UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR CUTTING FUSIBLE FABRICS

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6 Claims. (Cl. 164—36)

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This invention relates to a method and apparatus for cutting fusible fabrics. More specifically, the invention relates to a device which is adapted to cut fusible fabrics such, for example, as nylon by melting and concurrently therewith shearing the material of which the fabric is compounded and is also adapted to fuse the ends of the parted fibers to form smooth, well-bound and ravel-free edges to the cut material.

In devices heretofore known by us for cutting fusible fabrics, shearing means solely have been employed for performing the cutting operation. In the present invention, however, a combination of melting and shearing is employed to cut the fusible fabric rapidly and additional benefits are derived therefrom in the form of fused edges of the fabrics.

One of the objects of the present invention is to provide a new and improved cutting device of simple, rugged construction which will cut fusible fabrics efficiently and rapidly.

Another of the objects is to provide a tool and apparatus for cutting fusible fabrics in a manner so as to produce smooth, well-bound and ravel-free edges to the cut material, and to provide a tool and apparatus for cutting fusible fabrics which will not require repeated sharpening as the result of continued use.

Still other objects, advantages and improvements will be apparent from a consideration of the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a view of the cutting tool mounted in accordance with a preferred arrangement of the apparatus of the present invention and illustrating the method of employing the apparatus to cut fusible fabrics;

Fig. 2 is a view in elevation of the cutting tool;

Fig. 3 is an end view of the cutting tool of Fig. 2;

Fig. 4 is a view in perspective of the tool in operation; and

Figs. 5 and 6 are sectional views taken respectively along the lines 5—5 and 6—6 of Fig. 2.

Referring now to the drawing in which like numerals of reference are employed to designate like parts throughout the several views, there is shown thereon a cutting apparatus according to the preferred embodiment of the invention, and adapted to cut fusible fabrics such, for example, as nylon in accordance with the method of the invention, the apparatus comprising a cutting tool generally indicated by the numeral 10 which is formed of a plate 11 composed of a suitable heat conducting material such, for example, as metal with a graduated opening 12 therein. The opening 12 is formed by two intersecting V-shaped grooves, 13 and 14, machined in opposite sides of the plate 11 by cutters whose edges are in the same plane; the result being the formation of two non-parallel knife edges, 15 and 16, in the same plane. As the material 22 to be severed is fed, by either manual or mechanical means, into the graduated opening 12, the entrance of which is preferably rounded as at 17 and 18 to facilitate entry of the material 22 along some predetermined line of separation, the material is compressed by the knife edges 15 and 16.

Concurrently therewith the material is heated by contact with the knife edges to a temperature sufficiently high to render it plastic. This heating is accomplished by an electrical heating element 19 provided within a slot formed to a suitable depth in three edges of the perimeter of the plate substantially as shown, the heating element being provided with a pair of electrical conductors 22 for establishing a circuit connection between the heating element and a source of electrical power. The element heats the metal of the plate sufficiently to melt and fuse any fusible fabric material coming into contact with the metal. The compressing and heating operations continue until the material reaches the narrowest point 24 of the opening. At this point, in order to prevent any plugging up of the plastic material and to eliminate sticking due to a further narrowing of the opening, a hole 25 is formed through the plate.

The material is continually fed, passing through the hole 25 and reaching an edge 26 formed at a point where the opening 12, because of the intersection of the knife edges 15 and 16, no longer exists and where the V slots 13 and 14 begin to decrease in depth. The depth and width of the V slots decrease until a point 27 is reached where both the depth and width of the slot are zero. The material now is melted into a plastic state and is fed against the aforementioned edge 26 which has the effect of a wedge and forces the softened material to separate and causes each of the separated portions thereof to pass to either side of the plate 11. The severed fibers of the edges of the material 23 are then rubbed against the metal of the diminishing V slots 13 and 14 in the plate 11. The fabric fibers are drawn together by a smearing action, and being in a plastic state, become fused to each other thereby furnishing the cut material 23 with the desired smooth, well-bound and ravel-free edges along the line of separation and eliminating any possibility of snagging.
loose threads during a cutting operation there-
after involving the fused edges. As shown in Figs. 1 and 4 the cutting tool 18 may be attached to a table 28 or any other suit-
able means of support according to the require-
ments of a specific cutting operation. In the
illustrated example, the tool 18 is joined to the
table by means of the supporting brackets 29 held
in place by any suitable means such as by bolts
31 and is heat insulated from the table by means
of the heat insulating spacers 32. For best op-
eration of the cutter, the center line of the open-
ing 12 in the plate 11 lies in the plane of the
upper surface of the table 28 or slightly above
the surface. It is apparent that provisions for
feeding the material at a uniform rate either
manually or mechanically may be devised ac-
cording to the type and amount of material be-
ing separated and to the desired result of the
cutting operation and that in some instances
provision for a movable tool may be utilized as
being more practicable in a specific operation
without altering the basic characteristics of the
invention herein disclosed.

