Dec. 18, 1962 A. HEDEGAARD 3,068,819

CHAIN CUTTING APPARATUS

Filed Oct. 16, 1959 4 Sheets-Sheet 1

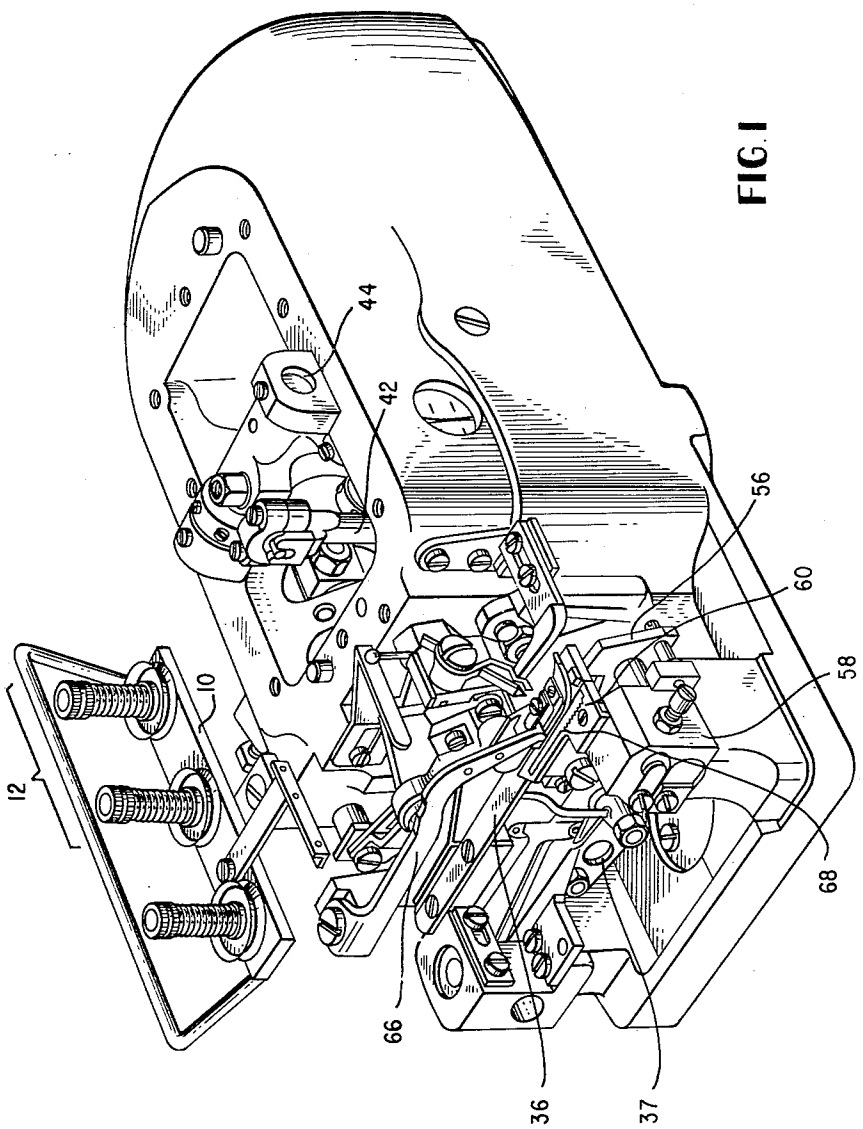


FIG. 1

