July 23, 1929. W. D. BUMSTEAD ET AL 1,722,195

METHOD OF ELECTRIC WELDING WIRES

Filed April 23, 1928

Fig. 1

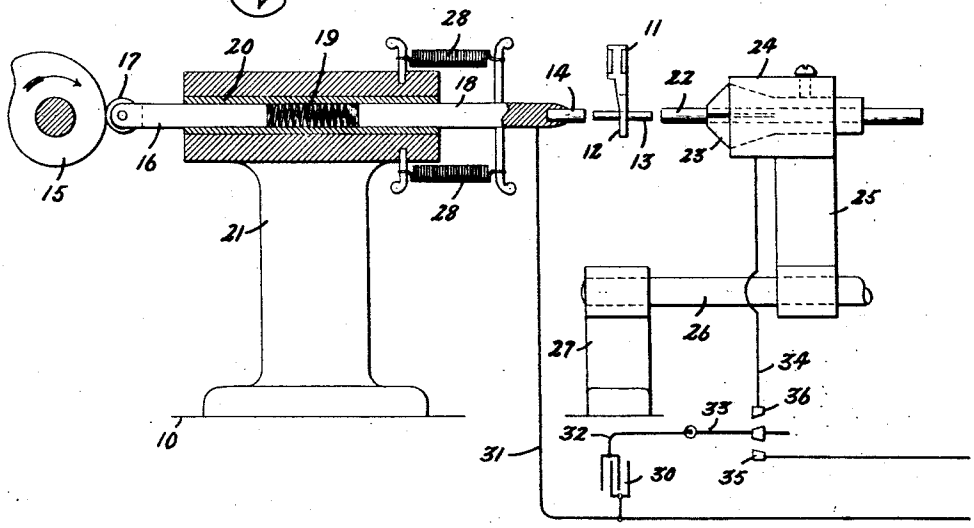


Fig. 2

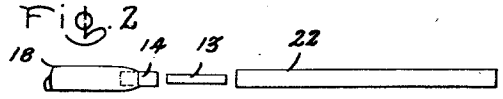


Fig. 3

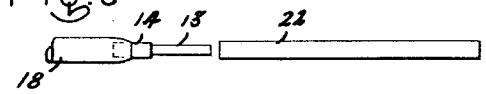


Fig. 4

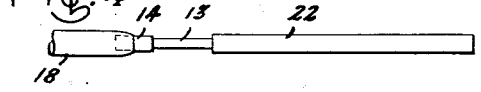


Fig. 5

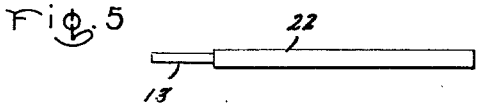
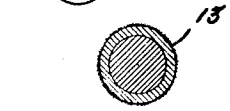


Fig. 6



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UNITED STATES PATENT OFFICE.

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METHOD OF ELECTRIC WELDING WIRES.

Application filed April 23, 1928. Serial No. 272,181.

Our invention relates to methods and apparatus for welding wires together and more especially for producing leading-in conductors for electric incandescent lamps and similar devices which comprise a comparatively short length of wire having a co-efficient of expansion approximately the same as glass, said wire being welded to another wire which is composed of copper, nickel or other higher expansion wire. It has been customary to weld these wires by the so-called percussive welding method which is disclosed in patent to Chubb No. 1,066,468 of July 8, 1913. According to that method, the two wires which are to be welded together are each gripped in such a way as to make electrical contact between each of the sections of wire and its gripping device which is connected to the high potential electrical discharge circuit. It is desirable to use wire coated with a borate for the sealing-in portion, and in such case it is necessary for the gripping device to penetrate the coating in order to make the proper electrical contact. This not only chips off part of the coating but also causes an accumulation of the borate powder around the contacts, and in view of the fact that it is necessary to produce great numbers of these wires, this becomes more or less of a nuisance. According to our invention this is obviated by making electrical contact with the ends of the wires. It will be obvious that our invention also has advantages when used for uniting uncoated wires since the necessity for tight gripping of the wires is removed and the operation is performed with less chance of distortion of the wire. Various other features and advantages of our invention will appear from the description which follows of a species thereof.

