

Sept. 9, 1969

TETSUO IIZUKA
METHOD AND APPARATUS FOR TREATING CLOTH-END
THREADS IN A SEWING MACHINE

3,465,702

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3 Sheets-Sheet 1

Fig. 1

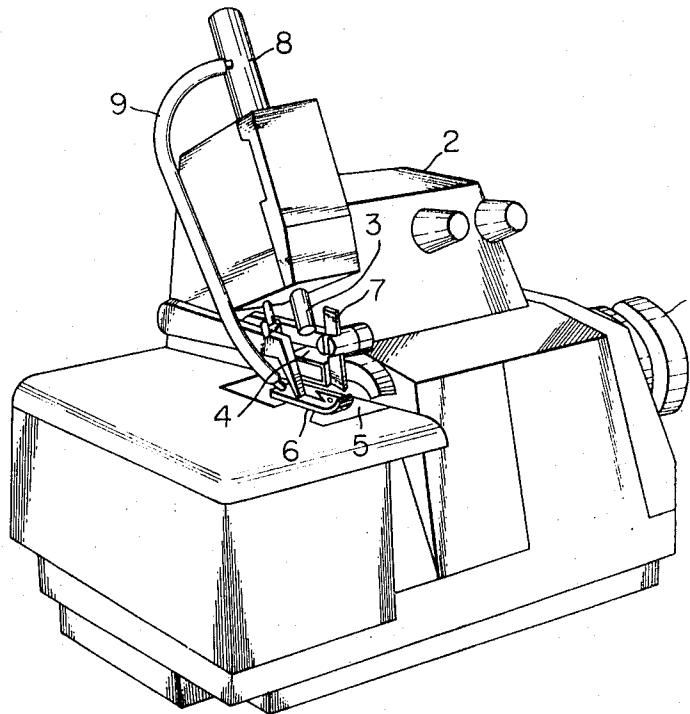
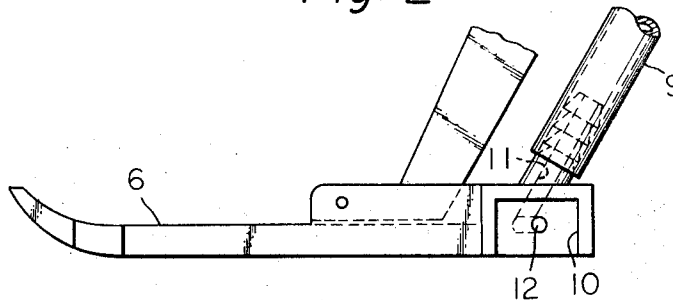


Fig. 2



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Fig. 3

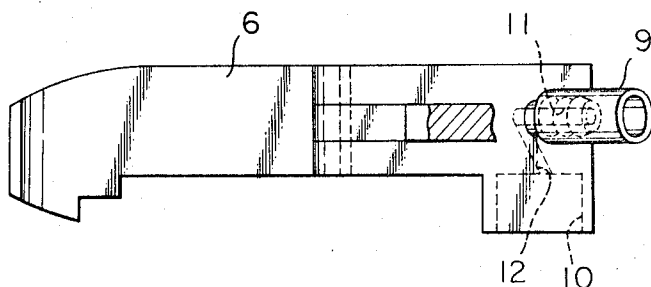
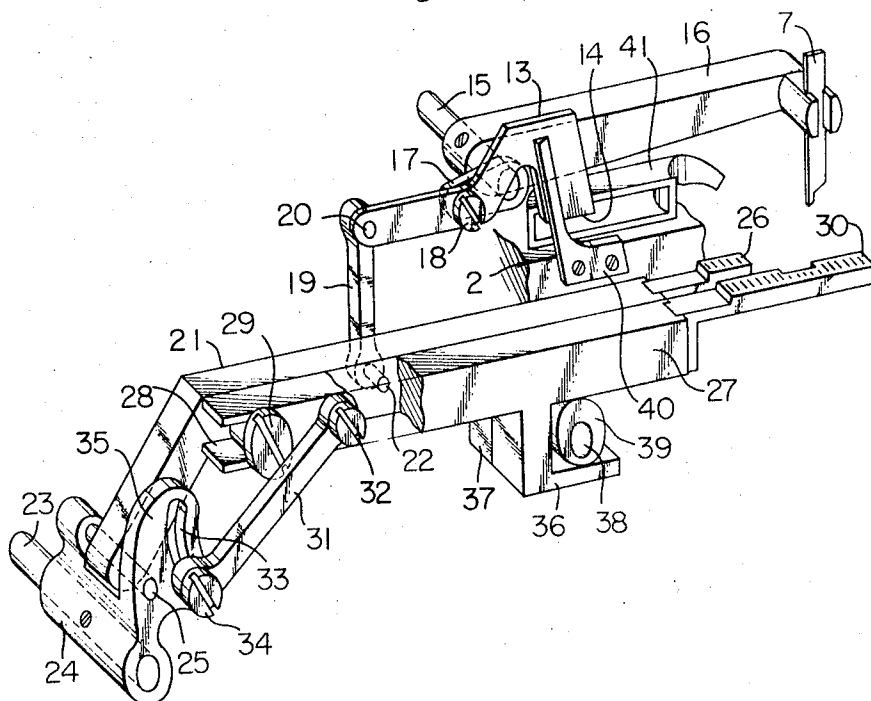