INVENTOR.
ARNE HEDEGAARD
BY Dicke, Craig & Freudenberg
ATTORNEYS

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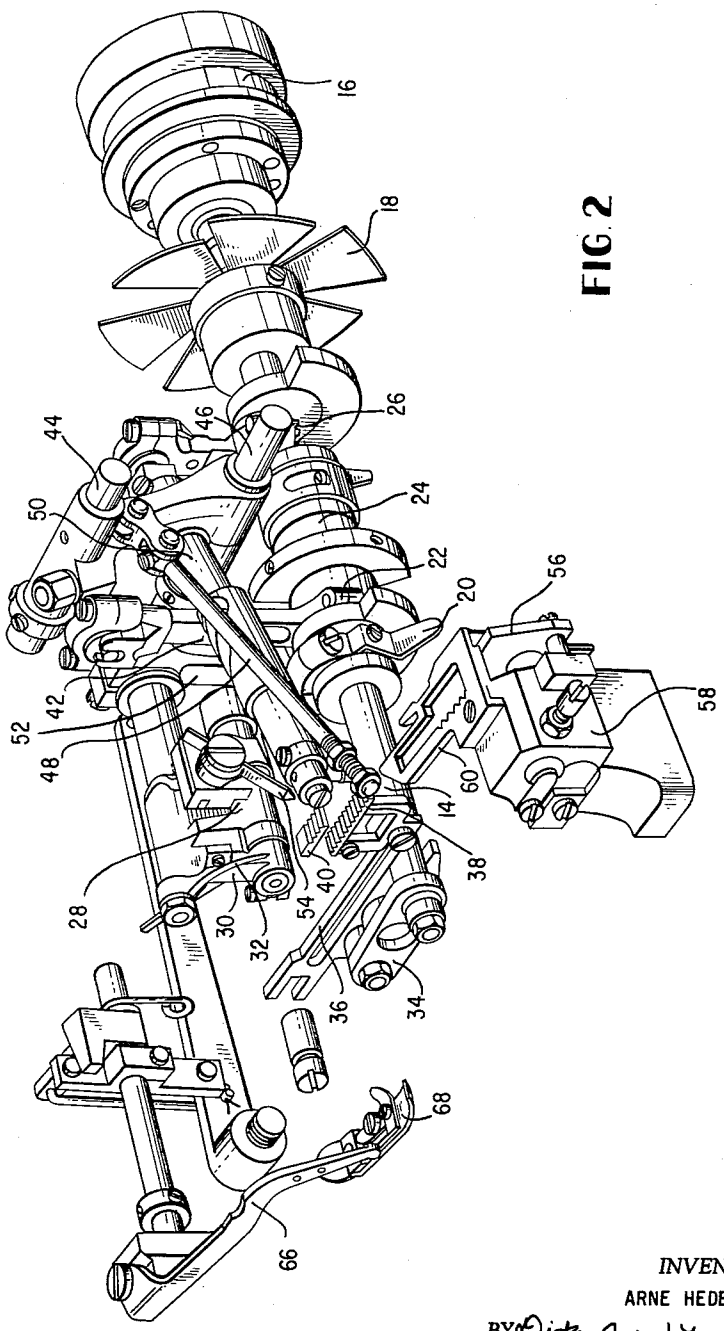


