June 13, 1939. G. E. HARLAN 2,162,615

SOLDERING TOOL

Filed Jan. 27, 1937

Fig. 1.

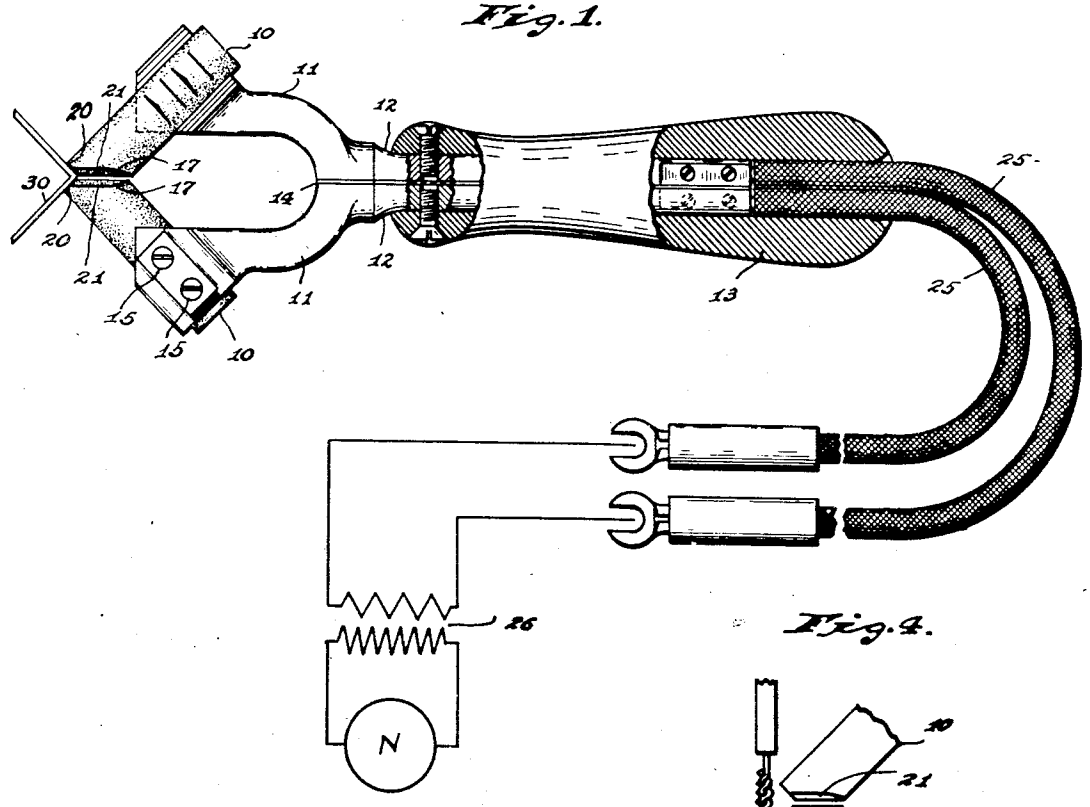


Fig. 4.

Fig. 2.

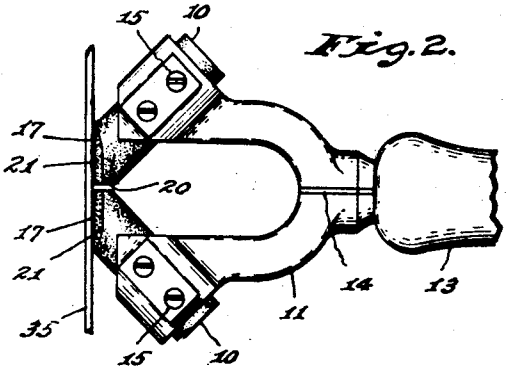


Fig. 5.

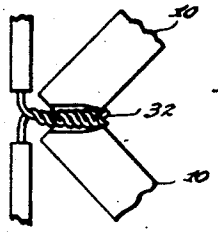


Fig. 3.

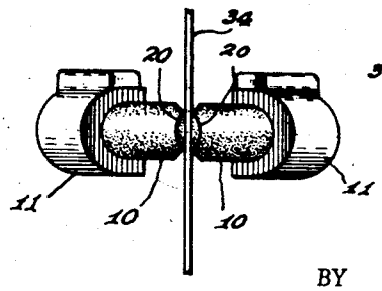
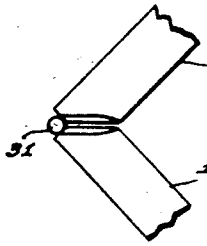


Fig. 6.



INVENTOR.
GEORGE E. HARLAN,
BY
ATTORNEYS.

Patented June 13, 1939 2,162,615

UNITED STATES PATENT OFFICE

2,162,615

SOLDERING TOOL

George E. Harlan, Indianapolis, Ind.

Application January 27, 1937, Serial No. 122,499

5 Claims. (Cl. 219—26)

My invention relates to soldering tools of the kind embodying a pair of spaced, relatively high resistance electrodes which, when a circuit is completed through them by application to the work, become heated as the result of current-flow and in turn heat the work. It is the object of my invention to produce a tool of this type in which the electrodes and the electrode holders will be so arranged as to permit the application of the electrodes to work of widely varying character, such as to flat plates, to corners in structures fabricated of sheet-metal, to joints in wires, to rods, etc.

In carrying out my invention I mount the electrodes respectively in two electrode holders carried by a common handle. The electrode holders are so arranged that each electrode is disposed at an angle of approximately 45° to the handle-axis and at an angle of approximately 90° to the other electrode. The face of each electrode is beveled at an angle of approximately 45° to the electrode-axis; and the electrodes are made rotatable in their respective holders so that they can be disposed either with their end faces in parallel spaced relationship or in co-planar relationship. In addition, the edges of the end faces of the electrodes are beveled so as to form trough-like recesses or grooves one extending longitudinally of the handle and one transversely of the handle.

