THREAD CUTTING DEVICE FOR SEWING MACHINE

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The present invention relates to a thread cutting device for a sewing machine, and more particularly to a manually operated thread cutter for cutting threads in the region of the needle plate while still connected to a workpiece.

When a seam on a workpiece has been completed on a sewing machine, the workpiece is moved back so that the upper thread is drawn through the needle, and the lower thread is drawn out through the needle aperture in the needle plate. It is difficult to cut the threads in this position directly adjacent the workpiece when scissors are used, and thread cutting devices directly attached to the sewing machine have been proposed. However, thread cutting devices according to the prior art serving this purpose are complicated and difficult to operate.

It is one object of the invention to provide a thread cutting device for cutting threads leading to a workpiece on a sewing machine directly adjacent to the workpiece so that no thread is wasted.

Another object of the present invention is to provide a thread cutting device of extremely simple construction which is under full control of the operator.

Another object of the invention is to provide a manually operated thread cutter which is normally located below the top face of the sewing machine table and needle or throat plate, but which can be raised to a higher position so that threads can be inserted by the operator under the cutting edge of the cutter.

Another object of the invention is to use an edge of an opening in the needle or throat plate as a cutting edge cooperating with the cutting edge of a movable cutter so that the two edges cooperate in a scissor-like manner.

Another object of the invention is to cause a resilient scissor-like engagement between a movable cutter and a cutting edge of the needle or throat plate.

With these objects in view, the present invention relates to thread cutting device provided in a sewing machine. One embodiment of the invention comprises a table for supporting a workpiece and formed with an opening, cutter means located in the opening and mounted for movement between a higher position located above the top face of the table and a lower position located below the top face; and manually operated means connected to the cutter means for moving the same between the positions thereof. In this fashion, threads leading from the sewing machine to a workpiece on the table and inserted between the top face of the table and the cutter means in the higher position are cut when the cutter is moved to the lower position.

The opening is formed in a needle or throat plate. The cutter means include a support rod or support portion carrying at the upper end thereof a cutter with a downwardly directed slanted cutting edge which cuts threads crossing the opening in the needle plate.

In the preferred embodiment of the invention, a guide members is mounted below the table and has a guide-way extending toward the opening in the needle plate. The support portion of the cutting member is resiliently urged against the guide-way so that the cutter is resiliently urged against an edge of the opening in the needle plate which thus serves as a second cutting edge cooperating with a slanted cutting edge of the cutter in a scissor-like fashion.

The manually operated means include a linkage located below the table and connected to the support portion of the cutter means, and a manually operated handle located above the table of the sewing machine, and connected to the linkage for moving the cutter between the higher and lower positions.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is an elevation view, partially in section, and illustrating an embodiment of the invention;

FIG. 2 is a plan view of the device illustrated in FIG. 1;

FIG. 3 is an elevation on an enlarged scale, partially in section, illustrating a detail of FIG. 1; and

FIG. 4 is a fragmentary side view, partially in section and illustrating the parts of the device shown in FIG. 3.

Referring now to the drawings, a conventional sewing machine 24 which is only schematically indicated in FIGS. 1 and 2, has a table 1 provided with a needle or throat plate 16 in which is formed the usual apertures for the feed dogs and the needle. The needle plate has a rectangular opening 22 in which a cutter 16 and the upper end of a support rod or support portion 15 are located. As best seen in FIG. 4, support portion 15 includes an upper and lower parts which extend at an obtuse angle to each other, and is provided with lateral flaps 18 engaging the sides of a guide member 20 secured to the underside of table 1. A face of support portion 15 between the upper and lower parts of the same slidingly engages a guideway 20a which is inclined at a small angle to a vertical plane and leads to opening 22. The main part of guide member 20 is thicker than support portion 15, but an arcuate recess 21 in guide member 20 narrows the wall portion on which guideway 20a is provided and which is embraced by flaps 18. The lower end portion 23 of support portion 15 is formed with a horizontal slot 17, best seen in FIG. 3 in which a pivot pin 12 secured to the free end of a lever arm 13 is received for sliding movement. As best seen in FIG. 2, lever arm 13 is fixed to a horizontal shaft 9 which is mounted for turning movement in bearing brackets 7 and 8 secured to the underside of table 1. The other end of the horizontal shaft 9 carries a fixed arm 10 connected by a link 14 to an arm 5 which is secured to a vertical shaft 4 passing through table 1 and carrying at the upper end thereof a manually operated handle 3.

When handle 3 is turned about shaft 4 between two positions, lever arm 13 turns between the positions illustrated in solid and chain lines in FIG. 3 while pivot pin 12 slides in slot 17 in accordance with a horizontal component of the movement. At the same time, support portion 15 is moved up and down so that cutter 16 is
moved between higher and lower positions indicated in solid and chain lines in FIG. 3. Cutter 16 has a cutting edge slanted to the horizontal plane of the top face and defining an acute angle with the corresponding parallel edges of opening 22.