FIG. 2

INVENTOR.
ARNE HEDEGAARD
BY Dicke, Craig & Trostenberg
ATTORNEYS

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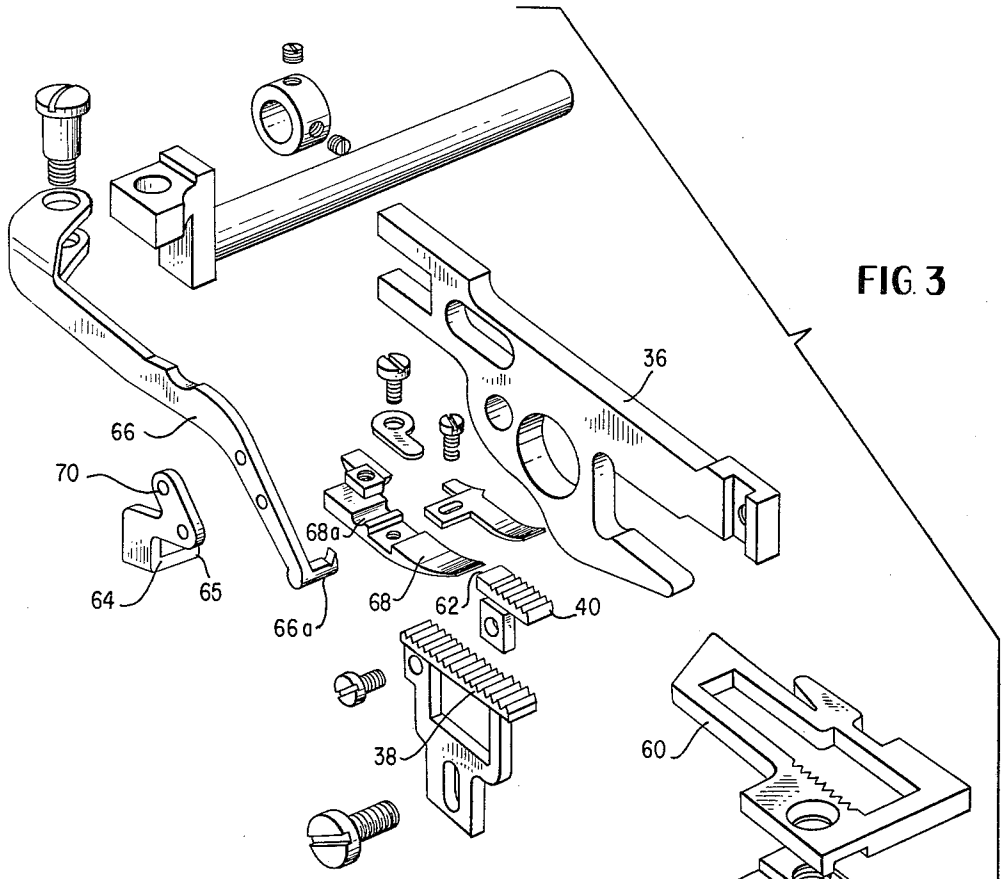
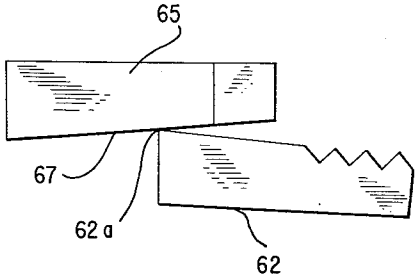


FIG. 3

FIG. 4



INVENTOR.
ARNE HEDEGAARD
BY Dicke, Craig & Freudenberg
ATTORNEYS

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FIG. 5

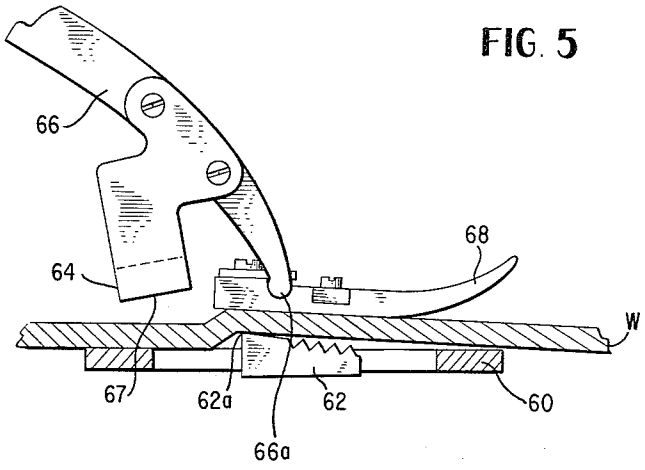
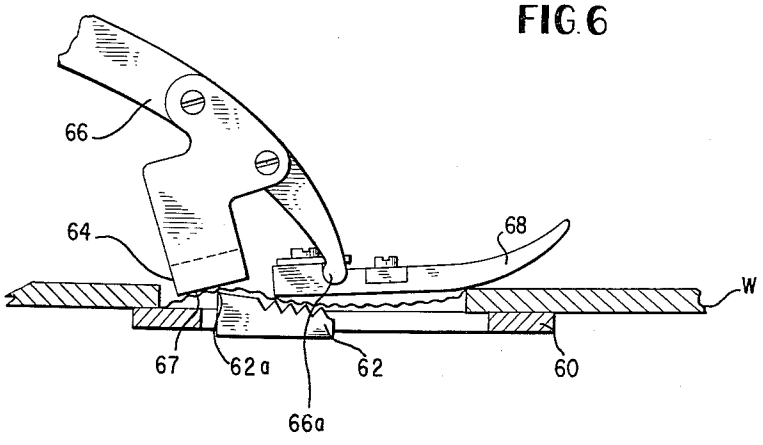


