United States Patent

Strachan

[15] **3,654,429**

[45] **Apr. 4, 1972**

[54] HEATING ARRANGEMENT

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[73] Assignee: **Ideal Industries, Inc.**, Sycamore, Ill.

[22] Filed: **July 27, 1970**

[21] Appl. No.: **58,288**

[52] **U.S. Cl.**.....**219/346**, 219/228, 219/233, 219/347, 219/355, 219/533, 219/535, 338/279

[51] **Int. Cl.**.....**H05b 3/00**, H01c 3/00

[58] **Field of Search**.....219/228, 227, 221, 339, 342, 219/343, 346, 347, 353–357, 520, 521, 533, 535, 538, 542, 552, 50; 338/279–281, 283, 290, 292

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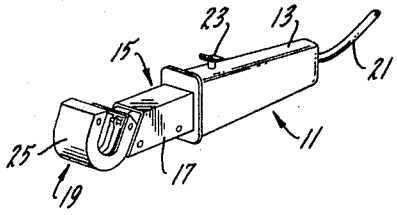
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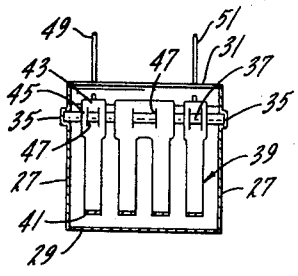
Primary Examiner—A. Bartis
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[57] **ABSTRACT**

A hand tool for heat shrinking material having an elongated shield of generally U-shaped cross-section defining a trough for receiving a work piece. A resistance heater element is positioned inside the shield. The resistance heating element is constructed of U-shaped strips having flat, radiating surfaces positioned generally parallel to a work piece positioned in the trough. The U-shaped strips are integrally connected to each other at the ends of the strips alternately on opposite sides of the U's to form a continuous electrical path through the resistance heating element. The strips are supported on insulated rods mounted in cups formed in the end walls of the shield.

3 Claims, 6 Drawing Figures

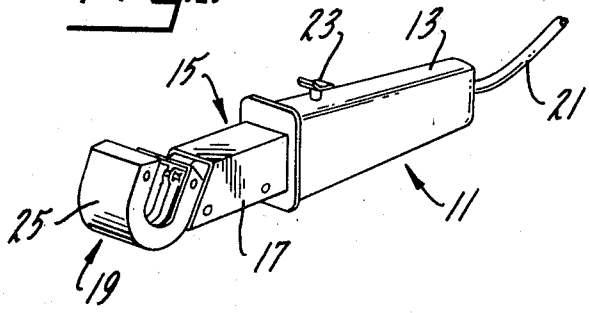




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Fig. 1.



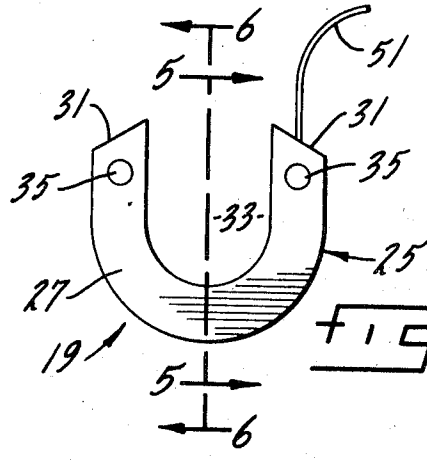


Fig. 2.

Fig. 3.

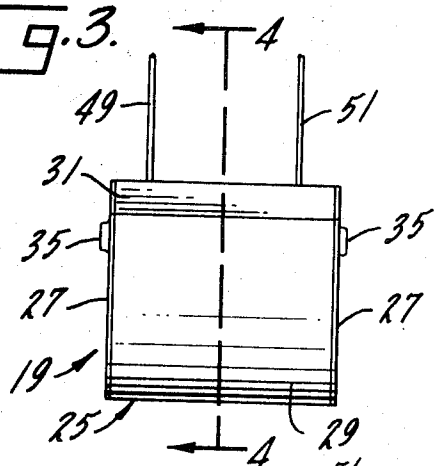
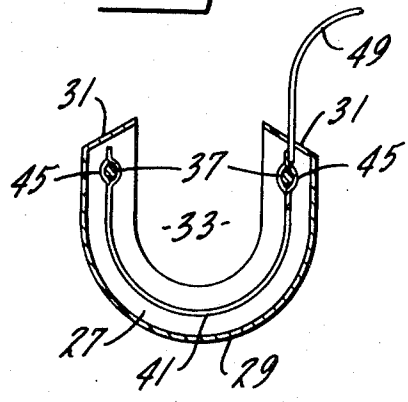


Fig. 4.



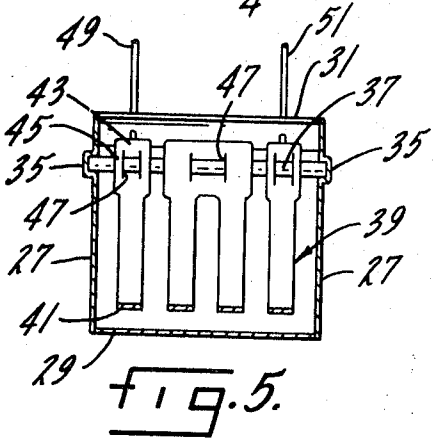


Fig. 5.

