBLE TABS TO CATHODE SLEEVES

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15 Claims. (Cl. 29—25.2)

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My invention pertains to apparatus for manufacturing a cathode having a double lead, more particularly to a novel means for automatically welding a metal ribbon to a cathode sleeve and bending one part of the ribbon with respect to another to form a double tab or lead.

In certain electron discharge devices, it is desirable to electrically connect the cathode sleeve to two spaced conductive elements. One method of providing the connection consists of welding a metal ribbon or tab intermediate its ends to the cathode and then connecting one end of the ribbon to one conductive element and the other end of the ribbon to the other conductive element.

At present, the general procedure followed in preparing a tubular cathode having a double tab connector bonded thereto, comprises feeding a predetermined length of sheet metal ribbon adjacent the cathode sleeve with the sleeve supported on a mandrel, and welding said ribbon, at a point intermediate its ends, to one end of the sleeve. This results in one portion of the ribbon or tab lying adjacent the body of the sleeve and the rest of the ribbon extending beyond the end of the sleeve. After the bond between the ribbon and the sleeve is formed, one portion, that lying adjacent the body of the sleeve of the ribbon, is folded back over the other, that extending beyond the end of the sleeve, to form the double tab.

The ribbon or tab is generally folded in the manner described prior to coating so that, when the cathode is coated, none of the operating surface will be masked by the ribbon and the coating will be complete and uniform. It is easier to connect the ends of the ribbon to the above-mentioned spaced conductive elements if the parts have been previously folded. In addition, once the tab has been folded, its two portions may be handled without the danger of touching the sleeve and contaminating it or otherwise disturbing the coating after it has been applied.

However, such procedure, whereby the ribbon is folded manually after it has been welded to the cathode sleeve, is undesirable for many reasons. The main reason is that, since the cathode is a delicate component, it should be subjected to a minimum number of operations and manual bending of the tab is such an operation to be avoided.

The principal object of my invention is to provide an improved apparatus for manufacturing a cathode having a double lead or tab.

More particularly it is an object of my invention to provide an apparatus for welding a metallic ribbon to a cathode sleeve and automatically bending said ribbon to form a double tab.

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Another object of my invention is to provide such an apparatus which reduces materially the manual handling of the sleeve, thereby reducing the number of manufacturing operations and chance for damage to the cathode.

In accordance with my invention, I provide an apparatus in which the tab ribbon is fed into position extending along and overlying the cathode sleeve. The tab ribbon is welded to the cathode sleeve while a mandrel supports the cathode during the welding operation. The cathode sleeve can be readily slipped on and off the mandrel. I mount a blunt-edged blade adjacent to the mandrel on which the cathode sleeve is mounted. As the cathode is retracted and removed from the mandrel after the weld is made, the blunt-edged blade engages the portion of the ribbon overlying the body of the cathode sleeve and folds it back over the portion extending beyond the end of the cathode to form a double tab.

The invention will be described in detail with reference to the single sheet of drawings wherein:

Fig. 1 shows a sectional view of the apparatus embodying my invention and having a metal ribbon fed thereto to be welded to the cathode sleeve;

Fig. 2 shows a sectional view of the apparatus with the double tab being formed as the cathode is removed from the mandrel;

Fig. 3 is a top view along the line 3—3 of a portion of the device showing the relationship between the blunt-edged blade and the sleeve bearing mandrel; and

Fig. 4 is a side view of a completed cathode having a double tab welded thereto by the apparatus of the invention.

Referring to the figures, a welding machine 1 is provided with a frame member 2 having an opening 3 therein and carrying a mandrel 5 extending laterally therefrom. A cutting blade 7 movable as shown is mounted on the frame member 2 and a welding rod or electrode 9 movable as shown is also associated therewith. The welding rod is connected through a suitable linkage 25 to a foot-operated mechanism (not shown) controlled by the machine operator and used to move the rod 9 into welding position. Any other suitable means for operating the welding rod could be employed. The welding rod 9 is pivotally connected to the frame 2 by a suitable member 27. The welding rod is also connected to a positive source of potential (not shown) and the mandrel is arranged to form the return path to ground for the electrical current. A blunt-edged blade 11 is mounted on a portion 29 of the frame member 2 or in any other convenient place by a fasten-

ing means 23 so that it is positioned adjacent to and substantially parallel to the mandrel axis and a short distance vertically therefrom.