Fig. 4



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Fig. 5

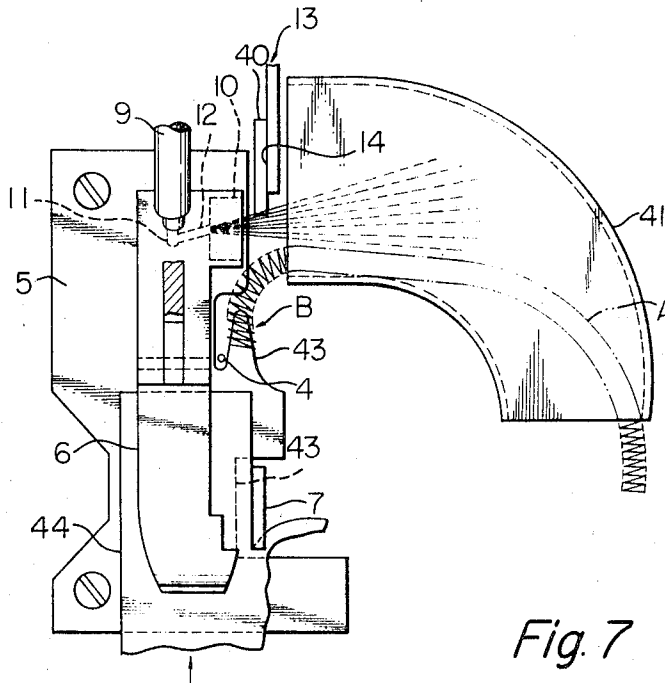


Fig. 7

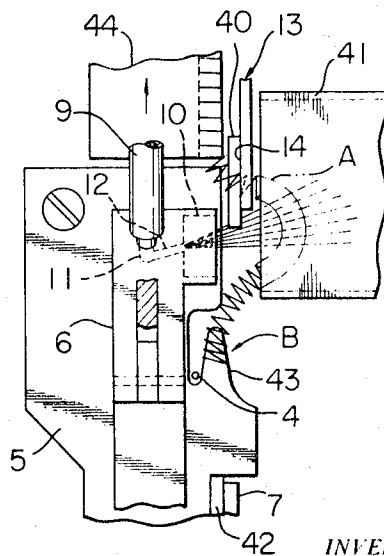
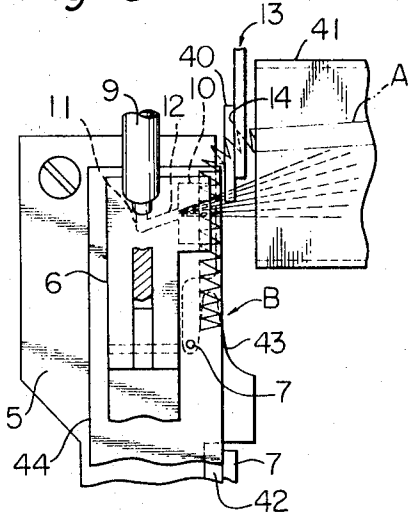


