

[54] **THREAD-CUTTING MECHANISM FOR SEWING MACHINES**

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[56] **References Cited**

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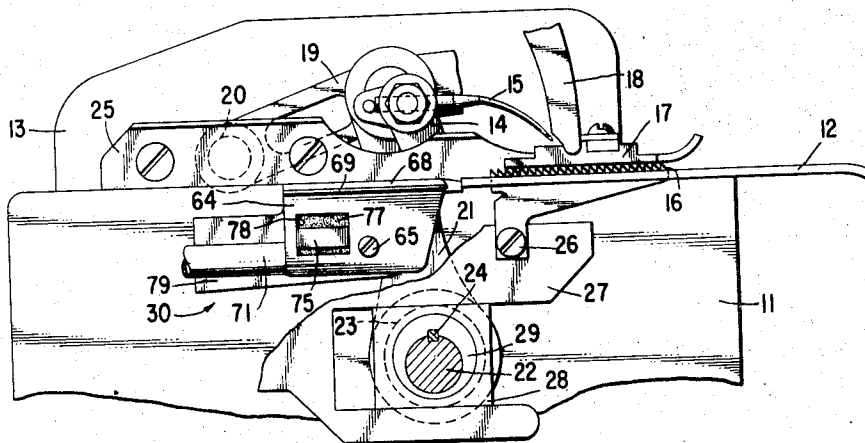
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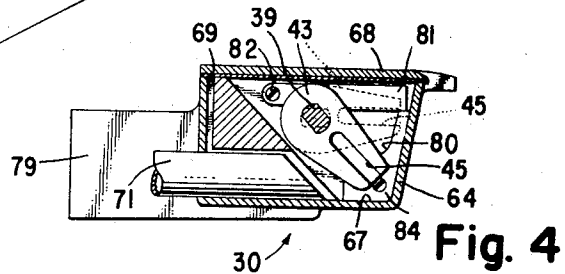
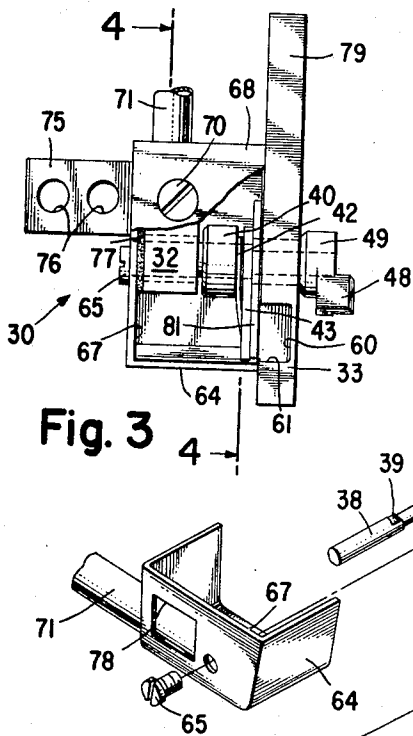
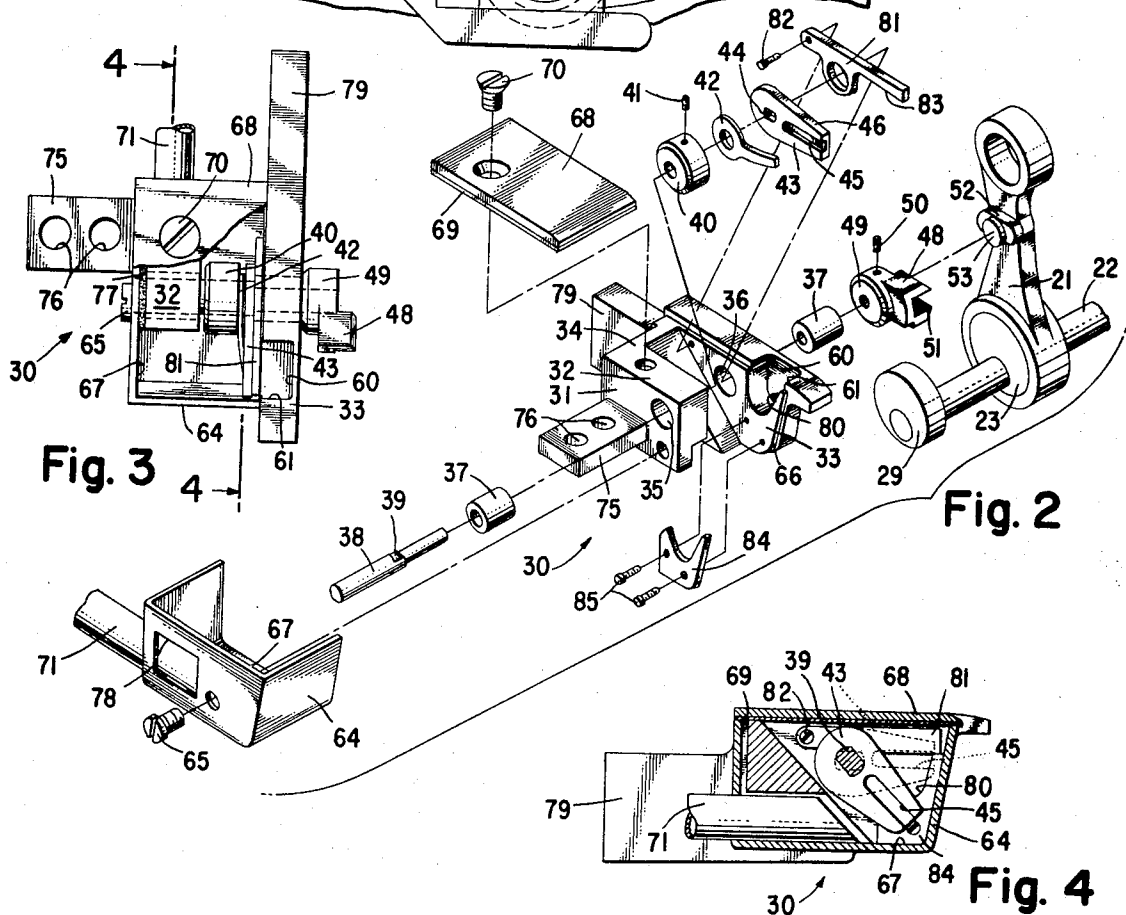
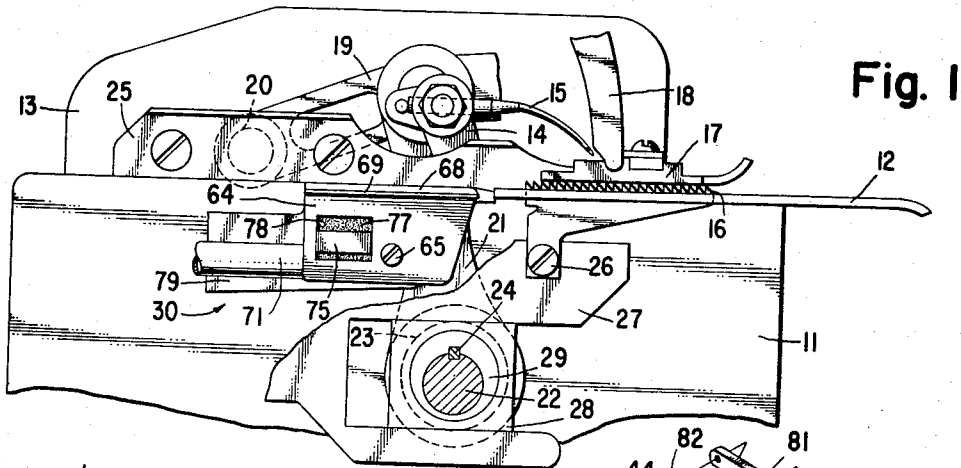
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[57] **ABSTRACT**