In operation of the device a metal ribbon 13 which is to form the double tab is fed from any convenient source (not shown) and is inserted through the opening 3 in the support member 1 so that it lies adjacent to the tubular cathode 15 which has been mounted on the mandrel 5. One portion 17 of the ribbon lies adjacent to the main body of the cathode and the remainder 21 of the ribbon extends beyond the end of the cathode. In this position the leading portion 17 of the ribbon 13 lies above the blade 11 so that the blade is positioned between the cathode and the ribbon. When the predetermined length of ribbon 13 has been inserted, the welding rod 9 is depressed to contact and weld the ribbon and the cathode sleeve in the area designated by the numeral 19. The position of the ribbon strip 13 at the time that the weld is made is indicated by the dotted line construction. The cutting blade 7 is then operated and the tab is cut from the main wire strip. The welding rod is returned to its former position and the cathode and attached tab are ready to be removed from the mandrel.

Referring particularly to Fig. 2, as the cathode 15 is retracted and removed from the mandrel 5 by hand or by any other suitable means, the blunt-edged blade 11 engages the leading portion 17 of the double tab and forces it back over the other portion 21 to form the double tab which extends beyond the end of the cathode sleeve. After the cathode has been removed from the mandrel, the sleeve appears as shown in Fig. 3 with the ribbon welded to one end of the sleeve and folded to form a double tab extending beyond the end of the sleeve.

From the foregoing discussion, it is apparent that the invention provides an efficient apparatus for welding a metal ribbon to a tubular cathode and automatically folding one portion of said ribbon over the other portion to form a double tab.

What is claimed is:

1. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus including means for releasably supporting said sleeve, means associated with said supporting means for bonding to said sleeve a ribbon of predetermined length fed to said apparatus, and means adjacent said support for engaging and bending said ribbon on removal of said sleeve from said supporting means.

2. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus including means for releasably supporting said sleeve, means associated with said supporting means for bonding to said sleeve a ribbon of predetermined length fed to said apparatus, and a blunt-edged blade element adjacent said support for engaging and bending said ribbon on removal of said sleeve from said supporting means.

3. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus including means for supporting said sleeve, means associated with said supporting means for bonding to said sleeve a ribbon of predetermined length fed to said apparatus, and a blunt-edged blade mounted adjacent said supporting means so that it lies between one portion of said ribbon and said sleeve whereby said blade engages and bends said portion of said ribbon on removal of said sleeve from said supporting means.

4. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus comprising a mandrel for supporting said sleeve, a welding device associated with said mandrel for welding to said sleeve said ribbon of predetermined length fed to said apparatus and positioned adjacent said sleeve, and means adjacent said mandrel for engaging and bending said ribbon on retraction of said sleeve from said support means.

5. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus comprising a mandrel for supporting said sleeve, a welding device associated with said mandrel for welding to said sleeve said ribbon of predetermined length fed to said apparatus and positioned adjacent said sleeve, and a blunt-edged blade element adjacent said mandrel for engaging and bending said ribbon on removal of said sleeve from said mandrel.

6. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus comprising a mandrel for supporting said sleeve, a welding device associated with said mandrel for welding to said sleeve said ribbon of predetermined length fed to said apparatus and positioned adjacent said sleeve, and a blunt-edged blade mounted adjacent said mandrel so that it lies between one portion of said ribbon and said sleeve whereby said blade engages and bends said portion of said ribbon on retraction of said sleeve from said mandrel.

7. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus comprising a welding apparatus having a mandrel for carrying said sleeve as said ribbon is welded thereto, and a blade member mounted in cooperative relationship with said mandrel for automatically bending said ribbon as said sleeve is removed from said mandrel.

8. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus comprising a welding device having a movable welding rod and a mandrel for carrying a tubular cathode to which said ribbon is welded, and a stationary member mounted in cooperative relationship with said mandrel for automatically engaging and bending said ribbon as said cathode is removed from said mandrel.