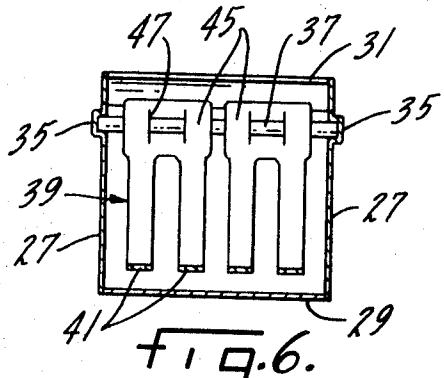


Fig. 6.

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HEATING ARRANGEMENT

SUMMARY OF THE INVENTION

This invention is concerned with an electrically operated, radiant heat, hand tool for heat shrinking material. It is particularly directed to the heater for such a hand tool. The heater comprises a plurality of flat, U-shaped strips of electrical resistance material. The strips are supported on insulated rods which extend through loops formed in the strips. The rods are seated in cups formed in the end walls of the shield.

An object of this invention is a heater for a heat shrinking tool which concentrates heat against the material to be shrunk.

Another object is a radiant heating element which presents a nearly continuous radiating surface to the material being heated.

Another object is a radiant heating element which does not require the use of reflectors to concentrate the radiated heat in a preselected zone.

Another object is a resistance heating element having heating strips which may readily be adapted to be connected in series or in parallel.

Other objects may be found in the following specification, claims and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated more or less diagrammatically in the following drawings wherein:

FIG. 1 is a perspective view of a heat shrinking tool embodying the novel features of this invention;

FIG. 2 is an enlarged end view of a portion of the heat shrinking tool of FIG. 1;

FIG. 3 is a front view of the device of FIG. 2;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 2 and

FIG. 6 is a cross-sectional view taken along line 6—6 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the numeral 11 designates a hand held tool for heat shrinking materials. The tool includes a handle 13 and a detachable heater assembly 15. The heater assembly includes a conductor housing 17 and a heater 19. The conductor housing supports prongs (not shown) which fit into mating receptacles (not shown) in the handle 13. A cord 21 connects the handle 13 to a suitable power unit (not shown). A push button 23 is provided on the handle to control the current to the heater 19.

The heater 19, shown in detail in FIGS. 2 through 6, includes an elongated generally U-shaped shield 25. The shield includes U-shaped end walls 27 connected by an arcuate shaped wall 29. Sloping walls 31 cap the U-shaped end walls 27. A work piece receiving trough 33 is defined by the end walls 27 and the arcuate connecting wall 29. Cups 35 are formed in the end walls 27 near the ends thereof.

Insulated support rods 37 are inserted in the cups 35 and extend longitudinally of the shield in each leg thereof. A U-shaped, elongated resistance element 39 is supported on the insulated support rods 37 inside the shield.

The resistance element 39 is an integral one piece unit formed of U-shaped strips 41 having enlarged portions 43 at the ends thereof. The enlarged portions 43 of each strip are integrally connected with the enlarged portions of adjacent

strips alternately to form a continuous electrical path through the resistance element. The resistance element is supported on the support rods by means of loops 45 which fit over the rods. The loops are formed in the enlarged portions 43 of the strips by cutting parallel slits 47 therein and bowing the enlarged portions between the slits alternately in opposite directions.

The resistance element 39 in the drawing is shown as one piece so that the individual strips 41 are in essence connected in series between input conductors 49 and 51 which are connected To the strips at the opposite end of the resistance element. If it is desirable to connect the flat resistance strips 41 in parallel, the strips would be formed separately.

The use, operation and function of the invention are as follows:

The heater of this invention is intended for use in a light weight hand tool adapted to heat shrink materials such as plastics. This tool is particularly adapted for heat shrinking plastic tubes to band electrical wires and the like. The present heating devices use a heat source, such as a straight or coiled wire, which radiates heat equally throughout 360° around the heat source axis. In order to obtain a concentrated heat zone, reflective devices have been used to direct the radiated heat to the heat zone. This invention utilizes radiant heat sources arranged generally lengthwise along the axis of the heating zone, which, in this instance, is the work piece receiving trough 33. The electrical resistance element 39 has flat surfaced, U-shaped strips 41 extending parallel to and partially surrounding the U-shaped trough 33. The flat surfaces of the strips present a large area radiating heat towards the trough 33. Thus, the need for reflectors is eliminated and the loss of efficiency due to deterioration of reflective surfaces is no longer a problem.

The resistance element 39 is formed so it can be conveniently made from flat sheets of electrical resistance material which requires only bending, cutting and slitting to form the resistance element.

While a preferred form of the invention has been shown and described, it should be understood that modifications, changes and alterations may be made without departing from the teachings of the invention. Therefore, the scope of the invention should be limited only by the claims appended hereto.

I claim:

1. A hand held heating tool having a heater assembly, said heater assembly including:
- an elongated shield of generally U-shaped cross-section defining a work piece receiving trough,
- end walls formed as part of said shield with rod receiving cups formed in said end walls,
- an electrical resistance heating element positioned in said shield,
- said heating element including U-shaped strips of resistance material having generally flat radiating surfaces facing said trough,
- loops formed in said strips adjacent the ends thereof,
- insulated support rods extending through said loops and seated in said cups to support said strips in said shield, and
- means to connect said electrical resistance heating element to a source of electrical power.

2. The heating tool of claim 1 further characterized in that each of said strips of resistance material is integrally connected to at least one adjoining strip to form a continuous electrical path through said heating element.

3. The heating tool of claim 2 further characterized in that adjoining strips of resistance material are integrally connected at the ends of said strips.

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