Fig. 6



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METHOD AND APPARATUS FOR TREATING CLOTH-END THREADS IN A SEWING MACHINE

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Int. Cl. D05b 65/06, 37/06

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1 Claim

ABSTRACT OF THE DISCLOSURE

An apparatus for treating cloth-end thread in a sewing machine which is stitching cloth fed along a linear line, by feeding cloth with air flow so that the seam crosses the thread cutting position rearward of the stitching position, and guiding it out of the machine. The apparatus has a feeding mechanism feeding cloth intermittently, a thread cutting mechanism and a guide tube open at one end toward the thread cutting mechanism and at the other end opening out of the machine so that the seam thread is continuously projecting at the fore and aft ends in the cloth feeding direction and crossing the thread cutting mechanism.

Background of the invention

This invention relates to an apparatus for treating cloth-end threads in a sewing machine and more particularly is directed to an apparatus for thread cutting in a sewing machine such as, for example, forming an overedge stitching seam of sewing threads even when the machine is unloaded or dead sewing.

Heretofore, there has been proposed an apparatus for cutting sewing threads cutting mechanisms which are provided in which the additional sewing threads are caused to flow by means of air in the feeding direction of the cloth which threads are continuously formed as the unloaded threads of seams by the operation of the sewing machine when dead sewing, i.e. sewing without cloth, or are formed at the forward and rearward ends of a cloth at the inlet of a tube the apparatus can cut the threads by means of a shearing blade or edge in cooperation with the operation of the machine. However, there are disadvantages such as the necessity of considerable space in addition to that for the sewing machine itself so as to make possible sufficient air flow to suck the threads into the tube until the threads are cut by means of the blade by flowing it across the blade resulting a complicated mechanism and high cost. It also shortens the life of the blade for cutting the threads since the blade cuts finely all the unloaded sewing threads and those at both ends of cloth together with the fine scraps of the threads produced, and when the sewing threads which are cut scatter from adjacent the cutting position for the threads or exhaust outlet of the tube those scraps adhere at the drive portion of the sewing machine to prevent driving the machine, or they contaminate the air at the work station and so on.

Summary of the invention

This invention eliminates the aforementioned disadvantages of the conventional apparatus for cutting finely all the sewing threads of a sewing machine, and provides a novel and improved apparatus for treating cloth-end threads in a sewing machine.

According to the present invention, there is provided an apparatus for treating cloth-end threads in a sewing machine having a feed mechanism for feeding cloth intermittently along a linear line, a seam forming mechanism

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including a needle with a thread and looper cooperating therewith, a thread cutting mechanism approaching parallel with the cloth end and across the cloth feeding direction to the rear in the cloth feeding direction of the seam forming mechanism, a guide tube open at one end toward an air flow and thread cutting mechanism and at the other end open toward the outside of the machine body, a compressor adapted to be driven in response to the up and down movement of a needle-bar, and an inverted U-shape member at the end of the guide tube which member has holes for ejecting the compressed air, whereby air flow cooperates with the cloth feeding between the thread cutting mechanism and the seam forming mechanism, the seam thread continuously coming in the cloth feeding direction crosses the thread cutting mechanism.

Preferably in the apparatus in accordance with the present invention, the overedge stitching seam is continuously formed from the seam forming position even when the rear end of the cloth fed by the cloth feeding mechanism between the upper surface of the needle-plate and the lower surface of the cloth-presser does not reach the seam forming position, the stitching edge of the cloth is cut by the cloth cutting mechanism so as to align the edges. The overedge stitching seam formed continuously even when no cloth is present is in turn fed out in the cloth feeding direction, but is blown into the guide tube before it arrives at the thread cutting mechanism by pressure of the air flow from the small hole provided so as to blow the compressed air through the guide tube without cutting and fed out continuously.

Preferably, when the cloth is fed to the seam forming position, the overedging seam is formed in the cloth, and when the cloth is fed, the overedge stitching seam not in the cloth at the rear end of the cloth advances in the direction perpendicular to that of the cloth feeding being carried by air flow. When the overedge stitching seam not in the cloth arrives at the threaded cutting mechanism, the overedge stitching seam following the rear end of the cloth is cut so that the continuous cut overedge stitching seam is blown out of the guide by air flow into a trash basket together with the waste cloth.