While the invention has been described in par-
ticularity with reference to an example thereof
which gives satisfactory results, it is to be under-
stood that this has been done for purposes of dis-
closure and that various other changes and modi-
fications may be readily apparent to those skilled
in the art to which the invention pertains, after
understanding the invention, and that the terms
employed in the appended claims are to be con-
sidered as words of description rather than as
words of limitation.

The invention herein described and claimed
may be manufactured and used by or for the
Government of the United States of America for
governmental purposes without payment of any
royalties thereon or therefor.

What is claimed as new and desired to be
secured by Letters Patent of the United States is:

1. An apparatus of the character disclosed for
separating fusible fabrics by heat and pressure
and comprising a heat conducting plate having a
slot therein, a heating element disposed in said
slot for heating the plate, a pair of knife edges
arranged in the same plane and formed in said
plate in predetermined spaced relation in such a
manner as to form an elongated tapered opening
therebetween, said plate having an enlarged open-
ing formed therein in communication with
and abutting said tapered opening at a point where
the separation of the knife edges is a minimum,
and a wedge in said plate having the apex edge
thereof arranged in the plane of said knife edges.

2. An apparatus of the character disclosed for
providing smooth, well-bound and ravel-free
edges to a fusible fabric material and comprising
a heat conducting plate member having a slot and
two complementary V-shaped grooves formed
therein, said grooves being arranged in corre-
sponding locations on opposite sides of said plate
member, each of said grooves decreasing in depth
and width from a predetermined maximum at the
point where the material enters the groove to a
point where the material breaks contact with the
plate at the surfaces of the two sides thereof, and
a heating element disposed in said slot for heating
the plate member and said material.

3. An apparatus of the character disclosed for
separating a fusible fabric material and for pro-
viding smooth, well-bound and ravel-free parted
edges thereto and comprising a heat conducting
metal plate, a heating element cooperatively asso-
ciated with said plate, two complementary knife
edges formed in said plate in the same plane and
arranged in such a manner as to form an elon-
gated tapered opening, the plate having an
enlarged opening formed therein at a point where
the graduated opening formed by the knife edges
reaches a minimum width, the wedge formed in the
plate, said wedge having its apex edge arranged in
the plane of the knife edges, and two V-shaped
grooves formed on opposite sides respectively of
the plate, said grooves uniformly decreasing in
depth and width from a maximum at the point
where the material enters the groove to a point
where the material breaks contact with the plate
at the opposite sides thereof.

4. A method of separating a fusible fabric along
a predetermined line of demarcation so as to
produce smooth, well-bound and ravel-free edges
therealong which comprises, applying heat and
pressure on both sides of the fabric increasingly
along the line of demarcation sufficiently to melt
and separate the fibers of the fabric, and con-
currently therewith smearing the melted and
parted fiber ends into the severed edges of the fabric
sufficiently to cause the fiber ends to be
fused together.

5. The method of separating a fusible fabric
material comprising the steps of simultaneously
and progressively applying heat and pressure ex-
teriorly to both sides of said fabric along a line of
desired separation to render it plastic, separating
said fabric while in the plastic state, and wiping
the parted edges of said fabric while in the plastic
state to render said edges smooth, well-bound and
ravel-free.

6. Apparatus for separating a fusible fabric
material and for providing smooth, well-bound
and ravel-free parted edges thereto comprising a
heat conducting metal plate, an element opera-
tively connected to said plate for heating the
plate, said plate having an elongated tapered slot
therein and having its widest portion at the re-
cieving mouth thereof, knife edges formed on said
plate along the length of said slot, said fabric
being adapted to enter said receiving mouth and
to pass between said knife edges, said tapered slot
applying and building the heat along the top
and bottom surfaces of the fabric as the fabric
moves along the length of the slot whereby the
fabric immediately adjacent the knife edges be-
comes plastic as it nears the end of the slot in the
narrowest portion thereof, and a tapered side
wedge adjacent said end of the slot and having its
edge in the path of the plastic portion of said
fabric for separation thereof, the tapered sides of
said wedge having wiping contact with the
separated edges of the fabric thereby to fuse the
edges of the fabric individual thereto.

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