June 6, 1950 J. W. DALGLEISH 2,510,383

METHOD OF CUTTING OR TRIMMING THERMOPLASTIC MATERIALS

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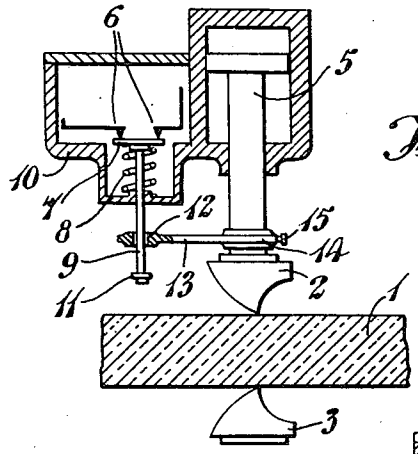


Fig. 1.

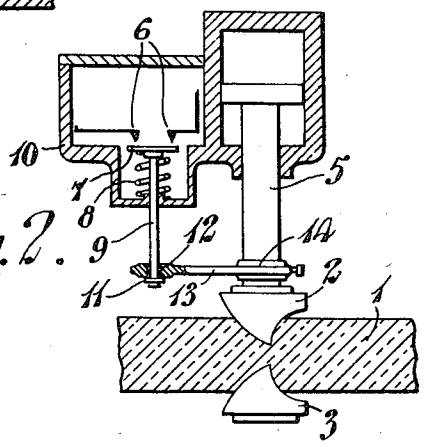


Fig. 2.

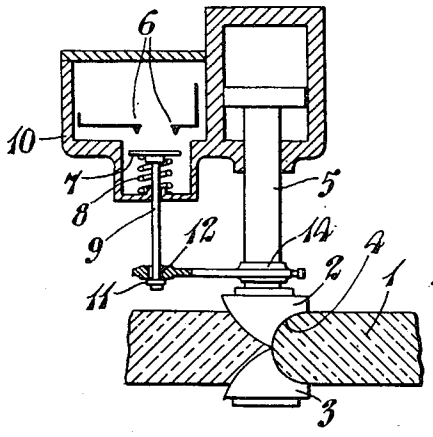


Fig. 3.

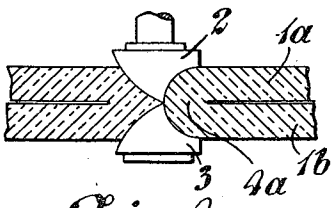


Fig. 4.

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METHOD OF CUTTING OR TRIMMING THERMOPLASTIC MATERIALS

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3 Claims. (Cl. 154—125)

1

The invention relates to a method of cutting or trimming thermo-plastic materials, particularly in sheet form. Such materials are being used in the manufacture of purses, tobacco pouches and the like. The present invention has for an object to enable such materials to be cut and to present a smooth moulded edge of superior finish.

According to the present invention, the method of cutting thermo-plastic materials consists in closing together upon the material two electrodes of the desired form to which a high frequency voltage of suitable amplitude and frequency for heating the material is applied, switching off the high frequency power before dielectric breakdown of the material occurs, and then continuing the closure of the electrodes to sever the material completely or so as to leave only a very thin flash which can be readily pulled away or trimmed off in a second operation. The electrodes are made with the desired shape and contour to produce the desired cut with the edge of the desired shape.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, in which:

Fig. 1 shows diagrammatically an arrangement according to the present invention for cutting thermo-plastic material, at the stage before the cutting has commenced.

Fig. 2 shows the arrangement with the sheet partly cut.

Fig. 3 shows the final stage where the sheet is cut;

Fig. 4 shows a modification.

Referring to the embodiment shown in Figs. 1, 2 and 3, the sheet 1 of thermoplastic material to be cut is placed between two linear electrodes 2 and 3 having the form of the cut required. A cross-section through the electrodes is such that when the two cutting edges thereof are in contact the portion of the plastic material enclosed between the adjacent shaped portions of the electrodes has the desired contour and form of the finished edge. Thus, as shown in the drawings, the electrodes 2 and 3, which are shaped to produce an edge of rounded form, have an approximately V-shaped cross-section with the portions adjacent the apices thereof which are directed towards the edge to be finished being curved to produce a rounded edge 4 (see Fig. 3) when the electrodes are in contact. For other forms of edge, corresponding alterations would be made in the shape of the electrodes.