Therefore, one object of this invention is to provide an apparatus for treating cloth-end threads in a sewing machine by which it is prevented from scattering waste cloth to dirty the atmosphere in the work area.

Another object of this invention is to provide an apparatus for treating cloth-end threads in a sewing machine which is a simple mechanism and not expensive.

A still further object of this invention is to provide an apparatus for treating cloth-end threads in a sewing machine which apparatus has a long life.

Still another object of this invention is to provide an apparatus for treating cloth-end threads in a sewing machine which prevents fine waste cloth or threads from getting into the apparatus.

One feature of this invention resided in its means for causing the overedge stitching seam not in the cloth to be blown into the guide tube by air flow under pressure ejected from a point rearward of the cloth-presser, so that only the seam adjacent to the portion continuing fore and aft of the ends of the cloth is fed to the cloth cutting mechanism so as to cut it together with the overedge stitching seam not in the cloth is divided into fine portions without cutting in a state in which it is continuous and long so that the portions are blown out of the guide tube. The necessary air flow for blowing away the seam portion is easily obtained by utilizing the up and down movement of the needle-bar, so that the arrangement and mechanism are very simple and less expensive than the conventional machine which requires high pressure in order to suck up the seam.

Another feature of this invention is that only the overedge stitching seam beyond the forward and rearward ends of the cloth is cut at the continuing portion with the cloth, so that the life of the thread cutting mechanism is long compared with the conventional machine for cutting all the overedge stitching seams not in the cloth into fine portions.

A still further feature of this invention is that when overedge stitching seam threads are cut, they are all sucked into the guide tube and into a waste basket, so that they are prevented from getting into the wearing portion of the drive shaft to damage it and they are also prevented from scattering to dirty the atmosphere in the work area.

Other objects and advantages of this invention will further become apparent hereinafter, and from the drawings.

Brief description of the drawings

FIGURE 1 is an overall perspective view of an overedging sewing machine;

FIGURE 2 is a side view of a cloth-presser provided with a feed tube for compressed air from a compressor to the rearward thereof;

FIGURE 3 is a plan view of the presser of FIGURE 2;

FIGURE 4 is a perspective view of an embodiment of this invention showing operation of a thread cutting mechanism;

FIGURES 5, 6 and 7 are schematic plan views of the seam forming and thread cutting mechanism; FIGURE 5 shows the condition for dead or unloaded sewing, FIGURE 6 shows cutting threads disposed to the rearward of the end of the cloth, and FIGURE 7 shows cutting threads disposed forward of the end of the cloth.

Description of the preferred embodiment

Although specific forms of the invention have been selected for illustration in the drawings, and the following description is drawn in specific terms for the purpose of describing those forms of the invention, this description is not intended to limit the scope of the invention, which is defined in the claims.

Referring now to the drawings, and particularly to FIGURE 1, which shows a general overedge sewing machine as one embodiment of this invention, the sewing machine including an apparatus for treating cloth-end threads comprises a pulley 1 driven by power from a source of power, a hollow bracket arm 2, a needle-bar 3 held by the hollow arm 2 interlocked thereto, a needle 4 attached to the lowermost end of the needle-bar 3, a needle-plate 5, a cloth-presser 6, cloth cutting blade 7 for cutting the cloth prior to sewing it, a compressor 8 for producing compressed air in response to the up and down movement of the needle-bar 3, a feed tube 9 through which the compressed air is fed to a position to the rear of the cloth-presser 6.

Referring now to FIGURES 2 and 3, which show the cloth-presser provided with a feed tube for compressed air from a compressor to the rear thereof, the sewing machine comprises also an inverted U-shape member 10 provided at the rear end of the cloth-presser 6, a small hole 11 being provided inside of the tube 9 so that the compressed air flowing therethrough is ejected therefrom through a small hole 12 which opens within the inverted U-shape member 10 toward the open side thereof.