9. Apparatus for welding a ribbon connector to one end of a cathode sleeve and bending a portion of the connector to form a double tab extending from said end of the sleeve, said apparatus including a welding device having a frame and a mandrel for carrying a tubular cathode to which said ribbon is welded, an opening in said frame for receiving said ribbon, and a stationary member mounted on said frame and

in cooperative relationship with said mandrel for automatically bending said ribbon as said cathode is removed from said mandrel.

10. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab, comprising a welding device having a frame, a movable welding rod and a mandrel for carrying a tubular cathode to which said metal ribbon is welded; said frame having an opening therein located adjacent said mandrel for receiving said metal ribbon; and a stationary blade member mounted on said frame and in cooperative relationship with said mandrel for bending said ribbon as said cathode is removed from said mandrel.

11. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab, comprising a welding machine having a movable welding rod and a frame having a mandrel mounted thereon, said frame having an opening therein for receiving a metal ribbon; a tubular cathode carried by said mandrel; said welding rod being adapted to weld said ribbon to said cathode; and a stationary blunt-edged blade mounted on said support and in cooperative relationship with said mandrel and arranged to bend one portion of said ribbon as said cathode is removed from said mandrel.

12. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab, comprising a welding device having a frame with a mandrel mounted thereon for carrying said tubular cathode; said frame having an opening therein for receiving a metal ribbon; a movable welding rod carried by said frame and adapted to weld said ribbon to said cathode; a movable cutting member connected to said frame and adapted to cut said ribbon to a predetermined length; and a stationary blunt-edged blade mounted on said frame and in cooperative relationship with said mandrel and arranged to bend one portion of said ribbon as said cathode is removed from said mandrel.

13. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab including a supporting frame, a mandrel mounted on said frame at one end of said mandrel for permitting a cathode sleeve to be slipped over said mandrel from its free end to be supported thereby, a movable welding electrode supported on said frame adjacent said mandrel and registering therewith, said frame having an opening adjacent said mandrel through which a tab ribbon can be fed to lie over said cathode sleeve in registry with said welding electrode, a cutter on said frame for cutting tab ribbon fed thereto in predetermined lengths, and a blade member mounted adjacent said mandrel to lie between said sleeve and the portion of said ribbon lying beyond said welding electrode, whereby when said sleeve is removed from said mandrel, said blade member engages said last mentioned portion of said ribbon and bends it over the remainder of the ribbon to form a double tab.

14. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab including a supporting frame; a mandrel mounted on said frame at one end of said mandrel for permitting a cathode sleeve to be slipped over said mandrel from its other free end to be supported thereby; a movable welding electrode supported on said frame adjacent said mandrel and registering therewith, said mandrel comprising the return path for the welding current; said frame having an opening adjacent said mandrel through which a tab ribbon can be fed to lie over said cathode sleeve in registry with said welding electrode and extending beyond the end of said sleeve; a cutter on said frame for cutting said tab ribbon fed thereto in predetermined lengths; and a blunt-edged blade member mounted adjacent to said mandrel and vertically above it and positioned between said sleeve and the portion of said ribbon lying beyond said welding electrode whereby when said sleeve is removed from said mandrel said blade member engages said last mentioned portion of said ribbon and bends it over the remainder of the ribbon to form a double tab.

15. Apparatus for welding a metal ribbon to a tubular cathode and bending a portion of said ribbon to form a double tab including a supporting frame; a mandrel mounted at one end on said frame and extending laterally therefrom for permitting a cathode sleeve to be slipped over said mandrel from its other free end to be supported thereby; a movable welding electrode pivotally supported on said frame adjacent said mandrel and registering therewith; said mandrel comprising the return path for welding current; said frame having an opening adjacent said mandrel through which a tab ribbon can be fed to register with said welding rod and having one end extending along said cathode sleeve and the other end extending beyond the end thereof; a cutter on said frame for cutting tab ribbon fed thereto in predetermined lengths; and a blunt-edge blade member mounted on said frame and positioned adjacent to said mandrel and between said one end of said ribbon and said sleeve whereby when said sleeve is removed from said mandrel, said blade member engages said last mentioned portion of said ribbon and bends it over the remainder of the ribbon to form a double tab, said welding electrode, said opening in said frame, said cutter, and said blunt-edged blade all being disposed on the same side of said mandrel.

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No references cited.