A thread-cutting mechanism for a sewing machine which employs a stream of air to carry the threads to the cutter and to remove the severed threads, and which is arranged periodically to interrupt the flow of air while the work feeding mechanism of the sewing machine is effective to cause variations in the air pressure in the thread-cutting device to facilitate movement of threads into the cutter without interfering with the transport of the work by the work feeding mechanism.

4 Claims, 4 Drawing Figures





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THREAD-CUTTING MECHANISM FOR SEWING MACHINES

BACKGROUND OF THE INVENTION

Thread severing mechanisms have been known heretofore to utilize a vacuum or flow of air caused by application of a suction to cause the threads which are desired to be severed to be drawn into position for influence by the cutter as well as to carry away the severed pieces of thread. A problem which arises with the known thread cutters using suction or air flow to move the thread, is that pockets of relatively calm air flow or backwash can form in which the thread or severed thread pieces can stagnate. This can lead to clogging of the cutter and it could result in accumulations of thread building up in the thread cutter which could clog the mechanism when such accumulations suddenly are caught up in the air stream.

Cutters are also known which utilize a vacuum or flow of air which is varied but not in relationship to the effective stroke of the work feeding mechanism of the machine. These known thread cutting mechanisms have the disadvantage that the transport of the work through the sewing machine can be disrupted by the thread cutter, particularly where light work fabrics are being sewn.