Referring to FIGURE 4, which shows a thread cutting mechanism, the sewing machine also comprises a thread cutting blade 13, an edge 14 provided at the end of the thread cutting blade 13, a shaft 15, an arm 16 being held integrally by the shaft 15 at one end, a flat mounting plate 17 to one end of which the cutting blade 13 is pivotally connected by means of the screw 18 and at the other end of which the shaft 15 is connected, a link 19 being connected at one end to the other end of cloth cutting blade 13 by a pin 20. A sub-feed station 21 has

the other end of the link 19 pivotally connected thereto by means of a pin 22, a shaft 23 being pivotally driven by and in response to the operation of the sewing machine, an arm 24 being fixedly secured to the shaft 23, a shaft 25 being connected to the arm 24. A sub-feed tooth 26 is provided at the other end of the sub-feed station 21, a main-feed station 27 including at one end a split-tail portion 28 being pivotally mounted on a screw 29 which screw is connected to the sub-feed station 21. At the other end are main-feed teeth 30, a link 31 having one end connected to the rear portion of the main-feed station 27 by means of screw 32 and the other end engaged with an arcuate slot 33 by means of a screw 34. The slot 33 is provided in a flat projecting portion 35 which is integral with the arm 24. Split portions 36 and 37 are provided on the underside of the main and sub-feed stations 27 and 20, respectively. A shaft 38 has eccentric cam 39 provided thereon and engaged between the split portions 36 and 37 so as to move them up and down. A fixed lower edge 40 for cutting the threads is opposed to the upper edge 13 which moves up and down, and a rectangular cross section guide tube 41 has an open end parallel with the cloth feeding direction adjacent to the seam forming position, which will be hereinafter described.

In operation, when the pulley 1 rotates the needle-bar held by the hollow arm 2 interlocked therewith moves up and down reciprocally and at the lower end of the needle-bar the needle 4 and a looper (not shown) provided inside of the arm 2 form overedge seams in the cloth inserted between the upper surface of the needle-plate 5 and the lower surface of cloth-presser 6. The cloth is fed by the cloth feeding mechanism, which moves the cloth along the upper surface of the needle-plate 5, and the end of the cloth which is aligned by cutting between needle-plate 5 and cloth feed cutting blade 7, is sewed. Although the mechanism is not shown at the top end of the needle-bar 3, the compressor 8 for producing compressed air in response to the up and down motion of the needle-bar 3 is provided, from which compressor the compressed air is caused to flow through the feed tube 9 to the rearward of the cloth-presser 6, where the inverted U-shape member 10 is provided. The feed tube 9 is formed so that the compressed air flowing therethrough is ejected from the small hole 11 provided inside the tube 9 and the small hole 12 open through the member 10 which is connected to the hole 11 through the inverted U-shaped member 10 and which opens toward the outside thereof.

The thread cutting blade 13 provided with the edge 14 at lower end thereof, as shown in FIGURE 4, is pivotally connected to one end of the flat mounting plate 17 by means of the screw 18, which plate projects from the shaft 15 which holds one end of the arm 16, to the other end of which cloth cutting blade is connected. The shaft 15 pivots back and forth constantly in response to the operation of the sewing machine. One end of the sub-feed station 21 is held inside the arm 2. The lower edge 40 operates to shear the thread cooperating with the upper edge 14 which is reciprocally rocked by movement of the thread cutting blade 13. To the arm 2 is secured the rectangular guide tube 41 which has one end opening parallel with the cloth feeding direction adjacent to the seam forming position, which will hereinafter be described.

Referring now to FIGURES 5, 6 and 7, which show the seam forming and thread cutting mechanism, the guide tube 41 is secured to the hollow arm 2 which tube opens at one end parallel with the cloth feeding direction adjacent to the seam at which is formed position B forming overedging seam A by the cooperation of the needle 4, looper (not shown) and the tongue 43 of the needle-plate 5, etc. as well as to the shearing portion of the upper edge 14 of the thread cutting blade 13 and lower edge 40. At the other end the tube 41 opens at the front outside of the arm 2. As shown in FIGURE 6, to the needle-plate 5 is

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fixed the lower edge 42 for cutting cloth which operates to shear in cooperation with the cloth cutting blade 7. The position and direction for ejecting compressed air from the small hole 12 of the cloth-presser 6 is horizontally intermediate the seam forming position B and the shearing position between the upper edge 13 of the thread cutting blade 14 and lower edge 40 (as shown in FIGURE 5) so that it is disposed to eject into the guide tube 41.