FIG. 6



INVENTOR.
ARNE HEDEGAARD
BY Dicke, Craig & Trautenberg
ATTORNEYS

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CHAIN CUTTING APPARATUS

Arne Hedegaard, Copenhagen, Denmark, assignor to Rothenborg Specialmaskiner for Sy-Industrien A/S, Copenhagen, Denmark

Filed Oct. 16, 1959, Ser. No. 846,914
Claims priority, application Great Britain Oct. 21, 1958
6 Claims. (Cl. 112—252)

The present invention relates to improvements in over edger type sewing machines. Such machines are designed for simultaneously workpiece trimming and stitching and have stitchforming mechanisms and loopers to make two-thread or three-thread over edge stitches. More particularly, this invention relates to a thread-cutting apparatus associated with the workpiece engaging parts of such type of machines for cutting off superfluous threads after completion of stitching on a workpiece.

As is well known in this art, the workpieces are usually fed through this or other machines by means of a reciprocating feed dog structure which projects upwardly through an opening in a relatively stationary throat plate defining at least a part of the work-supporting surface over which the material is passed. The feed dogs may be serrated or toothed and the workpiece material held thereagainst by means of a presser foot carried at the end of a pressor arm with the arm being biased by suitable spring means or otherwise to urge the foot toward the feed dogs and throat plate, but with the position of the foot being movable relative to the throat plate during the feeding operation depending upon the thickness of the material being passed therebetween.

In the use of this over edge type of sewing machines it is usual practice to run the machine continuously putting in one workpiece after the other. With such successive feeding of workpieces, the loopers and the stitchforming mechanism continue to make a chain of stitches between the workpieces which, accordingly, are connected by certain lengths of stitches made between the end of one workpiece and the beginning of the next one. This requires additional work in separating the workpieces and cutting away the superfluous chain stitches therebetween. Such work is time consuming and further it gives rise to waste of thread.

It is the object of the present invention to avoid these disadvantages and provide an automatic thread cutter particularly useful on this specific type of sewing machines and operable to cut the chain threads at the end of each workpiece without disturbing the continuous chain for the next workpiece.

A further purpose of the invention is to provide a thread cutting arrangement in the form of a simple and inexpensive accessory which can easily be mounted on existing sewing machines of the type referred to.

Still another object of this invention is to provide an inexpensive, simple and automatic thread cutting apparatus arranged at the feed dog and presser arm of a sewing machine to sever threads at completion of a stitching operation on a workpiece, but being ineffective to cut the threads or the workpiece as long as the workpiece remains between the feed dog and the presser arm.

Another object of this invention is to enable an automatic thread cutting device to be attached to the forementioned or other types of sewing machines without interfering with the normal function of any of the machine mechanisms, particularly where there are a number of complicated moving parts in and about the stitching area.

The invention provides a cutting member being connected for coordinated movement with and preferably as a part of the chain feed dog and having a cutting edge or surface at the rear end thereof and a second cutting

member mounted above and opposite the first cutting member preferably on or as a part of the presser arm and foot structure and having a surface engaging with the stitched edge zone of the workpiece during the sewing operation and operable to engage with the cutting portion at the chain feed dog when the workpiece has passed the latter so as to thereby cut the threads of the chain by gnaw or fret action due to the relative movement of the feed dog cutting portion in engagement with the surface of the cutting member supported on the presser arm. The presser arm and its associated cutting member are biased toward the feed dog and its respective cutting member and are held apart by any workpiece therebetween to render the cutting member ineffective for thread cutting action but upon removal of the workpiece by normal feed action, or otherwise, the cutting members are permitted to move relatively towards each other under the biasing force for mutual engagement or to effect cutting action on any threads remaining therebetween.

The invention will be described in the following text with reference to the accompanying drawing disclosing one embodiment of the present invention, but not to be considered as limiting the invention except as defined in the claims, and in which:

FIGURE 1 is a general perspective view of an over edge sewing machine of the type referred to,

FIGURE 2 is an exploded view of the essential parts of the machine of FIGURE 1,

FIGURE 3 is an even further exploded view showing some of the parts of the machine of FIGURES 1 and 2 in which the novel structure of the invention is incorporated, including the throat plate, feed dogs and presser foot, and

FIG. 4 is a side view of the thread cutting arrangement according to the invention, and

FIGURES 5 and 6 are side views of the presser foot and thread cutting arrangement according to the invention illustrating the operation of the arrangement.