It is an object of this invention to provide a thread cutting device which is particularly adapted for severing thread chains produced on a sewing machine between successive sewn work pieces, and which utilizes the flow of air caused by the application of a suction to the thread-trimming device to carry the thread to the cutter and to carry the severed thread pieces away, and which includes means for interrupting the flow of air in the thread-cutting device while the sewing machine work feeding mechanism is effective to provide for advantageous transport of the threads through the thread-cutting device without adversely affecting transport of the work fabric. This object of the invention is attained by an arrangement in the thread-cutting mechanism of a thread inlet chamber and a thread outlet chamber to which air suction means communicates. The thread severing mechanism includes a vibrating thread cutting blade arranged alternately to open and close the passageway between the air inlet and air outlet compartments in response to a drive mechanism operated in timed relation with the sewing machine work feeding mechanism.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view, this invention will be described in detail below with reference to the accompanying drawings of a preferred embodiment in which:

FIG. 1 is an end elevational view partly in vertical cross-section of an overedge sewing machine having the thread cutting device of this invention applied thereto,

FIG. 2 is an exploded perspective view of the thread-cutting device of this invention,

FIG. 3 is a top plan view of the thread-cutting device with the top cover of the thread outlet chamber partly broken away to expose the mechanism therein, and

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

As shown in FIG. 1, the sewing machine of this invention is applied to an overedge sewing machine of the type which is described in detail in the U.S. Pat. No. 2,238,796, Apr. 15, 1941, to which reference may be had. This sewing machine includes a frame 11 which carries a work supporting cloth plate 12. A top cover or hood 13 on the machine frame houses operating mechanism including a needle carrier 14 to which a curved needle 15 is secured for forming stitches on a work fabric which is arranged on the cloth plate 12. A work feed dog 16 operates upwardly through the cloth plate to transport work fabrics being stitched from left to right as viewed in FIG. 1. The feed dog is opposed by a presser foot 17 carried by a presser lever 18 sustained by the machine frame. As is conventional in overedge sewing machines of the type illustrated in FIG. 1, mechanism is provided for trimming the work adjacent the stitching point, and to this end a work trimmer lever 19 is fulcrummed on a pin 20 in the machine frame and operatively connected to a driving pitman 21 which is operated by the main shaft 22 by way of an eccentric 23 secured to the main shaft by a key 24, with the eccentric being embraced by the pitman 21. A work guard 25 may be secured to the top cover 13 to protect the work fabrics being stitched from the operating mechanism.

The feed dog 16 is secured as by a fastening screw 26 to a feed bar 27 which straddles a slide block 28 which embraces a feed lift eccentric 29 secured on the sewing machine main shaft 22. As is known in the art, the feed dog is elevated into engagement with the work fabric during the feed stroke of the feed dog and the eccentrics 23 and 29 are preferably arranged to raise and lower the work trimming lever and feed dog simultaneously so that the work will be trimmed only while it is stationary between work feeding strokes of the feed dog.

The thread cutting device is indicated in the drawings generally at 30 and is best shown in FIG. 2. The thread trimming device comprises a body member 31 which is generally U-shaped with spaced arms 32 and 33 joined by a base portion 34. The spaced arms 32 and 33 are formed with aligned bores 35 and 36 which accommodate bushings 37 in which is journaled a thread cutter shaft 38 formed with a noncircular key section 39. Between the arms 32 and 33 of the body member 31, a collar 40 is secured on the cutter shaft by means of a set screw 41 for constraining a bowed spring 42 against a thread cutting knife 43. The knife is formed with a noncircular aperture 44 which embraces the noncircular key section 39 of the thread cutter shaft to lock the knife on the shaft. The knife is formed with a radial notch 45 to accommodate the bowed spring 42 and is also formed with a thread-cutting edge 46. At the opposite side of the body member arm 33 from the thread-cutting knife, the thread cutter shaft carries a cutter operating rock arm 48 having a hub 49 which is secured to the cutter shaft by a set screw 50. The cutter operating rock arm 48 is formed with a radial slot 51 which embraces a slide block 52 journaled on a pivot pin 53 carried by the driving pitman 21 and serves to impart oscillation to the thread-cutting knife 43 when the sewing machine is operated.

The arm 33 of the U-shaped body member 31 is formed with a thread inlet chamber 60 which is open

toward the inside of said arm and is formed with a thread inlet opening 61 at the top. A sheet metal enclosure 64, which is secured by a fastening screw 65 to the other arm 32 of the body member, is accommodated in a recessed seat 66 in the body member and provides a thread outlet chamber 67. The thread outlet chamber is closed at the top by a cover plate 68 which includes a gasket 69 and is secured to the body member by a fastening screw 70. Secured to the enclosure 64 is a conduit 71 which opens into the thread outlet chamber 67 and may be directed to any suitable source of negative air pressure so as to apply a substantially constant negative air pressure or suction to the thread outlet chamber 67.