The constitution of the present invention is as aforementioned. When the pulley 1 rotates, the needle-bar 3 moves up and down so that the overedge stitching seam A is formed by the needle 4, looper and tongue 43. The compressed air produced by the pump 8 by means of the up and down movement of the needle-bar 3 is horizontally ejected toward the opening of the guide tube 41 through the tube 9 and small hole 11 of the cloth presser 6 from the small hole 12 between the upper edge 13 of the thread cutting blade 14 and lower edge 40. The arm 24 rocked by the rocking operation of the horizontal shaft 23, horizontally reciprocates the sub-feed station 21 and its sub-feed teeth 26, and through the link 35 reciprocates main-feed station 27 and its main-feed teeth 30. The main and sub-feed stations 21 and 27 together move up and down by the rotation of the eccentric cam 39 inserted between the split portions 36 and 37 thereof, and by their horizontal reciprocating motion, and up and down movement the main and sub-feed teeth 30 and 26 move generally elliptically so that by the horizontal motion during the time they project above the upper surface of the needle-plate 5 cloth 44 inserted between the upper surface of the needle-plate 5 and lower surface of the cloth-presser 6 is fed toward the upper and lower edges 14 and 40. By means of the reciprocally rocking blade shaft 14 the arm 16 is constantly rocking so that by the shearing operation of the cloth cutting blade 7 at its end and lower edge 43 on the needle-plate 5 for cutting cloth the stitching edge of the cloth 44 is cut to align its edges. Further, the thread cutting blade 14 is so disposed that during up and down motion by the eccentric cam 39 when the blade shaft 15 rocks counterclockwise the main and sub-feed stations 27 and 21 raise, and on the contrary, when the blade shaft 15 rocks clockwise they lower. When the blade shaft 15 rocks counterclockwise together with mounting portion 17 so that the sub-feed station 21 raises, the thread cutting blade 14 rocks clockwise around the stepped screw 18 as a center so that the upper edge 13 and lower edge 40 operate to shear. On the contrary, when the blade shaft 15 rocks clockwise together with the mounting portion 17 so that the sub-feed station 21 is lowered, the thread cutting blade 14 rocks counterclockwise around the stepped screw 18 as a center so that its upper edge 13 raises upwards from the lower edge 40. These motions will be repeated continuously.

As aforementioned the sewing machine operates, and the overedge stitching seam A is continuously formed at the seam forming position B even when there is no cloth present. As the rear end of the cloth 44 is fed by the main and sub-feed teeth 30 and 26 between the upper surface of the needle-plate 5 and the lower surface of the cloth-presser 6, although it at first does not reach the seam forming position B, the stitching edge of the cloth 44 is cut by the cloth cutting blade 7 moving up and down and lower edge 42 so as to align the edges. The overedge stitching seam A formed continuously is in turn fed out in the cloth feeding direction, but is blown into the guide tube 42 before it arrives at the shearing portion between the upper edge 13 of the thread cutting blade 12 and lower edge 40 by pressure of the air flow ejecting from the small hole 12 of the cloth-presser 6, passing through the guide tube 41 without being cut and being fed out continuously forward of the arm 2.

Next, when the cloth 44 reaches the seam forming position, the overedge seam A is formed in the cloth 44 the edges of which are aligned, and when the cloth 44 is

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fed, the overedge stitching seam A previously formed outside the cloth at the rear end of the cloth 44 advances in the direction perpendicular to that of the cloth feeding due to the air flow. When the overedge stitching seam A not in the cloth arrives at the shearing portion of the upper edge 13 of the thread cutting blade 14 and lower edge 40 performing the shearing action continuously as shown in FIGURE 6, the overedge stitching seam A not in the cloth at the rear end of the cloth 44 is cut so that the cut off overedge stitching seam A is blown out of the inside of the guide 42 by air flow forward of the sewing machine and into a trash basket together with the waste cloth, etc.