An instance of the application of our invention is the production of leading-in wire comprising a sealing-in portion consisting of so-called Dumet wire. This is disclosed in Fink Patent No. 1,498,908, June 24, 1924, and this is usually coated with a borate as disclosed in Van Keuren Patent No. 1,427,870, September 5, 1922.

In the drawing, Fig. 1 is a sectional elevation of an apparatus constituting an embodiment of our invention; Figs. 2, 3 and 4 are diagrammatic illustrations of steps in our process; Fig. 5 shows the completed wire; and Fig. 6 shows a section of the sealing-in portion of the wire on an enlarged scale.

Referring now to the drawing and more particularly to Fig. 1 which illustrates a portion of a welding machine comprising our invention, this machine comprises a base 10 which supports the various mechanisms which feed, trim and position the wires preparatory to welding them together. We are aware that this combination of mechanisms is not new in the art and have therefore purposely omitted some of them in the drawing for the sake of clearness. As shown, an arm 11 comprising jaws 12 adapted to receive and grip a short length of wire 13 is actuated so as to transfer the said wire from its source of supply (not shown) to a position where one end thereof may be conveniently engaged by an aligned contact member 14 which is advanced toward it. The movement of the contact member 14 is accomplished by a cam 15 which actuates a rod 16 through roller 17 carried on the end of said rod. The movement of the rod 16 is communicated to another rod 18 through the intermediate compression spring 19. The rods 16, 18 and spring 19 are slidably mounted in bearing 20 formed in the standard 21 extending from the base 10 of the machine. Attached to the outer end of the rod 18 is the contact member 14 preferably of tungsten or other refractory metal. The shape of the cam 15 is such that when its high point bears against the roller 17 the rods will be moved forward to a position where the contact member 14 may touch one end of the wire 13. The spring 19 at this time is compressed sufficiently to hold the contact 14 firmly against the end of the wire.

Another wire 22 which is to be welded to the opposite end of the wire 13 is placed in a chuck 23 in accurate alignment with the wire 13. The chuck 23 is carried in a collar 24 forming part of a bracket 25, said bracket being slidably mounted on horizontal rods 26 extending from the standard 27. At the proper time the bracket 25 is moved forward in order that the end of the wire 22 may contact with the end of the wire 13. At the instant the ends of these wires contact a condenser located in the electrical circuit is dis-

charged and the heat produced at the point of contact is sufficiently great to produce a weld between the wires.

After the completion of the weld the roller 17 passes over the high point on cam 15 allowing the compression spring 19 to push the rod 16 backwardly. During this time the rod 18 is returned to its initial position by springs 28 which pull it backwardly thereby disengaging the contact 14 from the end of the wire 13. The jaws and likewise the chuck 23 are next opened to allow the removal of the completed weld.

Electrical energy is supplied from a suitable source, such as a generator (not shown), to a condenser 30. From one terminal of the condenser the current is directed to the contact member 14 through conductor 31. The other terminal of the condenser is connected to the chuck 24 through conductor switch 33 and conductor 34 making the chuck one terminal of the welding machine, the other terminal being the contact member 14. When the switch 33 engages the contact 35 the condenser is charged and the welding circuit is open. Just prior to the welding operation the switch 33 is caused to engage the contact 36 in order that the condenser will discharge the instant the ends of the wire 13 and 22 meet thereby welding them together.

What we claim as new and desire to secure by Letters Patent of the United States, is—

1. The method of uniting two wires which consists in forming an electrical contact between the end of one of said wires and a high potential electrical discharge circuit and then engaging the other end of said wire with an end of the other wire and completing the high potential discharge circuit.

2. The method of uniting a wire having an insulating coating with another wire which consists in forming a contact between one uncoated end of said first wire and a high potential electrical discharge circuit and then engaging the other uncoated end of said wire with an end of the other wire and completing the high potential discharge circuit.

In witness whereof, we have hereunto set our hands this 20th day of April, 1928.

WILLIAM D. BUMSTEAD.
EDWARD A. AURADA.