The body member 31 may be formed with a mounting lug 75 having holes 76 for any suitable fastening devices. The sheet metal enclosure 64 may be formed with an opening for the mounting lug 75 and a gasket 78 may be provided for the purpose of sealing this opening in substantially airtight condition. Various other mounting facilities for securing the thread-cutting attachment to the sewing machine may be provided such as a mounting lug 79 extending rearwardly from the body member 31.

Since the thread inlet chamber 60 is open at the inside of the arm 33 of the body member 31, a passageway 80 is provided between the thread inlet and thread outlet chambers 60 and 67, respectively, on the inside of the arm 33. The passageway 80 is bordered by a ledger blade 81 arranged at the top of the passageway 80 and secured by a fastening screw 82 to the body member arm 33. The ledger blade is formed with a cutting edge 83 adapted to cooperate with the cutting edge 46 of the thread-cutting knife 43. The passageway 80 is bordered at the sides and bottom by a spacer plate 84 (FIG. 4), preferably of the same thickness as the ledger blade and secured to the body member arm 83 by screws 85.

In operation, the thread-cutting knife 43 will be oscillated during periods of operation of the sewing machine so as to move between the extreme positions illustrated in the solid and dotted line positions shown in FIG. 4, causing the opposing cutting edges 46 and 83 of the knife and ledger blades to cooperate in scissors fashion to sever any thread which may extend through the passageway 80. The oscillation of the thread-cutting knife will alternately open and close the passageway 80 as shown in FIG. 4, thereby causing the source of negative air pressure or suction to which the conduit 71 is connected to apply a varying negative pressure in both the thread outlet compartment 67 and in the thread inlet compartment 60. The effect of a fluctuating negative pressure in the thread inlet chamber 60 will be to encourage the introduction therein of thread extending from the stitch forming instrumentalities in the sewing machine as represented by the needle 15. During periods which the passageway 80 between the inlet and outlet chambers is open, the rush of air therethrough will carry such threads across both of the scissors type edges 46 and 83. The fluctuations in air pressure in the air outlet chamber 67 will encourage movement of the severed thread ends through the con-

duit 71 and to a thread end collecting means (not shown) which may be of any known type.

Since the eccentric 23 for operating the thread cutter and the eccentric 29 for lifting the feed dog are synchronized to lift their respective members at the same time, the flow of air through the thread-cutting device will be interrupted during the work feeding stroke of the work feed dog. As a result, the thread-cutting device will not draw work fabrics toward or into the thread inlet opening 61 during transport of the work fabric and the thread cutter will, therefore, not interfere with transport of the work fabrics.

Having set forth the nature of this invention, what is claimed herein is:

1. A mechanism for cutting the sewing threads of a sewing machine having a thread carrying stitch-forming mechanism, work feeding mechanism effective intermittently to transport work fabric relatively to said stitch-forming mechanism, and actuating mechanism for operating said stitch-forming and work feeding mechanisms in timed relation to form a line of stitches, said thread-cutting mechanism comprising a housing formed with an inlet chamber having a thread inlet opening disposed in the line of stitch formation, and a substantially airtight outlet chamber, a conduit connecting said outlet chamber with a source of negative air pressure, and a passageway extending between said air inlet chamber and said outlet chamber, a thread-cutting blade shiftably supported in said housing for severing movement in a path alternately opening and closing said passageway to provide for pulsation in the air pressure existent in both said air inlet and said outlet chambers for encouraging movement of threads therein, and drive mechanism for said thread-cutting blade operated by said sewing machine actuating mechanism and effective to shift said thread-cutting blade into a position closing said passageway during each effective period of operation of said work feeding mechanism.

2. A thread-cutting mechanism as set forth in claim 1 in which said work feeding mechanism includes a work feed dog and said actuating mechanism includes a feed lift eccentric for intermittently raising said feed dog into an effective work transporting position, and in which said driving means for said thread-cutting blade comprises an eccentric driven in synchronism with said feed lift eccentric.

3. A thread-cutting mechanism as set forth in claim 1 in which said passageway between said air inlet and outlet chambers is bounded by a ledger blade formed with a thread-cutting edge and by a spacer plate, said ledger blade and spacer plate having substantially coplanar outer surfaces against which said thread-cutting blade is supported for oscillatory movement.

4. A thread-cutting member as set forth in claim 1 in which said housing includes a U-shaped body member formed in the spaced apart arms, said outlet chamber encompassing the space between said arms, and said passageway being formed in one of said arms, said thread-cutting blade being supported between said arms and biased against a ledger blade secured to said body member area in which said passageway is formed.

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