Due to the angular shape of support portion 15, and the inclination of the upper part of support portion 15 with respect to opening 22 and guideway 20a, and furthermore due to the fact that the lower end 23 of support portion 15 is moved by lever arm 13 in a vertical plane, support portion 15 will resiliently abut guideway 20a and the edge of opening 22 located in the top face of needle plate 2 closer to the operator. Consequently, cutting edge 16a of cutter 16 and edge 22a of opening 22 will resiliently engage each other in a scissor-like action during the downward movement of cutter 16.

**Operation**

The device is normally in a position in which cutter 16 is located below the top face of needle plate 2 so that the cutter does not interfere with sewing operations. At the end of a sewing operation, the workpiece is pushed back from the raised needle and short pieces of thread are drawn from the aperture in the needle plate and through the eye of the needle until the workpiece is in a position clearing opening 22.

The operator turns handle 3 in counterclockwise direction so that lever arm 13 and cutter means 15, 16 are raised to the position illustrated in solid lines in FIG. 3. The workpiece and the threads connected thereto are manipulated so that the threads are inserted between the opening 22 and the slanted cutting edge 16a directly adjacent to the workpiece. Thereupon, the operator turns handle 3 in clockwise direction so that cutter 16 is lowered and cutting edge 16a crosses edge 22a of opening 22 whereby the threads are cut.

The threads are cut directly adjacent the workpiece so that no thread is wasted. The thread ends of the shuttle thread and the needle thread will have a length corresponding to the distance between the needle aperture and opening 16, and this distance is selected so that the length of the machine threads is suitable for the next following stitch formation.

Guide member 20 may be made resilient, or resiliently mounted to exert pressure on guide portions 15 to cause resilient engagement between cutting edges 22a and 16a.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of thread cutting devices differing from the types described above.

While the invention has been illustrated and described as embodied in a manually operated cutter movable in an opening of the needle plate of a sewing machine, it is not intended to be limited to the detail shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

**Letters Patent:**

1. In a sewing machine, in combination, a thread cutting device comprising a table for supporting a workpiece and including a needle plate formed with an opening having a horizontal circumferential edge at the top face of said needle plate; a guide member secured to the underside of said table and having a guideway leading to said opening in said needle plate, said guideway defining a small angle with a vertical plane passing through said opening; cutter means including a support portion having a face sliding on said guideway and two lateral flaps frictionally engaging the sides of said guide member, said cutter means further having a cutter portion having a downwardly directed cutting edge extending at an angle relative to said circumferential edge, said support portion resiliently abutting said guideway and said horizontal circumferential edge of said opening and being guided along said guideway for movement between a higher position in which said cutting edge is located above said horizontal circumferential edge of said opening and a lower position in which said support portion is resiliently urged against said guideway and said edge of said opening; and manually operated means connected to said cutter means for moving the same between said positions whereby threads leading from said sewing machine to a workpiece on said table and inserted in substantially vertical direction between said top flat of said needle plate and said cutting edge in a higher position of said cutter are cut when said cutter is moved to said lower position whereby said cutting edge slingly engages said horizontal circumferential edge of said opening and thereby cuts said thread.

2. A thread cutting device as set forth in claim 1 wherein said support portion has upper and lower parts extending at an obtuse angle to each other, said face and said flaps being located between said two parts; and wherein substantially all unsupported means is connected to said lower part of said support portion.

3. A thread cutting device as set forth in claim 2 wherein substantially all supported means include a horizontal shaft mounted on the underside of said table, a lever arm secured to said horizontal shaft for turning movement in a vertical plane and having a free end pivotally connected to the lower end of said lower part of said support portion for moving the same in a vertical plane whereby said support portion is resiliently urged against said guideway and said edge of said opening.

4. In a sewing machine, in combination, a thread cutting device comprising a table for supporting a workpiece and including a needle plate having an aperture for the passage of a needle and of threads, and an opening having a straight edge in the top face of said needle plate; a guide member secured to the underside of said table and having a portion located underneath said needle plate and including a guideway extending toward said opening and being inclined at a small angle to a vertical plane passing through said opening; cutter means including an upright support portion having cutter at the upper end of said support portion, said support portion having upper and lower parts extending at an obtuse angle to each other, the upper part being inclined to the vertical, and the lower part being substantially vertical, said support portion having a pair of lateral flaps slingly engaging the sides of said needle plate and having said upper and lower parts connected so that a face of said support portion between said upper and lower parts and said flaps slingly engages said guideway, said upper part extending at an angle to said guideway so that said cutter resiliently engages said sharp edge of said opening in said needle plate, said cutter having a downwardly directed cutting edge slanted with respect to said edge of said opening and said cutting means being moveable between a higher position in which said cutting edge is located above said edge of said opening and a lower position in which said cutting edge is located below said edge of said opening; a horizontal shaft supported on the underside of said table; a lever arm mounted on said horizontal shaft and having a free end connected to said lower part of said support portion for moving said support portion in a vertical plane whereby said support portion resiliently engages said guideway and said cutter.
resiliently engages said edge of said opening; a handle located above said table and having a shaft portion passing through said table for mounting said handle for turning movement; and linkage means operatively connecting said shaft portion with said lever arm so that said cutter is moved between said higher and lower positions by operation of said handle whereby threads leading from said aperture in said needle plate to a workpiece on said table and inserted between said top face of the needle plate and said cutting edge in said higher position of said cutter are cut when said cutter is moved to said lower position.

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