The electrodes are mounted in a press, and are connected to be supplied with a high frequency

2

voltage of suitable amplitude and frequency for heating the material of the sheet 1. The drawing shows the bottom electrode 3, fixed and the upper electrode 2 moved by an air-operated ram 5. The supply of high frequency energy to the electrodes is controlled by the switch contacts 6, 7, the movable contact 7 of which is normally held in engagement with the contact 6 by the spring 8. The rod 9, extending from the movable contact 7 passes out through an aperture in the casing 10, within the switch mechanism is located in a direction substantially parallel to the direction of movement of the ram 5 and is provided with a head 11 at its lower end. Embracing the rod 9 is the apertured or forked end 12 of an arm 13 carried by its collar 14 from the ram 5 so that at a predetermined advanced position of the ram 5, the end 12 of the arm engages the head 11 of the rod 9 and moves the contact 7 out of engagement with the contacts 6 to open the circuit supplying the high frequency energy to the electrodes 2 and 3. The position at which the contact 7 is opened may be adjusted by adjusting the position of the collar 14 along the ram 5, a set screw 15 being provided for securing the collar in the adjusted position.

Upon closing the press, the electrodes 2 and 3 are brought into contact with the surface of the material (see Fig. 1) and the high frequency voltage is applied, the material thereby being heated to the softening point. When the material softens, the electrodes close together until they reach the position shown in Fig. 2 when the contact 7 is opened to cut off the supply of high frequency energy to the electrodes. The arm 13 is so adjusted that the high frequency energy is automatically switched off before dielectric breakdown of the material 1 occurs. Closure of the electrodes then continues until the electrodes meet or nearly meet (see Fig. 3) thereby forming the edge to the desired shape and severing the material completely or leaving only a very thin flash which can be readily pulled away or trimmed off in a second operation.

A feature of the invention lies in the sequence of operations whereby, in one operation of the press, the material is first heated to a plastic condition by the high frequency energy, and the high frequency energy is switched off automatically before the completion of the melting and severing operation.

Although particularly applicable to the cutting or trimming of thermoplastic sheet materials, the invention may also be applied to the cutting of thermoplastic woven fabrics in order to produce a

non-fraying selvedge. Moreover, as shown in Fig. 4 by inserting two sheets of material 1*a*, 1*b*, between the electrodes 2 and 3, the sheets may be simultaneously trimmed and welded together at the edge 4*a*. Furthermore, the invention may also be applied to the cutting of rods or tubes in order to produce a smooth moulded finish to the cut.

I claim:

1. Method of cutting thermo-plastic materials, which consists in positioning the material to be cut between two electrodes, applying high frequency energy to the electrodes to generate heat in the material therebetween, moving the electrodes towards each other during the application of the high frequency energy to cause them to enter the material, interrupting the supply of high frequency energy before dielectric breakdown of the material occurs and thereafter continuing the closure of the electrodes.

2. Method of cutting and simultaneously welding together a plurality of layers of thermo-plastic material which consists in positioning the layers between two electrodes, applying high frequency energy to the electrodes to generate heat in the material therebetween, moving the electrodes towards each other during the application of the high frequency energy to cause them to enter the material, interrupting the supply of high frequency energy before dielectric breakdown of the material occurs and thereafter continuing the closure of the electrodes to sever the material and weld together the cut edges of the layers of material.

3. Method of cutting thermo-plastic materials and moulding the cut edges thereof to a desired configuration which consists in positioning the material between two electrodes, applying high frequency energy to the electrodes to generate heat in the material therebetween, commencing the cutting operation while the material is hot and completing the cutting operation while extracting heat from the material and moulding the cut edge to the desired configuration.

JAMES WHITE DALGLEISH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,388,762	Riley	Aug. 23, 1921
1,668,782	Roberts	May 8, 1928
2,232,640	Schwartzman	Feb. 18, 1941
2,293,178	Stocker	Aug. 18, 1942
2,324,068	Crandell	July 13, 1943
2,328,063	Dodge	Aug. 31, 1943
2,354,714	Strickland	Aug. 1, 1944
2,425,388	Oestricher	Aug. 12, 1947