Furthermore, when the over stitching of the right end of the cloth 44 is completed so that the cloth 44 reaches the position where it is not subject to the cloth feeding action by means of the main and sub-feed teeth 39 and 26 as shown in FIGURE 7, since the overedge stitching seam A continues to be formed as a continuation of the overedge stitching seam at the forward end of the cloth 44 even if the cloth 44 is no longer present, the overedge stitching seam A not in the cloth disposed between the forward end of the cloth 44 and seam forming position B gradually increases its length and forms slack, the slack being blown into the guide tube 42 by the air flow. When the overedge stitching seam A not in the cloth extending from the forward end of the cloth 44 crosses the shearing portion of the upper edge 13 of the thread cutting blade 14 and lower edge 40 which are continuously shearing, the overedge stitching seam A not in the cloth and extending from the forward end of the cloth 44 is cut so that the cut overedge stitching seam is blown into the guide tube 42 by the air flow as shown in FIGURE 5 so as to be fed out continuously at the forward end of the arm 2.

As aforesaid, since the present invention provides the means for blowing the cut off overedge stitching seam into the guide tube by the air flow under pressure ejected at a position rearward of the cloth-presser, only the seam adjacent to the portion extending from the fore and aft ends of the cloth is fed to the shearing portion of the thread cutting blade so as to be cut. The overedge stitching seam not in the cloth is divided into fine portions so that they are blown out from inside the guide tube. Due to the easy obtainability of the air flow for blowing away the seam by utilizing the up and down movement of the needle-bar, the arrangement and mechanism are very simple and less expensive than the conventional system for requiring high pressure in order to suck the seam up. Also, inasmuch as only the overedge stitching seam extending from the forward and rearward ends of the cloth is cut, the life of the thread cutting blade becomes long compared with the conventional system for cutting all the overedge stitching seam not in the cloth into fine portions. In addition since the cutting fine waste threads of the stitching thread not in the cloth are not produced, the sewing machine is protected from them getting into the drive shaft bearings, etc., and the waste threads are not scattered to dirty the atmosphere in the work area.

Although in the aforementioned embodiment the ejecting opening of the compressed air is provided at the cloth-presser, it will be easily understood that a nozzle, etc., separate from the cloth-presser can be provided to obtain the same effect. Though in the aforesaid embodiment the compressed air is produced by utilizing the up and down movement of the needle-bar, it will be easily understood that compressed air can be obtained by utilizing any other drive portion of the sewing machine or a separate compressor from the sewing machine.

What is claimed is:

1. In a sewing machine for continuously forming an overedge stitching seam line at the edge of a cloth, said machine having a needle mechanism movable vertically with a thread therein, means for compressing air coupled to said needle bar and actuated by the vertical movement

of the needle bar, means for feeding a cloth intermittently in synchronization with the movement of the needle mechanism, and a rockable looper mechanism along a straight line therebetween; an apparatus for treating the seam end threads comprising:

- a cloth cutting mechanism having a cutter movable vertically and reciprocally across the plane of the cloth for cutting the end of the cloth along a line on which the seam line is to be formed, said cloth cutting mechanism being upstream, in the cloth feeding direction, from the needle and rockable looper mechanism, and a reciprocating rotating shaft coupled to said cutter for moving it;
- a thread cutting mechanism having a fixed cutter and a movable cutter movable vertically and reciprocally and cooperating with said fixed cutter, said movable cutter being coupled to said shaft for operating said cloth cutting mechanism, said cutters being positioned parallel with the cloth end at the downstream, in the cloth feeding direction, from the needle and rockable looper mechanism;
- a cloth presser having a port therein directed horizontally and coupled to said means for compressing air for ejecting a stream of compressed gas produced by the elevational movement of a needle bar, the stream of gas being directed across the cloth feeding direction intermediate the needle mechanism and rockable looper mechanism and the thread cutting mechanism; and

a guide tube opening at one end opposite said port in said cloth presser adjacent to the thread cutting mechanism and opening outside the sewing machine at the other end, whereby the continuous seam thread projecting from the forward and rearward of the end of the cloth in the cloth feeding direction is moved across the thread cutting mechanism and is cut and is blown into the guide tube and exhausted out of the sewing machine.

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