The accompanying drawing illustrates my invention: Fig. 1 is a plan view of the complete tool with parts of the handle broken away and showing the electrodes connected to a suitable current-source; Fig. 2 is a fragmental plan view similar to Fig. 1 but showing the electrodes as rotated to bring their end faces into a common plane; Fig. 3 is an end elevation of the tool with the electrodes disposed as indicated in Fig. 1; and Figs. 4, 5, and 6 are fragmental views illustrating the manner in which the electrodes can be applied to work of varying character.

As is clear from Fig. 1, each of the electrodes 10 is mounted in an electrode-holder 11, and the two electrode holders have shanks 12 which are received in a longitudinal bore in a handle 13, the shanks being separated from each other by a suitable sheet of insulating material 14.

Each of the electrodes 10 is cylindrical in shape and is rotatably received in a suitable hole of corresponding diameter in the associated electrode-holder 11, the electrode being held in fixed position in the electrode holder by some suitable means such as set-screws 15. The electrode-receiving holes in the electrode holders have substantially co-planar axes which are preferably disposed at angles of approximately 45° to the axis of the handle 13 and at an angle of approximately 90° to each other.

The ends of the electrodes are beveled, desirably at an angle of approximately 45° to the electrode-axis, to provide end faces 17. When the electrodes are disposed in the position illustrated in Figs. 1 and 3, the end faces 17 will be substantially parallel; but if each electrode is rotated about its own axis through an angle of approximately 180°, the two end faces will be brought into substantially the same plane, as is clear from Fig. 2.

The tip of each electrode is struck off, as indicated at 20, to provide a small face, conveniently disposed in a plane approximately perpendicular to the electrode-axis. In addition, corresponding side edges of the end faces of the two electrodes are beveled slightly, as indicated at 21.

In use, the electrodes are secured in the electrode holders with their outer ends spaced a slight distance apart. Secured to the end of each electrode-holder shank 12 is a lead, desirably a flexible, insulated wire 25, and the two leads are adapted for connection to a source of low-voltage current. As indicated in the drawing, this current is conveniently an alternating current derived from the secondary of a step-down transformer 26.

The electrodes are desirably of carbon; for, in addition to having the necessary high-resistance qualities, carbon has the advantage that solder will not adhere to it. Carbon electrodes about one-half inch in diameter and of the proportions shown have proven satisfactory for most work when a 2½ volt E. M. F. is empressed across them to cause a current of about 100 amperes. For very light work, smaller electrodes may be used. Smaller electrodes have the advantage of heating quickly, but are open to the disadvantage that they will break more readily than heavier ones. The carbon I have found most satisfactory is low-resistance motor-brush carbon, preferably graphite-free or as nearly so as possible.

When it is desired to use the tool, the two electrodes are brought into contact with the work which is to be soldered. This completes a circuit through the electrodes, and the resulting flow of low-voltage, high-amperage current heats the electrodes. The work is warmed by reason of its proximity to the electrodes, and solder is applied in the usual manner. The heat for warming the work and melting the solder is largely derived directly from the electrodes, as

the relatively low resistance of the work prevents the current flowing through it from having any pronounced heating effect.

When the electrodes are disposed as indicated in Figs. 1 and 3, the tool is adapted for use in a wide variety of situations. The two small surfaces 20 form a groove adapted to receive the joint between two sheet-metal pieces such as are indicated at 30 in Fig. 1 or to receive a round rod 31 as shown in Fig. 6. The beveled side edges 21 form another groove suitable for the reception of such articles as the twisted-together ends 32 of a pair of wires, as indicated in Fig. 5. The extreme ends of the electrodes may be brought against a wire-joint 33 disposed transversely of the tool, as indicated in Fig. 4. A plate thinner than the space between the parallel end faces of the electrodes can be inserted between them as indicated at 34 in Fig. 3 and the tool rocked about its own axis to bring the electrodes into contact with opposite faces of the plate. In situations where a plate, such as is indicated at 35 in Fig. 2, is too thick to be received between the electrodes, or where it is desired to heat a spot remote from the plate edges, the electrodes can be rotated 180° about their respective axes and applied to the plate.

I claim as my invention:

1. A soldering tool, comprising a handle, a pair of electrodes, electrode holders carried by said handle and supporting said electrodes in coplanar relationship and approximately perpendicular to each other, each electrode being rotatably mounted in its associated holder and having an end face disposed at an angle of approximately 45° to its axis, whereby said electrodes by rotation about their respective axes can be disposed either with their end faces opposed and approximately parallel or with such end faces approximately co-planar.

2. The invention set forth in claim 1 with the addition that said electrodes are disposed respectively at angles of approximately 45° to the axis of said handle.

3. The invention set forth in claim 1 with the addition that the extreme portions of adjacent ends of said electrodes are struck off to provide surfaces approximately perpendicular to the respective electrode axes.

4. A soldering tool, comprising a handle, a pair of electrodes, electrode holders carried by said handle and supporting said electrodes with their axes in angular relationship to each other, the adjacent ends of said electrodes being formed with approximately plane faces disposed at angles to the axes of the respective electrodes, the sum of the last mentioned angles being substantially equal to the angle between the electrode-axes, each of said electrodes being slidable axially of itself in its associated holder and also rotatable therein between a position in which said plane faces are substantially parallel to each other and a position in which said faces are substantially coplanar.

5. A soldering tool as set forth in claim 4 with the addition that the angle between the plane face and axis of one electrode is substantially equal to the corresponding angle in the other electrode.

GEORGE E. HARLAN.