The machine shown in FIGURES 1 and 2 is a commonly known machine of the type manufactured by Union Special Machine Company, Chicago, U.S.A. and disclosed in their catalog No. 103 N and will, therefore, only be described in very brief terms. Further disclosure and explanation of details of a machine of this type may be found in U.S. Patent 2,704,042, assigned to the above manufacturer, these disclosures being incorporated herein by reference.

As seen in FIGURE 1, the machine includes a main housing carrying at its left end the mechanism for performing the actual stitching operation at the location generally in the area of the throat plate 60 over which the material is passed, the material being held by a presser foot 68 on spring biased presser arm 66 against the throat plate and a feed dog projecting through the latter, as is more clearly described hereinafter.

The main housing shown in FIGURE 1 encloses most of the mechanically driven apparatus of the sewing machine for effecting stitching and feeding of the workpiece through the machine. At the top of FIGURE 1 is a tension post 10 carrying a pair of adjustable thread tensioning structures 12, including springs and thread gripping disks biased together by said springs.

As seen perhaps more clearly in FIGURE 2, the mechanical drive for the various moving parts of the machine is operated by means of a main crankshaft 14 driven, for example, by means of a pulley 16 from a motor-driven belt. The shaft 14 carries, in addition to a cooling fan 18, a plurality of eccentric crank pins to which are connected: a pitman 20 for the needle drive, a pitman 22 for driving the spreader or upper looper, a pitman 24 for the upper material-cutting knife drive, and a pitman 26 for the lower looper drive.

The pitman 22 longitudinally reciprocates the shaft 50 of the spreader or upper looper by way of a lever linkage pivoted on the shaft 44. The lower looper shaft 48 is similarly reciprocated longitudinally by pitman 26 through a lever linkage pivoted on shaft 46. The material cutter comprises the relatively stationary part at 56 and a movable blade 54 supported at the end of a shaft rocked by a linkage connected to pitman 24. The cutter blades at 54 and 56 trim the edge of the material just before it reaches the stitching area in its forward movement.

The left end of the shaft 14 carries an eccentric structure for reciprocating one or more feed bars of the feed dog driving mechanism for the usual up-and-back and down-and-forward movements of the feed dogs. The needle driving mechanism is operated by a pitman 20 to the upper end of which is connected a crank for rocking the shaft 28 on the end of which is an arm 30 carrying the needle 32. The needle driving arrangement is next adjacent the feed dog driving structure at the left end of the main shaft 14, but enclosed by the mechanism housing. The feed dog mechanism includes a main feed bar driving connection 34 including one or more eccentrics on shaft 14 providing reciprocating movement of the main feed bar 36 which carries the main feed dog 38 and the chain feed dog 40. The main feed dog 38 may be secured to the main feed bar 36 in a vertically adjustable position thereon by means of screws threaded into the bar 36 as seen in FIGURE 3. Moreover, the chain feed dog 40 may be secured to the main feed dog 38 by means of a screw passing through an aperture in the main feed dog and into a threaded aperture of the dog 40. In their assembled positions, the feed dogs 38 and 40 intermittently project upwardly through the apertured throat plate 60 and are simultaneously moved rearwardly therein for material feeding action.

The presser arm 66 is adjustably supported by the machine mechanism and carries at its forward end, by means of a pivotal connection 66*a*, 68*a*, the presser foot 68. The presser arm 66 is swingably secured to the left end of a shaft which can be rocked about its longitudinal horizontal axis by any suitable means such as a lever mechanism to raise the presser foot 68 from the material or to return it thereto by operation of a conventional foot treadle or knee press (not shown). In the material engaging position of the presser foot, the arm 66 is biased downwardly, for example, by bias of a spring on its rocking shaft, but the operating lever mechanism therefor must permit displacement of the foot 68 as material of different thicknesses moves between it and the throat plate 60.

The construction and mode of operation of the machine briefly described hereabove are well known to those skilled in the art and will, therefore, not be further described.

The present invention provides a simple and inexpensive thread cutting arrangement as illustrated in FIGURES 3 and 4.

This thread-cutting arrangement may comprise a cutting member 62 adjacent, detachably secured to, or forming a part of the chain feed dog 40 at the rear end thereof and coordinated for movement therewith. The cutting member 62 cooperates with a second cutting member 64 secured, preferably detachably, on or near the presser foot 68 at the lower forward end of the presser arm 66, but rearwardly of the foot 68.

This thread cutting arrangement comprises a cutting member 62 forming a part of the chain feed dog 40 adjacent the rear end thereof and a second cutting member 64 secured on the presser arm 66 at the lower end of which the presser foot 68 is supported.

As shown in the side view, FIGURE 4, the rear end of the cutting member 62 provides an edge 62*a* from which the top surface of the cutting member is sloping slightly downwardly in direction opposite the feeding direction. We have found that under certain circumstances the teeth of the chain feed dog will not be necessary, so that the entire chain feed dog may be in the form of a cutting member having its top surface sloping slightly from the rear edge.

The cutting member 62 is of a hard material, such as used in cutting tools and machine tools and may be in the form of a part of such material welded to, otherwise secured at the rear end of the chaining feed dog.

The secondary cutting member 64 has a portion 65 with a downwardly facing surface 67 normally engaging the top of the workpiece along the zone where the over edge stitches are made but arranged to be moved downwardly by the presser dog biasing means to engage with the edge 62*a* of the cutting member 62 when the workpiece has left the feed dog. Since the feed dogs reciprocably move the member 62, the edge 62*a* thereof will slide along the lower surface 67 of the member 65 at least during movement in the work feeding direction and thereby cut the thread by gnaw or fret action. Preferably the downwardly facing surface 67 is slightly inclined relatively to the horizontal plane to face slightly forwardly. The member 65 depends and is supported from an upwardly extending bracket arm 70 which is mounted, as by means of screws, on the presser arm 66.

As is well known the feed dogs travel in a closed path, moving rearwardly at an upper operative level and returning at a lower inoperative level below the surface of the throat plate 60. As shown in FIG. 5, while a work-piece *w* is travelling underneath the presser foot 68 the surface 67 of part 65 is held at a high inoperative position by the foot 68 resting on the work-piece, and the cutting edge 62*a* operating against the under-surface of the work-piece in the same way as the teeth of the feed dog. When a work-piece passes rearwardly from beneath the presser foot 68 the latter descends towards the throat plate 60, as shown in FIG. 6. The chain of stitches extending from the edge of the work-piece will then lie below the surface 67 of the member 64. In the rearward movement of the feed dog 40 the cutting edge 62*a* will slide along the lower surface 67 of member 65 and will gnaw through the chain.

It is within the scope of this invention to provide means whereby the height, or inclination (or both), of the part 65 may be adjusted relatively to the plane of the bottom surface of the presser foot 68. The height adjustment may be provided by constructing bracket 70 in two parts, an upper part being attached to the presser foot arm 66 and a lower part (which carries part 65) being adjustable vertically on the first part by means, for example, of a screw; desirably the lower part of the bracket is suitably guided. The adjustment for inclination may be provided by any suitable pivotal mounting.

In accordance with this invention, it will be apparent that the extent of the cutting edge 62*a* and the opposed cutting surface 67 at the presser foot must extend transversely of the work feeding direction a sufficient distance so that the threads carried rearwardly from the stitching area by the stitched work-piece will be at all times directed between these two cutting parts so that the aforementioned gnawing or fret action produces a severing of the threads.

It is known that in some machines of this type, there is a differential movement of more than one feed dog and, accordingly, it is within the spirit of this invention that the cutting edge 62*a* be provided at either of the feed dog structures rearwardly of the stitching area.

From the foregoing description of the invention which is merely given by way of example, it will be apparent that the simplicity of the thread cutting device not only involves invention in and of itself, but also in combination with the machine of the type in which it has been disclosed, such machine being already encumbered at the stitching area by numerous operating mechanisms posi-

tioned below, above, in front of and to one side of the stitching area. This inventive combination achieves an improved sewing machine accomplishing all of the aforementioned objects of the invention, as well as others which are obvious from the reading of the foregoing description.

While I have shown and described one embodiment in accordance with the present invention, it is understood that the same is not limited thereto, but is susceptible of many changes and modifications within the spirit and scope of the present invention and I, therefore, do not wish to be limited to the specific details described and shown herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. In a sewing machine having a workpiece supporting throat plate structure, a mechanism including a feed dog reciprocable in said throat plate for engaging and advancing a workpiece thereon in a predetermined path of movement and a presser foot having a smooth surface for holding the workpiece in engagement with said throat plate and feed dog, the combination therewith of a thread cutter means comprising a first cutting member arranged at one side of the path of movement of the workpiece and a second cutting member facing said first cutting member on the opposite side of said path of movement, and means for automatically moving said cutting members into engagement with each other after a workpiece has passed therebetween along said path of movement for severing superfluous stitching threads from said workpiece by mutual action of said cutting members, said last-mentioned means including a resiliently biased arm, said presser foot being pivotally supported on said arm.

2. Apparatus according to claim 1, wherein said first cutting member has a cutting edge extending transversely of the direction of work-piece movement through the machine and said second cutting member has a relatively flat surface, said means for moving said cutting members into engagement with each other including means for causing said mutual action, said action comprising a thread-gnawing movement of said cutting edge along said flat surface.

3. Apparatus according to claim 2, wherein said flat surface of said second cutting member is generally parallel to said cutting edge, but inclined, in the direction of workpiece feed, away from the cutting member having said cutting edge.

4. In a sewing machine apparatus of the over-edger type having stitch forming mechanism and loopers to make over-edge stitches comprising in combination with a presser foot means including a downwardly biased arm and a presser foot mounted on said arm and having a surface operable to engage the top surface of the work-piece, and a feed dog arrangement including a feed dog operating at the stitch zone of the work-piece and movable through an operative stroke at an upper level and returning through an inoperative stroke at a lower level: a member rigidly attached to said presser foot arm and having a downwardly facing surface behind said presser foot surface and a sharp edge of said feed dog pointing towards said surface during said operative stroke and operable to engage said surface of said member during the last part of said operative stroke when the work-piece has passed said presser foot whereby said sharp edge will gnaw through the stitch chain during said last part of the operative stroke of said feed dog across said surface.

5. A sewing machine apparatus having a stitch forming mechanism and loopers to make over-edge stitches comprising in combination with means for supporting the work-piece, presser means including a presser foot having a needle-receiving opening therein defining a stitch zone and operable for resiliently pressing against the top surface of the work-piece and adapted to be lowered in the direction of said supporting means when the work-piece has passed the presser means and a feed means operating at said stitch zone reciprocating through an upper operative stroke above said supporting means and through a lower inoperative stroke below said presser means: a cutting edge on said feed means, a cutting member rigidly secured to said presser means and having an inclined cutting surface, said presser means supporting said cutting member and said surface in a position above said cutting edge rearwardly of said stitch zone to enable the stitch chain to be engaged between said inclined cutting surface and said cutting edge during the last part of the operative stroke of said feed means when the presser means is lowered in the direction of the supporting means after passage of the work-piece, whereby said cutting edge will travel along said inclined surface and will gnaw through the stitch chain during said last part of the operative stroke, said presser means being pivotally mounted about a horizontal axis located a substantial distance rearwardly of said stitch zone, said presser means including an elongated arm structure extending between said axis and said cutting member.

6. An automatic device for severing the stitch chain on overedge sewing machines having work-piece feed means and a structure thereabove including a presser foot, comprising a first-cutting member on the feed means and a second-cutting member provided on said structure at the rear of the presser foot and coacting with the first-cutting member, the first-cutting member being provided with a sharp edge facing the second-cutting member, said second cutting member having on the side facing the first-cutting member an even flat surface which is located below the height of the bottom of the presser foot and along which the sharp edge of the first-cutting member grates when the work-piece has left the feed means so that the stitch chain is chewed through.

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